

ALY6080 Integrated Experiential Learning

Module 12: Capstone Project Final Report

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Submission Date: 27th November 2024

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**Introduction**

Plastic pollution has emerged as a critical global challenge, with over 300 million tons of plastic produced annually and less than 10% of it being recycled. This overwhelming plastic waste is not only choking ecosystems but also posing significant threats to public health and economic stability worldwide. In Canada, the issue is particularly pressing, as the widespread use and improper disposal of plastic waste continue to degrade the environment, disrupt wildlife habitats, and burden municipal waste management systems. Addressing this crisis requires a multi-faceted approach that combines education, community engagement, and legislative reforms to transition toward a sustainable, circular economy.

Recognizing the urgency of this issue, *Mind Your Plastic (MYP)* has taken a proactive stance in combating plastic pollution across Canada. Through its flagship initiative, the **Circular Economy Ambassador Program (CEAP)**, MYP aims to create a generation of environmentally conscious individuals empowered to make a difference. The program stands as a comprehensive solution, blending education, hands-on community action, and data-driven advocacy to inspire and enable change at both local and national levels.

At its core, CEAP integrates four transformative phases designed to connect theoretical learning with practical application:

1. **Empowering Through Education**  
   Teachers participating in CEAP receive a carefully crafted curriculum tailored to various age groups, providing a foundation in understanding plastic pollution and the environmental consequences of linear consumption models. This phase fosters an experiential learning environment where students explore the principles of the circular economy and develop a deeper appreciation for sustainable living practices.
2. **Acting Locally**  
   Moving beyond the classroom, students and teachers engage in community-based cleanups, collecting, categorizing, and analysing waste. Armed with reusable bags and gloves provided by MYP, participants follow municipal waste management guidelines to ensure responsible handling. This phase encourages critical thinking and solution-oriented discussions around reducing pollution in their neighbourhoods, such as advocating for more public trash bins or supporting the adoption of reusable products by local businesses.
3. **Driving Change Through Innovation**  
   CEAP emphasizes problem-solving by encouraging students to perform waste audits at home or in their communities. Students are challenged to identify areas for improvement and recommend actionable changes, such as transitioning to sustainable alternatives or working with businesses to minimize waste. By involving families and local stakeholders, this phase builds a collaborative network that reinforces the importance of collective responsibility.
4. **Building for the Future**  
   The program doesn’t end with cleanup efforts. Data collected during the cleanup phase is meticulously recorded and added to two national databases—*Mind Your Plastic* and *National Shoreline Cleanup*. This information serves as a valuable resource to identify pollution trends, measure program impact, and support policy advocacy. By highlighting evidence-backed insights, CEAP strengthens its case for influencing municipal regulations and long-term waste management strategies.

The **Circular Economy Ambassador Program** sets itself apart by transforming passive learning into active engagement. It creates a ripple effect that begins in classrooms and extends to communities, households, and policymakers. By equipping young Canadians with the knowledge, tools, and motivation to tackle plastic pollution, MYP is fostering a culture of environmental stewardship that will help Canada transition toward a more sustainable, plastic-free future.

Through CEAP, *Mind Your Plastic* is not just addressing an environmental issue but also empowering a new generation of change-makers. By bridging the gap between awareness and action, the program ensures that today’s youth are prepared to lead the fight against plastic pollution, making a tangible impact on Canada’s journey toward sustainability.

**Executive Summary of Dataset**

The Circular Economy Ambassador Program (CEAP), launched by Mind Your Plastic (MYP) in 2021, continues to make significant strides in promoting circularity and reducing plastic pollution through education and hands-on participation. In 2024, the program saw remarkable growth, with 3,624 students participating nationwide, a nearly twofold increase compared to 2022/2023, where 1,880 students were involved. This continued growth is a testament to the program’s effectiveness in fostering environmental stewardship among youth across Canada.

As of 2024, the CEAP program had attracted participants from across 12 provinces and territories. The highest number of participants came from Ontario (1,182), New Brunswick (1,022), and Saskatchewan (783). These provinces contributed significantly to the overall participant count of 5,747 students since the program’s inception. This widespread participation highlights the program's national reach and its ability to engage youth from diverse geographical regions, reinforcing the importance of community-driven environmental action.

In terms of waste collection, the overall program participants successfully collected a total of 30,450 waste items, with 79.59% categorized as single-use items, 18.34% as reusable, and 1.75% as organic waste. A small portion, 0.32%, remained classified as unknown. The predominance of single-use plastics remains a challenge, emphasizing the urgent need for alternatives and more sustainable product designs.

Breakdown of Key Items Collected

The most common items collected in throughout the three years include:

* Bottle caps (786 items, 2.58% of the total),
* Aluminum/Tin Foil (637 items, 2.09%),
* Various small plastic and non-recyclable items that continue to contribute to litter, such as 6-pack rings and cigarette butts.

Program Insights and Future Recommendations

The data from 2024 reaffirms that most waste collected remains recyclable, suggesting that a circular economy approach—reusing waste as a resource—is key to minimizing environmental impacts. To further this mission, the CEAP program encourages the adoption of sustainable alternatives to single-use plastics and a more extensive public education campaign. Additionally, the involvement of students in this program has proven instrumental in advocating for policy changes at the municipal level, including the ban of single-use plastics in local communities.

To enhance the impact of these efforts, MYP recommends:

* Further integration of environmental education in school curricula,
* Collaboration with industries to improve sustainable product designs,
* Strengthened government regulations on packaging materials,
* Enhanced litter monitoring and increased fines for violations,
* Expanded extended producer responsibility programs, and
* Installation of more effective waste disposal infrastructure in public areas.

By adopting these recommendations, there is hope for a significant reduction in plastic pollution and a shift toward more sustainable behaviours across all sectors of society. The engagement and leadership of Canadian youth through the CEAP program continue to demonstrate that meaningful environmental change is possible.

**What are the Issues?**

The issue of plastic waste in Canada is immense, with over **3 million tonnes** of plastic being discarded each year. Of this, only **9%** is recycled, leaving the majority to end up in landfills, waste-to-energy facilities, or the environment. This unregulated disposal of plastic waste is a serious environmental concern, as it heavily impacts the health of ecosystems, including wildlife, rivers, lakes, and oceans. As Canada is home to the world’s longest coastline and one-quarter of the globe’s freshwater, the country holds a unique responsibility in tackling plastic pollution. The presence of plastic waste in these natural environments harms biodiversity and contributes to long-term environmental degradation, which also places a financial burden on the economy, particularly on industries such as tourism and fishing.

A critical factor contributing to the plastic pollution problem is the lack of access to waste collection services on a global scale. Approximately **67% of the global population** does not have access to basic waste collection, which exacerbates the accumulation of unmanaged plastic waste in developing countries. Without improving waste management infrastructure worldwide, the plastic pollution problem will continue to worsen.

Inconsistent plastic waste tracking standards across Canada's provinces further complicate efforts to address plastic waste. The federal government recently announced the introduction of a national plastic registry to track the production and disposal of plastic, aiming to replace inconsistent provincial programs. This move marks an important step toward creating a unified national standard to manage plastic waste effectively, but more comprehensive measures are needed to significantly improve recycling rates and reduce plastic waste.

Single-use plastics remain one of the most prominent contributors to plastic waste in Canada. Efforts have been made to curb the use of items like plastic straws and bags, but the debate on how to best tackle single-use plastics continues. Addressing plastic pollution requires a more holistic approach that covers the entire lifecycle of plastics, from production to disposal. The ongoing negotiations among **176 countries**, currently taking place in Ottawa, represent a significant opportunity to establish a global treaty to combat plastic waste. Experts believe that this is a critical moment for international collaboration, as failure to act could result in further environmental damage. The treaty aims to regulate plastics throughout their lifecycle and bring global consistency to efforts to curb plastic waste.

In conclusion, Canada, with its unique environmental assets, has a crucial role to play in the fight against plastic pollution. Urgent action is needed at both the national and global levels to implement sustainable practices that will reduce plastic waste, improve waste management infrastructure, and promote circular economy principles. By collaborating with all levels of government, industry, and citizens, a zero-plastic waste future can be achieved, keeping plastics in the economy and out of the environment.

**Current Government Actions**

Canada has been actively addressing the challenge of marine litter and plastic waste through a variety of initiatives and regulatory measures aimed at mitigating pollution and promoting a circular economy. Marine litter, which consists predominantly of plastics (about 80% to 90%), severely impacts the environment, particularly in Canada's freshwater and marine ecosystems. It is estimated that around **29,000 tonnes** of plastic waste were littered in the Canadian environment in 2016 alone, with **10,000 tonnes** entering the Great Lakes annually from both Canada and the United States. This waste, often in the form of fishing gear, packaging, and microplastics, threatens wildlife, damages ecosystems, and contributes to the contamination of natural habitats.

To combat this, Canada has facilitated efforts like the **Great Canadian Shoreline Cleanup**, where over 800,000 volunteers have removed more than **1.3 million kilograms** of trash from shorelines. The most common types of litter collected include cigarette butts, food wrappers, plastic bottles, and other short-lived plastic products, highlighting the significant role single-use plastics play in pollution.

In response to this pressing issue, the Canadian government has committed to a **Zero Plastic Waste Agenda** that focuses on collaboration across multiple sectors—including governments, industry, non-government organizations, and the public. This agenda emphasizes reducing plastic pollution by developing national regulations, standards, and targets aimed at keeping plastics in the economy and out of the environment. Canada's **Greening Government Strategy** is another key initiative driving change, as it seeks to eliminate unnecessary single-use plastics within federal operations by **2030**, while ensuring at least **75%** of plastic waste from government activities is diverted from landfills.

Central to the government’s efforts is the transition toward a **circular economy**, a system where products are designed for reuse, repair, or recycling. This approach moves away from the traditional "take-make-waste" model and envisions a future where plastics and other materials remain in circulation for as long as possible, reducing both environmental and economic costs. Canada aims to generate billions in revenue and create up to **42,000 jobs by 2030** through circular economy initiatives. One important step is advancing **value-retention processes (VRPs)** such as refurbishment and reuse, which retain the economic value of products while reducing waste.

Additionally, **science and research** play a pivotal role in shaping the government's plastic pollution policies. Canada has released frameworks like the **Plastics Science Agenda (CaPSA)** and the **Science Assessment of Plastic Pollution** to guide future research investments and inform decision-making. These initiatives identify knowledge gaps, encourage innovation, and track progress in reducing plastic pollution. To foster innovation, the government launched the **Canadian Plastics Innovation Challenges (CPIC)**, providing nearly **$19 million** in funding to small and medium-sized enterprises developing technological solutions to address plastic waste. This initiative supports innovators in creating sustainable alternatives and reducing reliance on plastics, with grants of up to **$150,000** for concept development and up to **$1 million** for prototypes.

Through these comprehensive actions—ranging from regulatory measures to innovation funding and public education campaigns—Canada is positioning itself as a global leader in addressing plastic pollution and advocating for a sustainable, zero plastic waste future.

**CEAP – Cleanup**

Sign-ups for the **third year** of the CEAP program opened in the spring of **2024**. Teachers filled out an online sign-up form to confirm their participation in the 2024 CEAP program. In September of 2024, teachers received digital education resources, personalized instructions on how to fulfill the cleanup effectively with their students within their municipalities, and physical supplies such as t-shirts, reusable gloves, and waste bags. To participate in the CEAP program, teachers had tasks to be fulfilled before, during, and after conducting their cleanups.

**Pre-Cleanup Tasks**

1. Introduce the plastic pollution issue to their students using digital educational materials that included a PowerPoint lesson.
2. Identify a location and date for the cleanup and determine if permits were necessary for their cleanup location, using the personalized guidelines provided by MYP.
3. Students complete a pre-cleanup survey that assesses their level of understanding of the topic of plastic pollution and the circular economy.

**During the Cleanup Tasks**

1. Complete the Data Tally Sheet by recording the counts of all the items that were collected by their students.
2. Complete the Location Data Sheet by noting the different businesses, activities, and structures present within and around their cleanup location.
3. Complete the Sorting and Diverting Data Sheet by documenting the estimated weights of the different types of waste collected.
4. Take pictures/videos of the cleanup itself and/or students.

**Post-Cleanup Tasks**

1. Students complete a post-program completion survey that assesses their knowledge on the topic of plastic pollution and a circular economy.
2. Email MYP all the completed data sheets, waivers, photos, and videos.

**Data Analysis**

The analysis of the waste collected during cleanups was carried out using item counts and proportions derived from the datasheets submitted by teachers and students from participating schools. These datasheets included the Location, Sorting and Diverting, and Data Tally Sheets. Since some schools did not provide the estimated weights of the collected waste, weight analysis was not included. Additional research on the geographical locations was conducted using Google Maps, while data calculations and organization were managed in Google Sheets, which involved creating pivot tables and generating charts and visuals. Each datasheet tracked various aspects of the cleanup to enable a comprehensive analysis of the collected waste.

Participating Schools Sheet

The CEAP participation data includes several key variables tracked across three separate sheets for each year: **2021**, **2022/2023**, and **2024**. One of the key variables is the **province**, representing the location of the participating schools. However, there were inconsistencies across the sheets regarding province names—some sheets used two-letter abbreviations (e.g., "ON" for Ontario), while others spelled out the full name. To analysis, we standardized the province names for consistency. The **school** variable lists participating schools such as **Bell's High School**. For the **Participants Signed Up** variable, since many teachers did not provide final participant numbers, it was assumed that all signed-up participants took part in the program, and this number was used for calculations. Other variables, such as **Waivers Signed**, **Pre-Survey Fulfilled**, and **Post-Survey Fulfilled**, were similarly standardized and analysed to ensure a comprehensive evaluation of the program.

Location Data

The location data for the CEAP cleanups involves several key variables used to record details about the cleanup efforts. Each participating **Group/School** is identified by name, such as **Hiltop High School** or **Christopher Lake Public School**, along with the **province** where the school is located (e.g., **Alberta** or **Ontario**). The **Group Subject** refers to the subject taught by the participating teacher, such as **Science**. The **Date of Cleanup** records when the cleanup occurred, while the **Area Name** captures the specific location, such as **Whitecourt** or **Cambridge**. Geographical coordinates, including **Latitude** and **Longitude**, are recorded in decimal degree format to specify the cleanup location. Additional location details include whether there were **Restaurants**, **Supermarkets**, **Storm Drainage**, **Recycling Facilities**, and **Roads** near the site, with possible values of **Yes** or **No**. Lastly, the data includes the total **Distance Cleaned** by the group, measured in kilometres, and any other significant activities noted during the cleanup.

Tally Sheet

The **Tally Sheet** is the central focus for analysing the waste collected during CEAP cleanups. It records a variety of key details, starting with the **Cleanup Date**, which indicates when the cleanup took place, and the **Cleanup Type**, which categorizes the location as either School Property, Park, Beach, Neighbourhood, Hospital Grounds, or Other. Additionally, the **Cleanup Area**, **School Name**, **Group Name**, and the specific **City** and **Province** where the cleanup occurred are noted to provide geographic context. The focus of the tally sheet is to categorize the waste items into 14 pre-defined categories such as **Cigarette Butts**, **Cans**, **Plastic Bags**, **Styrofoam Pieces**, and others, with a separate category for **Miscellaneous** items that do not fit into the predefined categories.

Each waste item is further described with details such as **Quantity**, **Date Marking**, **Color**, and **Material Composition** (e.g., Plastic, Glass, Wood), along with the **Type of Plastic** where applicable (e.g., Polypropylene, Polystyrene). Descriptions and sizes of larger or notable items are recorded, and additional **Other Details** provide any extra observations about the collected waste. Finally, each item is classified as **Garbage**, **Recyclable**, **Compost**, or **Unknown**, and assigned a lifecycle designation of **Single-Use**, **Reusable**, **Organic**, or **Unknown**. This comprehensive record forms the backbone of the waste analysis, allowing for an in-depth understanding of the types of waste collected and their environmental implications, serving as a vital tool for informing cleanup strategies and waste reduction efforts.

**Table 1: Data Tally Sheet – List of Collected Items within established categories**

|  |  |
| --- | --- |
| Categories | Items |
| Bottle | Plastic Bottle |
| Cans | Can  Can tab |
| Cigarette Butts | Cigarette Butts |
| Commonly Found Items | 6-pack rings  Bottle caps  Bread tags  Can tab  Feminine Hygiene products  Hair elastics  Paper  Plastic cutlery  Rubber bands  Steel/Aluminium bottle caps  Straws  Wipes |
| Cups | Cold Drink Cup  Hot Drink Cup  Type 5 Plastic  Type 6 Plastic |
| Facemasks | Disposable Face Mask  Reusable Face Mask |
| Food packaging | Food packaging |
| Glass | Glass Bottle  Glass Pieces/Fragments |
| Lids | Cold Drink Lids  Hot Drink Lids |
| Miscellaneous | Aluminium/ Tin Foil  Fabric  Fishhook  Metal  Rope  Rubber Pieces  Tape  T-shirt |
| Plastic Bags | Garbage Bags  Plastic Bag  Shopping Bags  Ziplock bags |
| Plastic Pieces | Plastic Pieces Large (>30cm)  Plastic Pieces Medium (10-30cm)  Plastic Pieces Small (0-10 cm) |
| Styrofoam Pieces | Styrofoam Piece Large (>30cm)  Styrofoam Piece Medium (10-30cm)  Styrofoam Piece Small (0-10 cm) |
| Take-Out Containers | Take-Out Containers |

Brand Data

The **Brand Data** captures information related to the brands identified during CEAP cleanups. Each entry includes the **Cleanup Date**, **Cleanup Type** (e.g., Park, Beach), and **Cleanup Area** (e.g., Mill Lake Water Park or Dewdney Regional Park), along with the **School Name** and **Group Name** of the participants. This data is further categorized by **City** and **Province**, such as Abbotsford or Dewdney in **British Columbia**.

The core of the brand data involves recording the **Brand** names found during cleanups. This brand identification is based on a presence/absence analysis, where schools like **Port Maitland School** in **Nova Scotia** spotted waste items branded with logos such as **Lays**, **Quaker**, and **Ziploc Gusher**. Additionally, the **Brand Quantity** tracks the number of times a particular brand was recorded. For example, **Rockingham Elementary School** in Nova Scotia found waste items branded with **Pepsi** three times, corresponding to the quantity of three items recorded in the data. This data provides insights into the prevalence of specific brands in waste found during the cleanups.

**Table 2: Total number participants Year by Year of the program with Total number participants 5747**

|  |  |
| --- | --- |
| Year | Sum of Participants |
| 2021 | 243 |
| 2022/2023 | 1880 |
| 2024 | 3624 |
| Total | **5747** |

The total number of participants in the CEAP program has shown substantial growth over the past three years, as seen in both the **table** and **bar chart** visualizations. In **2021**, the program had a modest start with **243 participants**. This number saw a significant increase in the following year, as the 2022/2023 period recorded **1,880 participants**, representing a sevenfold growth. The most dramatic increase occurred in **2024**, with **3,624 participants**, nearly doubling the previous year’s total.

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**Figure 1: Total number of participants Year by Year of the CEAP program**

**Key Observations:**

* **2021** marked the beginning of the program with a relatively small participant base, likely due to initial awareness or limited outreach.
* The **2022/2023** year witnessed a significant expansion, indicating the program’s increasing popularity and effectiveness in engaging schools and communities.
* **2024** continued this upward trajectory with the largest number of participants to date, reflecting growing recognition and perhaps an enhanced effort to involve more schools and regions.

This steady rise in participant numbers highlights the program’s success in outreach and impact, engaging more students each year and likely expanding to new regions and schools across Canada. The trend suggests that as the CEAP program continues, its reach and influence will further grow, bringing more participants into its environmental education initiatives.

**Table 3: Number and percentages of participants per province**

|  |  |  |
| --- | --- | --- |
| Province | Count of Participants | Percentage |
| ON | 1182 | 20.57% |
| NB | 1022 | 17.78% |
| SK | 783 | 13.62% |
| BC | 709 | 12.34% |
| AB | 671 | 11.68% |
| NS | 641 | 11.15% |
| MB | 208 | 3.62% |
| PE | 168 | 2.92% |
| NFL | 156 | 2.71% |
| QC | 145 | 2.52% |
| YU | 42 | 0.73% |
| NT | 20 | 0.35% |
| Total | **5747** | **100%** |

The Table 3 displays the **distribution of participants by province** over the entire three-year period of the CEAP program, with a total of **5,747 participants**. The table shows both the **absolute number of participants** and their **percentage share** relative to the total participant pool, highlighting which provinces contributed the most and least to the program.

**Key Observations:**

* **Ontario (ON)** had the highest number of participants, with **1,182 participants**, accounting for **20.57%** of the total. This indicates that Ontario has been a major hub for the program’s outreach and engagement.
* **New Brunswick (NB)** follows closely with **1,022 participants** (17.78%), making it another significant contributor to the overall program. The high participation in NB reflects strong engagement in this province.
* **Saskatchewan (SK)** ranks third with **783 participants** (13.62%), showcasing its active involvement in the program as well.
* **British Columbia (BC)** and **Alberta (AB)** also show considerable participation, with **709 participants** (12.34%) and **671 participants** (11.68%) respectively, indicating their steady involvement over the three years.
* Smaller provinces such as **Yukon (YU)** and **Northwest Territories (NT)** had the least participation, contributing **42** (0.73%) and **20** (0.35%) participants respectively, which may reflect smaller population sizes or fewer schools participating in the program.

This distribution highlights that participation is spread across Canada, with a concentration of participants in larger or more densely populated provinces like Ontario and New Brunswick. The data reflects how the program has managed to engage a wide geographic range of participants, although participation in some smaller provinces and territories remains limited.

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**Figure 2: Total Number and Percentage of Participants in the 2021 CEAP Program from Each Participating Province.** *Percentages are based on a total of 243 participants from 9 schools.*

The pie chart for 2021 illustrates the limited geographical reach of the CEAP program during its initial stages. With **243 total participants** from **9 schools** across only **2 provinces**, the representation highlights the early developmental phase of the initiative.

* **British Columbia (BC)** contributed most participants, with **187 participants accounting for 76.95% of the total**. This significant involvement can be attributed to BC's early adoption of environmental education programs and strong support from local schools and communities. As one of the leading provinces in sustainability initiatives, BC’s high participation reflects its commitment to promoting awareness and action on plastic pollution.
* **Ontario (ON)**, on the other hand, contributed **56 participants, representing 23.05% of the total**. Despite being the most populous province, Ontario's lower share in 2021 likely reflects logistical challenges in rolling out the program and limited initial engagement due to the program's infancy.

The disparity in participation between the two provinces indicates that CEAP’s outreach and resources were concentrated primarily in British Columbia, with Ontario serving as a secondary focus. The limited number of provinces involved underscores the need for broader program promotion and expansion during subsequent years.

A pie chart with numbers and a number of people with Crust in the background

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**Figure 3: Total Number and Percentage of Participants in the 2022/2023 CEAP Program from Each Participating Province.** *Percentages are based on a total of 1880 participants from 34 schools.*

The 2022/2023 pie chart shows a substantial expansion of the CEAP program, with participation growing to **1,880 total participants** from **34 schools** across **11 provinces and territories**. This growth demonstrates the program’s success in scaling its reach and increasing community engagement across Canada.

* **Saskatchewan (SK)** emerged as the leading contributor, with **439 participants (23.35%)**, reflecting the province’s strong focus on environmental education and active community participation. SK’s leadership in this period highlights its dedication to integrating CEAP into its schools and local initiatives.
* **Ontario (ON)** followed closely with **407 participants (21.65%)**, showing a marked improvement in its engagement compared to 2021. This increase likely stems from greater program visibility and improved coordination with schools across the province.
* **British Columbia (BC)** also demonstrated significant growth, with **258 participants (13.72%)**, continuing its strong commitment to environmental action and education.
* **New Brunswick (NB)** contributed **198 participants (10.53%)**, while **Nova Scotia (NS)** accounted for **168 participants (8.94%)**, highlighting their active involvement in promoting sustainability within smaller provinces.
* Other provinces such as **Alberta (104 participants, 5.53%)**, **Manitoba (100 participants, 5.32%)**, and **Newfoundland and Labrador (92 participants, 4.89%)** showed moderate participation levels, indicating expanding awareness and engagement in these regions.
* **Prince Edward Island (PE)** and **Quebec (QC)** also contributed smaller shares, with **68 participants (3.62%)** and **20 participants (1.06%)**, respectively, reflecting their gradual integration into the program.

The increase in both the number of provinces and the diversity of participants in 2022/2023 underscores CEAP’s success in scaling its efforts. Factors contributing to this growth likely include expanded outreach efforts, increased awareness of environmental issues, and improved access to resources for schools across Canada. This period marked a significant milestone for CEAP, establishing a strong foundation for future nationwide participation.

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**Figure 4:** **Total number and percentage of participants in the 2024 CEAP program from each participating province and territory.** *Percentages are based on a total of 3624 participants from 51 schools.*

The pie chart for the 2024 CEAP program highlights the distribution of participants across various provinces and territories in Canada, showcasing both the number of participants and their percentage share of the total. The total participation for 2024 was **3,624 participants**, demonstrating significant nationwide engagement. Below is a detailed breakdown of the participation:

* **New Brunswick (NB)** contributed the largest share with **996 participants (27.48%)**, marking it as the most engaged province in the program. This robust participation reflects strong support from schools and communities, as well as the province's active involvement in environmental education initiatives.
* **Ontario (ON)** followed with **719 participants (19.84%)**, maintaining a high level of participation. Ontario's large population base and extensive school network likely contributed to this strong engagement. Its continued commitment to environmental education has positioned it as a key player in the program.
* **Alberta (AB)** accounted for **473 participants (13.05%)**, demonstrating consistent and solid engagement. Alberta's active participation reflects its growing emphasis on sustainability and environmental stewardship.
* **Saskatchewan (SK)** contributed **418 participants (11.53%)**, showcasing its solid commitment to CEAP in 2024. This level of participation highlights the province's efforts to integrate environmental education into schools and community activities.
* **Nova Scotia (NS)** had **383 participants (10.57%)**, reflecting strong involvement despite being one of Canada’s smaller provinces. This indicates a significant focus on environmental initiatives and community participation.
* **British Columbia (BC)** participated with **344 participants (9.49%)**, showing moderate but steady involvement in the program. BC's consistent efforts in environmental action and education continue to make it an important contributor to CEAP.
* Smaller provinces and territories also participated, albeit with lower numbers. **Manitoba (MB)** contributed **116 participants (3.2%)**, while **Newfoundland and Labrador (NFL)** and **Yukon (YU)** each accounted for **88 participants (2.43%)**. These smaller shares are likely due to logistical challenges, fewer schools, and smaller populations in these regions.

The possible reasons behind these variations in participation could be attributed to several factors. Provinces with larger populations, like Ontario and New Brunswick, naturally have a larger pool of potential participants. Additionally, provinces that may have more robust environmental education programs or greater access to the CEAP resources could see higher engagement. On the other hand, smaller provinces and territories may face challenges such as fewer schools, lower student populations, or geographic limitations that could impact their ability to participate at the same level as larger provinces.

**Key Differences:**

1. **Overall Participation Increase**: The number of total participants grew from **1,880** in **2022/2023** to **3,624** in 2024, demonstrating a significant expansion of the program.
2. **Ontario's Growth**: Ontario saw the most substantial increase, nearly doubling its participation, from **407 participants** (**21.6%**) in **2022/2023** to **996 participants** (**27.48%**) in 2024. This shows a much larger engagement from Ontario schools in 2024.
3. **Decline in Saskatchewan**: Saskatchewan, which had the highest number of participants in **2022/2023** (**439 participants, 23.4%**), saw a sharp decline in 2024 to only **88 participants** (**2.43%**).

**Increased Provincial Diversity**: In 2024, more provinces showed stronger participation, and the distribution was more evenly spread compared to **2022/2023**, where a few provinces dominated the program.

**Table 4: Schools and Participant numbers of 2021 that engaged in the CEAP Program.** *A total of 9 Unique Schools participated in 2021***.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | School Name | Province | Provided Data | Participants Signed Up |
| 2021 | John Barsby Secondary School Students | British Columbia | Yes | 25 |
| 2021 | Wellington Secondary Gr.8 Students | British Columbia | Yes | 25 |
| 2021 | Sir Charles Tupper Secondary,Circular Economy Ambassador Program Club | British Columbia | Yes | 12 |
| 2021 | Grade 11 Windmere Secondary | British Columbia | Yes | 23 |
| 2021 | Grade 8/9Windmere Secondary | British Columbia | Yes | 56 |
| 2021 | uO Climate Crisis Coalition | Ontario | Yes | 11 |
| 2021 | uO Climate Crisis Coalition | Ontario | Yes | 12 |
| 2021 | uO Climate Crisis Coalition | Ontario | Yes | 33 |
| 2021 | Youth2Sea | British Columbia | Yes | 9 |
| 2021 | Environmental Science Sutherland Secondary | British Columbia | Yes | 27 |
| 2021 | Carson Graham Secondary | British Columbia | Yes | 10 |
| Total |  |  |  | **243** |

**Table 5: Schools and Participant numbers of 2022/2023 that engaged in the CEAP Program.** *A total of 34 Unique Schools participated in 2022/2023***.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Year | School Name | Province | Participants Signed Up | Waivers Signed | Provided Data |
| 2022/2023 | Calgary Islamic | AB | 78 | 21 | Yes |
| 2022/2023 | Sir John A. MacDonald | AB | 35 | 35 | Yes |
| 2022/2023 | James Gilmore Elementary | BC | 60 | 20 | Yes |
| 2022/2023 | Our Lady of Fatima | ON | 10 | 5 | Yes |
| 2022/2023 | Stratford Hall | BC | 44 | 44 | Yes |
| 2022/2023 | École New Era | MB | 22 | 20 | Yes |
| 2022/2023 | École New Era | MB | 22 | 22 | Yes |
| 2022/2023 | Elmwood | MB | 48 | 40 | Yes |
| 2022/2023 | St. Stephen High | NB | 26 | 18 | Yes |
| 2022/2023 | Holy Cross All Grade | NFL | 20 | 20 | Yes |
| 2022/2023 | MUN Campus Childcare Inc. | NFL | 48 | 32 | Yes |
| 2022/2023 | Cool School | NS | 7 | 4 | Yes |
| 2022/2023 | Springvale Elementary | NS | 48 | 50 | Yes |
| 2022/2023 | Beatrice Strong Point | ON | 54 | 11 | Yes |
| 2022/2023 | Bell's High | ON | 10 | 10 | Yes |
| 2022/2023 | Brian Public | ON | 25 | 18 | Yes |
| 2022/2023 | Dr. David R. Williams Public | ON | 43 | 45 | Yes |
| 2022/2023 | Meaford Homeschool Club | ON | 20 | 18 | Yes |
| 2022/2023 | Royal Orchard Middle | ON | 25 | 21 | Yes |
| 2022/2023 | Sir Frederick Banting Secondary | ON | 60 | N/A | Yes |
| 2022/2023 | Sir Guy Carleton | ON | 16 | 16 | Yes |
| 2022/2023 | Birchwood Intermediate | PE | 128 | 60 | Yes |
| 2022/2023 | Ellerslie Elementary | PE | 40 | N/A | Yes |
| 2022/2023 | École Secondaire du Rocher | QC | 100 | 40 | Yes |
| 2022/2023 | Christopher Lake | SK | 180 | 126 | Yes |
| 2022/2023 | Henry Janzen Elementary | SK | 28 | 21 | Yes |
| 2022/2023 | South Corman | SK | 206 | 206 | Yes |
| 2022/2023 | St Walburg | SK | 25 | 10 | Yes |
| 2022/2023 | Ponoka secondary | AB | 85 | - | No |
| 2022/2023 | Dunwich-Dutton Public School | ON | 26 | - | No |
| 2022/2023 | St.Kateri | ON | 118 | - | No |
| 2022/2023 | Northumberland Regional High School | NS | 28 | - | No |
| 2022/2023 | JL Ilsey High School | NS | 100 | - | No |
| 2022/2023 | Summerside Intermediate School | NS | 75 | - | No |
| 2022/2023 | Quluaq School | NT | 20 | - | No |
| Total |  |  | **1880** |  |  |

**Table 6: Schools and Participant numbers of 2024 that engaged in the CEAP Program.** *Total 51 Schools participated in 2024***.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Name of School | # of Waivers signed | Post-Survey Fulfilled | Pre-Survey Fulfilled | Provided Data? | Province | School Number | Year | Sum of Participants signed up |
| AG Baillie Memorial | '- | '- | '- | No | NS | 47 | 2024 | 22 |
| Astral Drive Elementary | '- | '- | '- | No | NS | 48 | 2024 | 24 |
| Baker Community School | '- | '- | '- | No | MB | 34 | 2024 | 22 |
| Beatrice Strong Public School | '- | '- | 21 | Yes | ON | 15 | 2024 | 32 |
| Bedford South School | '- | 12 | '- | No | NS | 49 | 2024 | 55 |
| Cavalier Drive School | '- | '- | '- | No | NS | 44 | 2024 | 46 |
| Christopher Lake Public School | 89 | 37 | 91 | Yes | SK | 11 | 2024 | 182 |
| Cobequid Consolidated Elementary School | '- | '- | 1 | No | NS | 46 | 2024 | 27 |
| Connections for Learning | 6 | '- | 12 | Yes | AB | 9 | 2024 | 104 |
| Coronation Park Community School | '- | '- | 1 | No | SK | 32 | 2024 | 129 |
| Cowesses Community School | '- | '- | '- | No | SK | 33 | 2024 | 33 |
| Dewdney Elementary | 21 | 19 | 22 | Yes | BC | 5 | 2024 | 25 |
| Earl Oxford | 15 | '- | 17 | Yes | MB | 13 | 2024 | 42 |
| École Abbey Landry | '- | '- | '- | Yes | NB | 21 | 2024 | 450 |
| École Centennial Park Elementary | 30 | '- | 1 | Yes | BC | 1 | 2024 | 33 |
| École New Era School | '- | '- | 15 | Yes | MB | 12 | 2024 | 23 |
| École Sir William Osler | '- | '- | '- | Yes | MB | 14 | 2024 | 29 |
| False Bay School | 8 | '- | 21 | Yes | BC | 7 | 2024 | 22 |
| Forest Glen School | '- | '- | '- | No | NB | 41 | 2024 | 83 |
| Green Bay South Academy | 11 | '- | '- | Yes | NFL | 27 | 2024 | 88 |
| Hamlet Public School | 23 | '- | 29 | Yes | ON | 16 | 2024 | 66 |
| Hampton Middle School | '- | '- | '- | No | NB | 42 | 2024 | 415 |
| Hastings Public School | '- | '- | '- | No | ON | 39 | 2024 | 134 |
| Hilden Elementary School | 17 | '- | '- |  | NS | 26 | 2024 | 25 |
| Hilltop High School | 15 | 10 | 24 | Yes | AB | 10 | 2024 | 35 |
| Holland Elementary School | '- | '- | '- | No | QC | 40 | 2024 | 17 |
| Lake Cowichan School | '- | '- | 1 | No | BC | 30 | 2024 | 57 |
| Le Monarque | 3 | '- | '- | Yes | QC | 20 | 2024 | 28 |
| Little Current Public School | '- | '- | '- | No | ON | 35 | 2024 | 33 |
| Mary Fix Catholic School | '- | '- | '- | No | ON | 38 | 2024 | 270 |
| Mckay Elementary | '- | '- | '- | No | BC | 29 | 2024 | 32 |
| McMillan Elementary | '- | '- | '- | No | BC | 28 | 2024 | 62 |
| Nicomeckl Elementary | 17 | '- | 18 | Yes | BC | 3 | 2024 | 25 |
| Pentz Elementary | '- | '- | '- | No | NS | 45 | 2024 | 45 |
| Ponoka Secondary Campus | 9 | '- | 48 | Yes | AB | 8 | 2024 | 270 |
| Port Maitland Consolidated Elementary | 10 | 20 | '- | Yes | NS | 25 | 2024 | 22 |
| Robert Service School | '- | '- | '- | No | YU | 51 | 2024 | 17 |
| Rockingham Elementary School | 19 | 18 | 21 | Yes | NS | 24 | 2024 | 24 |
| Salisbury Elementary | '- | '- | '- | Yes | NB | 22 | 2024 | 26 |
| Salisbury Elementary School | '- | '- | '- | No | NB | 43 | 2024 | 22 |
| Selkirk Elementary | '- | '- | '- | No | YU | 50 | 2024 | 25 |
| Simons Valley | '- | '- | 44 | No | AB | 31 | 2024 | 64 |
| St. John the Apostle | '- | '- | 21 | Yes | ON | 19 | 2024 | 25 |
| St. Jude's Catholic School | '- | '- | '- | No | ON | 36 | 2024 | 31 |
| St. Nicholas | 20 | '- | 3 | Yes | ON | 17 | 2024 | 85 |
| Stave Falls | '- | '- | 1 | Yes | BC | 4 | 2024 | 20 |
| Tahayghen Elementary School | '- | '- | 19 | Yes | BC | 2 | 2024 | 22 |
| Viola Desmond Public School | '- | '- | '- | No | ON | 37 | 2024 | 21 |
| Walnut Road Elementary | 23 | '- | '- | Yes | BC | 6 | 2024 | 120 |
| West Bedford School | '- | '- | 1 | Yes | NS | 23 | 2024 | 93 |
| Woodland Park Public School | 26 | 21 | 20 | Yes | ON | 18 | 2024 | 22 |
| Total |  |  |  |  |  |  |  | **3624** |

Most Collected Categories

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**Figure 5:** **Calculated percentages of Categories collected in the Data Tally Sheet from a total of 30,450 collected items through the three years.**

The horizontal bar chart visualizes the **percentage of categories collected** during cleanups, providing a clear representation of the composition of waste across various categories. Here's a breakdown of the chart:

1. **Plastic Pieces** dominate the collected waste, accounting for **20%** of the total, with **6,090 items**. This highlights the prevalence of plastic fragments in the environment, likely stemming from the breakdown of larger plastic products.
2. **Commonly Found Items** come in a close second, making up **18.84%** of the total waste, with **5,738 items**. This category likely includes items frequently discarded by individuals, such as wrappers, paper, or small packaging items.
3. **Cigarette Butts** represent a significant portion of the waste, constituting **17.16%**, with **5,226 butts** collected. Cigarette butts are notoriously common in litter and can have a significant environmental impact due to the non-biodegradable filters.
4. **Food Packaging** makes up **8.77%** of the total collected waste, with **2,671 items**, indicating a considerable amount of single-use food containers and wrappers being discarded.
5. **Miscellaneous items** account for **7.66%**, with **2,332 items**. This category likely includes various types of waste that didn’t fit into the other predefined categories.
6. **Plastic Bags** account for **4.74%**, with **1,444 bags** collected. Despite efforts to reduce single-use plastic bags, they remain a notable source of litter.
7. **Cups** make up **4.11%**, with **1,250 items**. These likely include disposable coffee cups or other single-use drink containers.
8. **Styrofoam Pieces** constitute **3.66%**, with **1,114 pieces**, reflecting the persistence of this material, which is difficult to recycle and often breaks into smaller fragments.
9. **Glass**, **Lids**, **Bottles**, and **Cans** each contribute smaller but still significant percentages, ranging from **2.71%** to **3.51%**. These items are frequently found in areas with high human activity and are commonly associated with food and drink consumption.
10. **Face Masks**, though lower in percentage (**2.26%**), reflect a relatively recent trend due to the COVID-19 pandemic, with **688 masks** collected.
11. **Take-Out Containers** and **Fishing Gear** are the least prevalent categories, with **0.75%** and **0.02%**, respectively. Although their quantities are lower, take-out containers (like plastic and Styrofoam boxes) remain a significant source of single-use waste.

This chart provides a clear visual of the types of waste most collected, with **plastic pieces**, **commonly found items**, and **cigarette butts** making up the majority of the waste. This data underscores the ongoing issue of plastic pollution and single-use items contributing to environmental litter.

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**Figure 6: Calculated Percentages of Categories Collected in the 2021 Data Tally Sheet**

The horizontal bar chart represents the percentage distribution of categories collected during cleanups in 2021, offering insight into the composition of waste identified. The total number of items collected in this year is not specified in the chart but provides a proportional view of the categories. Here's a detailed breakdown:

1. Plastic Pieces were the most collected category, making up 21.38% of the total. This significant percentage highlights the pervasive nature of plastic fragments, likely originating from the breakdown of larger plastic products. It reflects the enduring issue of plastic waste accumulation in the environment.
2. Cigarette Butts accounted for 19.16% of the collected waste, representing one of the most littered items worldwide. These items, though small, have a considerable environmental impact due to the non-biodegradable filters they contain.
3. Commonly Found Items contributed 17.86%, encompassing miscellaneous frequently discarded materials such as wrappers, small packaging, or paper items. This category indicates the widespread disposal of everyday consumer waste.
4. Miscellaneous Waste represented 11.25% of the total. This category includes items that do not fit into predefined classifications, pointing to the diverse nature of litter in public areas.
5. Food Packaging made up 9.31%, reflecting the prominence of single-use wrappers and containers often discarded in public spaces. This category underscores the challenges posed by convenience-driven consumption habits.
6. Styrofoam Pieces accounted for 5.14%, highlighting the persistence of this material in the waste stream. Despite its lightweight nature, Styrofoam is challenging to recycle and often breaks into smaller fragments, exacerbating environmental damage.
7. Glass constituted 4.09%, representing items such as bottles or fragments. This category's presence suggests the need for better recycling and disposal practices for glass products.
8. Plastic Bags, contributing 2.36%, remain a visible source of pollution despite efforts to reduce their use. Their presence highlights the ongoing struggle against single-use plastics.
9. Cans and Face Masks both accounted for 2.06% each. Cans likely come from drink containers, while face masks reflect a more recent trend tied to the COVID-19 pandemic, highlighting how global events influence waste patterns.
10. Cups represented 2.00%, primarily likely disposable coffee cups or single-use drinkware, a reflection of modern consumption habits.
11. Lids, Bottles, and Take-Out Containers contributed smaller percentages of 1.45%, 1.03%, and 0.84%, respectively. While lower in proportion, these items are significant contributors to single-use waste and often end up in landfills or littered in the environment.

This breakdown of collected waste in 2021 emphasizes the dominance of plastic pollution, cigarette butts, and commonly discarded everyday items. These findings highlight the urgent need for systemic changes in consumer behavior, waste management practices, and the reduction of single-use materials.

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**Figure 7: Calculated Percentages of Categories Collected in the 2022/2023 Data Tally Sheet**

The horizontal bar chart for 2022/2023 presents the percentage distribution of waste categories collected during cleanups over these two years. The chart highlights the most prevalent types of waste and their relative contributions to the total, offering valuable insights into ongoing trends in environmental pollution. Here’s a detailed breakdown:

1. **Cigarette Butts** were the most collected item, accounting for **19.50%** of the total. This category continues to dominate the waste stream, reflecting the persistent issue of improper cigarette disposal and the non-biodegradable nature of their filters.
2. **Plastic Pieces** made up **18.59%**, underscoring their significant presence in the waste stream. These fragments likely originate from the breakdown of larger plastic items, further highlighting the enduring problem of plastic pollution.
3. **Commonly Found Items** closely followed, contributing **18.49%** to the total. This category represents frequently discarded everyday items such as wrappers, paper, or small packaging materials.
4. **Food Packaging** accounted for **9.77%**, emphasizing the ongoing issue of single-use food containers and wrappers being improperly disposed of. This percentage reflects the role of convenience-driven consumption in environmental degradation.
5. **Miscellaneous Waste** constituted **6.79%**, representing a variety of items that do not fit into specific predefined categories. This diverse mix of waste highlights the complexity of pollution sources.
6. **Plastic Bags** contributed **4.77%** to the total. While efforts to phase out single-use plastic bags have gained momentum in recent years, their continued presence in waste collections indicates that they remain a challenge.
7. **Cups**, representing **3.97%**, likely include disposable coffee cups and other single-use drink containers. These items reflect consumer reliance on convenience products.
8. **Styrofoam Pieces** made up **3.21%**. The persistence of Styrofoam in the waste stream underscores the challenges of recycling and managing this material, which often breaks into smaller fragments.
9. **Bottles**, **Lids**, **Glass**, and **Cans** contributed smaller but still significant percentages, ranging from **2.86% to 3.07%**. These items are often associated with food and beverage consumption and indicate the need for improved recycling efforts.
10. **Face Masks** accounted for **2.68%**, representing a continuing trend tied to the COVID-19 pandemic. Their presence reflects the environmental impact of personal protective equipment.
11. **Take-Out Containers** and **Fishing Gear** were the least prevalent categories, with **0.53%** and **0.04%**, respectively. Although lower in proportion, take-out containers remain a persistent source of single-use waste.

The data for 2022/2023 reveals a continued dominance of cigarette butts, plastic pieces, and commonly found items in the waste stream. Compared to 2021, there is a consistent pattern in the prevalence of single-use plastics and convenience items, indicating the persistent challenges of addressing plastic pollution and littering habits.

The presence of face masks remains a notable addition to the waste stream, reflecting the ongoing effects of the pandemic. Meanwhile, categories like Styrofoam and plastic bags highlight the need for stricter regulations and better recycling infrastructure to reduce their environmental impact.

This analysis underscores the importance of public education, policy changes, and community action to address the root causes of pollution and mitigate its effects on the environment.

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**Figure 8:** **Calculated percentages of items collected within each category in the Data Tally Sheet from a total of 7032 collected items for 2024 year.**

**Table 7: Percentage of Different Categories with their Total Counts of 2024 Year**

|  |  |  |
| --- | --- | --- |
| Category | Percentage | Total Counts |
| Plastic Pieces | 22.17% | 1559 |
| Commonly Found Items | 20.61% | 1449 |
| Cigarette Butts | 9.70% | 682 |
| Plastic Bags | 6.84% | 481 |
| Miscellaneous | 6.48% | 456 |
| Cups | 6.36% | 447 |
| Food packaging | 5.86% | 412 |
| Glass | 4.52% | 318 |
| Lids | 4.47% | 314 |
| Bottle | 4.07% | 286 |
| Styrofoam Pieces | 3.38% | 238 |
| Cans | 2.93% | 206 |
| Face-Masks | 1.42% | 100 |
| Take-Out Containers | 1.19% | 84 |
| Total | **100%** | **7032** |

In 2024, the total number of items collected was **7,032**. The top three categories for collected items were **Plastic Pieces** (**22.17%**), **Commonly Found Items** (**20.61%**), and **Cigarette Butts** (**9.7%**). These three categories alone account for a significant majority of the waste, highlighting persistent issues with plastic and single-use items. Other notable categories include **Plastic Bags** (**6.84%**) and **Miscellaneous** items (**6.48%**), which also contributed significantly to the total amount of waste collected.

The presence of **Plastic Pieces** and **Commonly Found Items** in the top spots underscores the ongoing challenge with plastic pollution and items frequently discarded in public spaces. **Cigarette Butts**, though slightly lower in percentage compared to other years, remain a significant environmental concern.

**Significant Key Patterns and Differences (2021–2024)**

1. **Dominance of Plastic Pieces and Commonly Found Items:**
   * **Pattern:** Plastic Pieces and Commonly Found Items consistently rank among the top three categories across all years. This highlights the persistent issue of plastic pollution and everyday consumer waste in the environment.
   * **Difference:** Plastic Pieces saw a steady increase, peaking at **22.17%** in 2024, while Commonly Found Items also increased, reaching **20.61%** in 2024.
2. **Cigarette Butts Fluctuation:**
   * **Pattern:** Cigarette Butts were consistently among the top three categories in earlier years, reflecting a long-standing litter issue.
   * **Difference:** Cigarette Butts showed a sharp decline in 2024 (**9.7%**) compared to 2021 and 2022/2023 (over **19%**). This may indicate improved awareness or policies addressing cigarette litter.
3. **Food Packaging and Plastic Bags:**
   * **Pattern:** Food Packaging consistently contributed to the waste stream, but its prominence decreased in 2024. Plastic Bags, on the other hand, increased steadily over the years.
   * **Difference:** Plastic Bags grew from **2.36%** in 2021 to **6.84%** in 2024, while Food Packaging dropped out of the top categories in 2024.
4. **Face Masks Impact:**
   * **Pattern:** Face Masks emerged as a waste category in 2021 due to the COVID-19 pandemic and peaked in 2022/2023.
   * **Difference:** By 2024, Face Masks were no longer a significant category, reflecting reduced pandemic-related waste.
5. **Styrofoam Pieces Decline:**
   * **Pattern:** Styrofoam Pieces consistently appeared in earlier years but showed a decreasing trend over time.
   * **Difference:** Styrofoam Pieces dropped from **5.14%** in 2021 to **3.21%** in 2022/2023 and were not significant in 2024, suggesting improved management or reduced usage.
6. **Miscellaneous Items Decline:**
   * **Pattern:** Miscellaneous Items showed a consistent presence but declined in percentage over the years.
   * **Difference:** From **11.25%** in 2021, this category dropped to **6.79%** in 2022/2023 and **6.48%** in 2024, indicating better classification or reduced random litter.
7. **Overall Volume and Trends:**
   * **Pattern:** The total volume of waste increased during 2022/2023, reflecting broader engagement and data collection efforts, but decreased in 2024.
   * **Difference:** The waste composition in 2024 shifted slightly toward plastic-related items, with a decline in Cigarette Butts and miscellaneous waste.

The key differences highlight an increase in Plastic Bags and Plastic Pieces over time, while categories like Cigarette Butts, Face Masks, and Styrofoam Pieces show declining trends. These patterns reflect both evolving waste behaviours and the effectiveness of certain waste management or awareness initiatives.

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**Figure 9: Percentage of Most Prominent Categories within All Provinces for All three years.**

**Key Findings for the Overall Three Years:**

1. **Plastic Pieces and Cigarette Butts as Dominant Waste Categories**  
   Plastic pieces and cigarette butts were among the most prevalent waste categories across multiple provinces. For instance, Newfoundland & Labrador reported 47.54% of its waste as plastic pieces, while Prince Edward Island showed 36.42% from cigarette butts. This highlights ongoing concerns with plastic pollution and cigarette litter, especially in coastal and public areas.
2. **Commonly Found Items Indicating Persistent Littering**  
   Commonly found items, reflecting everyday litter, were consistently high in provinces like New Brunswick (31.04%) and Manitoba (26.58%). This suggests that general littering behaviour remains a widespread issue across different regions.
3. **Food Packaging Waste Prevalent in Certain Provinces**  
   Food packaging waste was notable in Nova Scotia (22.86%), signalling significant issues with single-use container waste. In contrast, Newfoundland & Labrador reported the lowest percentage of food packaging waste at just 0.88%, showing variations in waste composition across provinces.
4. **Plastic Bags Highlighting the Need for Targeted Reduction Strategies**  
   Plastic bags accounted for significant waste in Nova Scotia (11.20%) and Manitoba (7.64%), suggesting a need for targeted strategies to reduce plastic bag usage in these areas.
5. **Lid and Styrofoam Waste Emphasizing Recycling Challenges**  
   Alberta (8.27%) and New Brunswick (5.37%) recorded the highest levels of plastic lids, while New Brunswick (7.69%) and British Columbia (7.53%) reported significant Styrofoam waste. This underlines the importance of improving recycling efforts for difficult-to-recycle materials like lids and Styrofoam.
6. **Miscellaneous Waste Requiring Comprehensive Management**  
   Newfoundland & Labrador (30.35%) and British Columbia (10.58%) reported high levels of miscellaneous waste, indicating the need for a more comprehensive approach to managing diverse waste types.

In summary, plastic pieces, cigarette butts, and commonly found items dominate the waste landscape in Canada. However, distinct patterns emerge in certain provinces, such as high food packaging waste in Nova Scotia and significant plastic bag usage in Manitoba. These insights suggest that a region-specific approach to waste management could be more effective in addressing the unique waste challenges across provinces.

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**Figure 10: Percentage of Most Prominent Categories within All Provinces for 2021**

Key Findings from 2021:

**1. Cigarette Butts as the Leading Waste Category**

* **Ontario** reported the highest proportion of cigarette butts at **31.71%**, making it the most significant waste category in the province.
* **British Columbia** followed with **11.67%**, indicating a much lower proportion compared to Ontario.
* This highlights a regional disparity in smoking-related litter, possibly linked to population density and smoking behaviors in public spaces.

**2. Commonly Found Items Highlighting General Littering**

* **British Columbia** reported **23.37%** of its waste as commonly found items, which include wrappers, bags, and small discarded materials.
* **Ontario** showed a slightly higher proportion of **12.82%**, though not as dominant as cigarette butts in the province.
* These findings indicate persistent littering habits across both provinces, with a notable emphasis on everyday consumer waste.

**3. Plastic Pieces Reflecting Ongoing Plastic Pollution**

* **Ontario** reported **23.72%** of its waste as plastic pieces, surpassing British Columbia’s proportion of **21.73%**.
* The prominence of plastic pieces in both provinces underscores the ongoing challenge of plastic pollution and its contribution to overall environmental litter.

**4. Miscellaneous Waste Demonstrating Diverse Composition**

* Miscellaneous waste accounted for **11.10%** in British Columbia and **12.94%** in Ontario.
* This category reflects a wide range of unclassified waste items, highlighting the need for improved sorting and categorization during cleanups.

**5. Food Packaging as a Noticeable Category**

* **British Columbia** reported **11.50%** of its waste as food packaging, compared to **7.61%** in Ontario.
* The prevalence of single-use food packaging highlights consumer convenience culture as a significant contributor to litter.

**6. Glass, Styrofoam Pieces, and Plastic Bags as Minor Contributors**

* Glass waste accounted for **4.58%** in British Columbia and **3.98%** in Ontario, showing relatively consistent patterns.
* **Styrofoam Pieces** made up **7.84%** in British Columbia, significantly higher than other waste categories in the province.
* **Plastic Bags** contributed **4.58%** in British Columbia and **3.98%** in Ontario, reflecting ongoing concerns about single-use plastics.

In 2021, cigarette butts, plastic pieces, and commonly found items were the dominant waste categories in both British Columbia and Ontario, albeit with notable differences in proportions. Ontario showed a significantly higher proportion of cigarette butts and plastic pieces, while British Columbia had a greater share of food packaging and Styrofoam pieces. These findings reflect regional variations in waste patterns and suggest the need for tailored waste management strategies, particularly focusing on reducing cigarette litter and single-use plastics in both provinces.

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**Figure 11: Percentage of Most Prominent (Top 10) Categories within All Provinces for 2022/2023**

Key Findings from 2022/2023:

**1. Plastic Pieces as the Dominant Waste Category**

* **Newfoundland & Labrador** reported the highest proportion of Plastic Pieces at **46.77%**, demonstrating significant plastic waste concerns in this province.
* **Nova Scotia** (36.65%) and **New Brunswick** (44.86%) also recorded high levels of Plastic Pieces, reflecting the persistence of plastic waste as a dominant environmental issue.
* Other provinces, such as **Ontario** (26.08%) and **Quebec** (32.05%), reported substantial contributions of plastic pieces, underscoring their ubiquity across regions.

**2. Cigarette Butts Consistently High**

* **Prince Edward Island** reported the highest proportion of Cigarette Butts at **48.40%**, emphasizing its dominance as a major waste category in this province.
* **British Columbia** (39.38%) and **New Brunswick** (15.29%) also showed significant proportions of Cigarette Butts, reflecting persistent smoking-related litter issues.

**3. Commonly Found Items Reflecting Litter Trends**

* **Saskatchewan** reported **27.11%** of its waste as Commonly Found Items, the highest among all provinces, suggesting prevalent littering behaviors.
* **Nova Scotia** (27.40%) and **Quebec** (21.23%) also showed considerable proportions of this category, highlighting the impact of everyday consumer waste.

**4. Food Packaging and Plastic Bags Showing Regional Impact**

* **Nova Scotia** recorded **11.21%** of its waste as Food Packaging, the highest among all provinces, pointing to the influence of single-use food items.
* **Saskatchewan** (6.96%) and **Ontario** (6.01%) also reported moderate contributions of Food Packaging.
* Plastic Bags were most prominent in **Prince Edward Island** (10.55%) and **Manitoba** (6.39%), reflecting ongoing single-use plastic concerns.

**5. Styrofoam Pieces and Cups as Minor Contributors**

* Styrofoam Pieces were more notable in **Manitoba** (7.58%) and **Nova Scotia** (7.33%), indicating a localized persistence of this difficult-to-recycle material.
* Cups contributed a small percentage in most provinces, with **Prince Edward Island** reporting **5.00%**, reflecting disposable drinkware’s role in litter composition.

**6. Regional Variations in Miscellaneous Waste**

* **Ontario** (12.82%) and **British Columbia** (15.01%) recorded the highest proportions of Miscellaneous Waste, indicating diverse and non-categorized waste materials.
* This category highlights varying local waste streams that may include unique, unclassified items.

The 2022/2023 data highlights significant regional differences in waste composition, with Plastic Pieces, Cigarette Butts, and Commonly Found Items consistently dominating across provinces. Notable variations include the high proportion of Cigarette Butts in Prince Edward Island and the elevated share of Food Packaging and Plastic Bags in Nova Scotia and Prince Edward Island. These trends point to both national and regional waste management challenges, emphasizing the need for targeted interventions to address plastic pollution, smoking-related litter, and single-use items in specific provinces.

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**Figure 12:** **Percentage of Most Prominent Categories within All Provinces for 2024 year.**

Key Findings from the 2024:

1. **Plastic Pieces as a Major Waste Category**Plastic pieces remain a significant waste category in several provinces:
   * Manitoba leads with 45.11% of waste collected being plastic pieces.
   * Alberta (38.82%) and Saskatchewan (29.03%) also show high proportions of plastic pieces.
   * This highlights that plastic waste continues to be a prominent environmental issue in these regions.
2. **Commonly Found Items Indicating Persistent Littering**Commonly found items, including everyday discarded items like wrappers, bags, and small packaging materials, were notably present in several provinces:
   * New Brunswick reported the highest proportion of commonly found items at 28.43%.
   * Other provinces, such as British Columbia, Manitoba, Nova Scotia, Saskatchewan, and Ontario, show an average presence of around 22-23%.
   * Quebec reported the lowest in this category, with 8.45%, showing a regional variation in general littering behavior.
3. **Cigarette Butts as a Consistent Litter Concern**Cigarette butts were prevalent in several provinces:
   * British Columbia reported the highest proportion of cigarette butts at 21.77%.
   * Quebec followed with 16.89%, while Alberta and Ontario showed similar trends with around 10%.
   * This indicates an ongoing challenge with smoking-related litter, particularly in public and recreational areas.
4. **Bottles as a Noticeable Waste Category in Specific Regions**
   * Newfoundland & Labrador reported the highest proportion of bottles at 20.83%, which stands out as one of the highest across all provinces in this category.
   * Other provinces reported significantly lower proportions of bottle waste compared to Newfoundland & Labrador.
5. **Miscellaneous Waste Highlighting Diverse Litter Composition**
   * Newfoundland & Labrador reported the highest amount of miscellaneous waste at 66.67%, indicating a diverse range of waste materials collected in this region.
   * This category suggests a need for a comprehensive approach to manage a variety of non-categorized waste items.
6. **Plastic Bags Reflecting Single-Use Plastic Concerns**
   * Saskatchewan reported the highest proportion of plastic bags at 14.61%, followed by Prince Edward Island at 12.67%.
   * This reflects concerns around single-use plastics in these regions and suggests areas for targeted reduction efforts.

In summary, plastic pieces, commonly found items, and cigarette butts remain the dominant waste categories across most provinces in 2024. Unique regional patterns, such as the high bottle waste in Newfoundland & Labrador and substantial miscellaneous waste in the same province, as well as elevated plastic bag waste in Saskatchewan, highlight specific waste management challenges. These findings underscore the ongoing need for regionally tailored waste management solutions, especially for single-use plastics and cigarette litter across Canada.

**Most Prominent Categories (All Three Years)**

* Plastic Pieces
* Cigarette Butts
* Commonly Found Items
* Food Packaging
* Plastic Bags

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**Figure 13:** **Percentage of Most Prominent Categories within All Location Types for All three years.**

**Key Findings for the Overall Three Years:**

In the overall trend across multiple years, the most prominent waste categories demonstrate a consistent pattern in terms of their distribution across different location types (School Property, Park, Neighborhood, Beach, Hospital Grounds). Below are the detailed findings for each location type:

1. **School Property**
   * **Commonly Found Items (22.43%)** and **Cigarette Butts (12.20%)** were the most prominent waste categories, contributing significantly to the waste collected on school grounds. These items reflect everyday waste typically associated with school environments, where students and the public are present regularly.
   * **Plastic Pieces (20.73%)** and **Food Packaging (10.70%)** also made up a notable portion of the waste, likely due to the consumption of packaged foods by students.
   * The distribution across multiple categories, including cups and plastic bags, shows a diverse mix of waste types in school settings.
2. **Park**
   * Parks showed a high percentage of **Cigarette Butts (24.35%)** followed by **Commonly Found Items (22.43%)**, reflecting the common litter associated with recreational activities in public green spaces.
   * **Plastic Pieces (21.94%)** were also a significant portion, highlighting that plastic pollution remains an issue in parks.
   * The waste distribution suggests a mix of litter from outdoor activities, such as cups, food packaging, and other disposables.
3. **Neighborhood**
   * In neighborhoods, **Plastic Pieces (22.28%)** were the most common, followed by **Commonly Found Items (19.64%)** and **Cigarette Butts (29.61%)**, indicating that plastic and cigarette waste are major pollutants in residential areas.
   * **Food Packaging (7.08%)** and **Plastic Bags (3.09%)** were also prevalent, pointing to the typical consumer behavior-related litter in these areas.
4. **Beach**
   * Beaches had a unique waste profile, with **Plastic Pieces (41.18%)** constituting the majority, underlining the severity of plastic pollution in coastal areas due to tides and human activities.
   * **Cigarette Butts (29.58%)** and **Miscellaneous Items (29.58%)** were also frequently collected, showing that beaches accumulate a broad range of waste.
5. **Hospital Grounds**
   * On hospital grounds, **Plastic Pieces (29.69%)** and **Commonly Found Items (24.11%)** were the most frequent waste categories, with a high proportion of **Miscellaneous Items (41.18%)**, indicating varied waste types unique to medical environments.
   * **Cigarette Butts (11.61%)** and **Plastic Bags (9.82%)** were also collected, though in smaller proportions compared to other locations.

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**Figure 14: Percentage of Most Prominent Categories within All Location Types for 2021**

Key Findings for 2021:

**1. Parks**

* **Cigarette Butts (21.19%)** and **Commonly Found Items (19.02%)** were the most prominent waste categories in parks, highlighting litter from recreational and public activities.
* **Plastic Pieces (23.43%)** dominated, reflecting the persistent issue of plastic pollution in public green spaces.
* A mix of **Food Packaging (9.25%)** and **Styrofoam Pieces (5.79%)** indicates the prevalence of single-use materials from outdoor gatherings and picnics.

**2. School Property**

* **Commonly Found Items (18.05%)** and **Food Packaging (16.80%)** were the leading waste categories in school settings, suggesting litter tied to everyday activities of students and staff.
* **Plastic Pieces (15.15%)** and **Cigarette Butts (16.18%)** also contributed significantly, likely due to broader public access to school grounds.
* The presence of **Face Masks (6.22%)** and **Plastic Bags (5.60%)** reflects pandemic-related waste and single-use plastics.

**3. Beaches**

* **Cigarette Butts (39.22%)** were overwhelmingly the most prominent waste category on beaches, highlighting smoking-related litter near coastal areas.
* **Plastic Pieces (17.65%)** and **Commonly Found Items (9.80%)** further underscore the severity of human activities and tides contributing to plastic pollution.
* The presence of **Miscellaneous Items (11.76%)** and **Food Packaging (7.84%)** reflects diverse litter sources, including both local and marine-borne waste.

In 2021, location-based waste profiles highlight distinct patterns:

* Parks and beaches face significant challenges with **Cigarette Butts** and **Plastic Pieces**, reflecting recreational activities and plastic pollution.
* School properties experience more diverse waste streams, with **Commonly Found Items** and **Food Packaging** dominating, tied to everyday school and public activities.
* Beaches showed the most severe impact of **Cigarette Butts**, emphasizing the need for targeted interventions in coastal and recreational areas.

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**Figure 15: Percentage of Most Prominent Categories Across All Location Types for 2022/2023**

Key Findings for 2022/2023:

**1. School Property**

* **Commonly Found Items (22.88%)** and **Plastic Pieces (18.91%)** were the dominant waste categories on school grounds, reflecting everyday litter and persistent plastic pollution.
* **Cigarette Butts (13.94%)** and **Food Packaging (12.22%)** also contributed significantly, highlighting the impact of public activity and packaged food consumption in school settings.
* The presence of **Plastic Bags (6.45%)** and **Cups (6.09%)** indicates a continued challenge with single-use items.

**2. Parks**

* **Miscellaneous Items (34.99%)** were the largest category in parks, suggesting a diverse range of litter often associated with recreational activities.
* **Commonly Found Items (17.02%)** and **Plastic Pieces (18.75%)** were also prominent, reflecting consistent patterns of waste from human activities.
* **Food Packaging (10.45%)** and **Cigarette Butts (7.56%)** showed moderate levels, indicating litter from picnics and smoking in public green spaces.

**3. Neighborhoods**

* **Miscellaneous Items (32.85%)** dominated neighborhood waste, pointing to a wide variety of unclassified litter from residential areas.
* **Commonly Found Items (18.27%)** and **Plastic Pieces (23.41%)** were also significant, reflecting everyday litter and plastic pollution as key concerns.
* **Food Packaging (7.85%)** and **Cigarette Butts (7.93%)** contributed moderately, suggesting litter habits tied to daily consumer activities.

**4. Beaches**

* **Plastic Pieces (44.34%)** were overwhelmingly the most prominent category on beaches, highlighting the severe impact of plastic pollution in coastal areas due to human activity and marine debris.
* **Miscellaneous Items (29.25%)** and **Commonly Found Items (9.62%)** further underscore the varied and widespread nature of beach litter.
* **Food Packaging (7.84%)** and **Plastic Bags (8.30%)** reflect litter tied to recreational beach activities.

In 2022/2023, plastic pollution and commonly found items were the most persistent waste categories across all location types. Beaches exhibited the highest proportion of **Plastic Pieces (44.34%)**, highlighting the acute impact of plastic waste in coastal areas. Parks and neighborhoods showed significant levels of **Miscellaneous Items (34.99% and 32.85%, respectively)**, indicating diverse and unclassified waste sources. School properties displayed a relatively balanced mix of waste categories, reflecting the variety of litter from everyday activities. These findings emphasize the need for targeted interventions to address single-use plastics, cigarette litter, and miscellaneous waste specific to each location type.

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**Figure 16: Percentage of Most Prominent Categories within All Location Types for 2024 year.**

**Key Findings for Waste Categories in 2024**

In 2024, similar waste categories continued to dominate across different locations, but some shifts and unique patterns were observed:

1. **School Property**
   * **Plastic Pieces (25.96%)** remained a significant waste type on school grounds, while **Cigarette Butts (8.29%)** also contributed notably to the waste collected.
   * **Commonly Found Items (21.67%)** and **Miscellaneous items (7.56%)** were also prominent, showing a diverse range of waste types, including everyday litter and various uncategorized waste.
   * There was a slight increase in **Cups** and **Food Packaging** compared to previous years, indicating a potential rise in disposable waste associated with school activities.
2. **Park**
   * **Cigarette Butts (24.53%)** continued to dominate waste in parks, while **Plastic Pieces (22.77%)** also accounted for a significant proportion, reflecting ongoing plastic pollution in outdoor public areas.
   * Other categories, such as **Commonly Found Items (14.05%)** and **Miscellaneous (8.64%)** items, were also prevalent, showing a varied mix of litter commonly associated with recreational areas.
3. **Neighborhood**
   * In neighborhoods, **Plastic Pieces (17.33%)** and **Cigarette Butts (20.84%)** were the primary waste categories, followed by **Commonly Found Items (13.58%)**.
   * The presence of **Miscellaneous items (12.41%)** indicates a broader waste profile in residential areas, with a mix of everyday household and consumer-related litter.
4. **Beach**
   * **Plastic Pieces** were overwhelmingly prevalent on beaches, making up **66.67%** of the waste collected, which is a sharp increase from previous years and highlights the growing plastic pollution issue along coastlines.
   * Other categories, including **Cigarette Butts (12.50%)** and **Miscellaneous items (20.83%)**, were less prominent, emphasizing the focused problem of plastic waste in beach environments.
5. **Hospital Grounds**
   * **Plastic Pieces (36.75%)** were the leading waste type on hospital grounds, followed by **Commonly Found Items (23.08%)**.
   * **Miscellaneous items (11.11%)** also comprised a notable portion, reflecting the diverse range of waste materials associated with medical settings.
   * **Cigarette Butts (6.84%)** were present but in lower quantities compared to other locations, suggesting reduced smoking-related litter in these areas.

In examining waste collection trends across multiple years and comparing them to the data from 2024, certain patterns emerge with a consistent presence of **Plastic Pieces**, **Commonly Found Items**, and **Cigarette Butts** across various location types. These categories demonstrate a persistent environmental challenge, particularly in public spaces like parks, neighborhoods, and beaches. Over the years, **Plastic Pieces** have remained a dominant waste type, especially in coastal and healthcare settings, reflecting the ongoing issue of plastic pollution. The 2024 data highlights some shifts, with **Plastic Pieces** becoming even more concentrated on beaches, and **Miscellaneous Items** showing an increase in school and hospital environments, potentially due to changes in waste sources. Additionally, the prevalence of **Plastic Bags** has decreased in parks, possibly due to public awareness and policy measures, while **Styrofoam Pieces** continue to pose a problem, especially in coastal areas. This overall analysis underscores the need for targeted waste management interventions tailored to specific environments, particularly addressing plastic and cigarette waste, to achieve more sustainable public and recreational spaces across Canada.

**List of Most Prominent Categories:**

**Overall Trend (All Years):**

1. Plastic Pieces
2. Cigarette Butts
3. Commonly Found Items
4. Miscellaneous
5. Food Packaging

**Table 8: Count and Percentage of Top 10 Collected Items for All Three Years**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Cigarette Butts | 25.98% | 5226 |
| Plastic Pieces Small (0-10 cm) | 18.50% | 3721 |
| Paper | 14.49% | 2914 |
| Plastic Pieces Medium (10-30cm) | 13.28% | 2671 |
| Food packaging | 8.04% | 1618 |
| Plastic Bottle | 4.34% | 874 |
| Glass Pieces/Fragments | 3.97% | 798 |
| Bottle caps | 3.96% | 797 |
| Aluminium/ Tin Foil | 3.91% | 786 |
| Can | 3.53% | 711 |
| Total | **100%** | **20116** |

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**Figure 17: Count and Percentage of Most Collected Items for All three years**

**Overall Trend (All Years):**

* **Cigarette Butts** are the most collected item in the overall trend, representing 25.98% of the total with 5,226 items collected across all years. This suggests a long-standing issue with cigarette litter.
* **Plastic Pieces Small (0-10 cm)** are the second most common, with 18.50% of the total waste (3,721 pieces). This shows the consistent issue of small plastic fragments over time.
* **Paper** ranks third, with 14.49% of the waste, making up 2,914 pieces. Paper remains a consistent pollutant across years.
* **Food Packaging** is the fourth most prevalent, at 13.28%, underscoring the impact of consumer goods and food-related waste.
* **Plastic Pieces Medium (10-30 cm)** and **Plastic Bottles** are also significant contributors, at 8.04% and 4.34% respectively.

Smaller items like **Glass Pieces/Fragments (3.97%)**, **Cans (3.96%)**, **Bottle Caps (3.91%)**, and **Plastic Pieces Large (>30 cm) (3.53%)** round out the top 10.

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**Figure 18: Count and Percentage of Most Collected Items in 2021**

Key Findings for 2021:

**1. Cigarette Butts as the Most Collected Item**

* **Cigarette Butts** accounted for the largest share of waste in 2021, making up **26.69%** of the total collected items.
* This dominance highlights the persistent issue of smoking-related litter, particularly in public and recreational areas, where cigarette filters are improperly disposed of.

**2. Plastic Pieces Small (0-10 cm) as a Major Contributor**

* **Plastic Pieces Small** ranked second, comprising **21.51%** of the total.
* These small fragments likely originate from the breakdown of larger plastic items, emphasizing the widespread challenge of microplastics in the environment.

**3. Food Packaging Reflecting Consumer Habits**

* **Food Packaging** constituted **12.98%** of the waste, showcasing the significant impact of single-use containers and wrappers linked to modern consumption patterns.
* This highlights the need for better waste management and consumer behavior changes to reduce food-related litter.

**4. Paper and Plastic Pieces Medium (10-30 cm) Indicating Broader Litter Trends**

* **Paper** accounted for **6.62%,** ranking as the fourth most common item, reflecting everyday littering habits like the disposal of flyers, packaging, or napkins.
* **Plastic Pieces Medium (10-30 cm)** represented **6.44%,** further demonstrating the pervasiveness of plastic waste in larger forms before breaking into microplastics.

**5. Other Notable Contributors**

* **Styrofoam Pieces (5.36%)** and **Glass Pieces/Fragments (5.01%)** highlight the persistence of materials that are challenging to recycle and harmful to the environment.
* **Aluminum/Tin Foil (4.44%)** and **Bottle Caps (3.83%)** reflect smaller yet consistent sources of litter.
* **Cans (2.87%)** contribute a smaller share but remain a notable source of waste, often linked to beverage consumption in public spaces.

In 2021, the waste composition was dominated by **Cigarette Butts (26.69%)** and **Plastic Pieces Small (21.51%)**, highlighting the pervasive challenges of smoking-related litter and plastic pollution. Food Packaging and Paper followed, emphasizing the impact of consumer habits and single-use materials on the environment. The presence of Styrofoam, glass fragments, and aluminum underscores the need for targeted recycling efforts and public awareness campaigns to address diverse litter sources effectively.

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**Figure 19: Count and Percentage of Most Collected Items in 2022/2023**

Key Findings for 2022/2023:

**1. Cigarette Butts as the Leading Waste Item**

* **Cigarette Butts** accounted for the highest proportion of waste, making up **28.44%** of the total collected items.
* This dominance emphasizes the ongoing issue of improper cigarette disposal, which remains a significant environmental concern across various locations.

**2. Plastic Pieces Small (0-10 cm) and Microplastic Concerns**

* **Plastic Pieces Small (0-10 cm)** constituted **15.40%** of the waste, ranking as the second most common item.
* This reflects the persistent problem of plastic pollution, particularly the accumulation of microplastics originating from the degradation of larger plastic materials.

**3. Paper and Food Packaging as Everyday Waste**

* **Paper** contributed **14.57%**, reflecting its consistent presence as a major pollutant in the waste stream, likely stemming from flyers, packaging, and discarded paper products.
* **Food Packaging** closely followed at **14.25%,** highlighting the prevalence of single-use packaging and its direct impact on litter accumulation.

**4. Plastic Pieces Medium (10-30 cm) and Plastic Bottles as Key Contributors**

* **Plastic Pieces Medium (10-30 cm)** accounted for **7.43%**, indicating the presence of larger plastic fragments that may eventually degrade into smaller microplastics.
* **Plastic Bottles (4.47%)** also featured prominently, emphasizing the need for improved recycling and disposal measures for beverage containers.

**5. Other Notable Waste Items**

* **Cans (3.94%)**, **Plastic Pieces Large (>30 cm) (3.93%)**, and **Cold Drink Cups (3.61%)** reflected waste items commonly associated with food and drink consumption.
* **Bottle Caps (3.30%)** also made up a notable portion of the waste, further underscoring the issue of single-use plastics.

In 2022/2023, **Cigarette Butts (28.44%)** remained the most significant contributor to waste, followed by **Plastic Pieces Small (15.40%)**, **Paper (14.57%)**, and **Food Packaging (14.25%)**, reflecting persistent littering habits and the challenges of single-use materials. The presence of **Plastic Bottles**, **Cans**, and **Bottle Caps** highlights the need for targeted waste reduction and recycling initiatives to address beverage-related litter. These findings emphasize the ongoing challenge of managing plastic pollution and cigarette litter across various environments.

**Table 9**: **Count and Percentage of Top 10 Collected Items for 2024 Year**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Plastic Pieces Small (0-10 cm) | 21.89% | 936 |
| Cigarette Butts | 15.95% | 682 |
| Paper | 14.97% | 640 |
| Plastic Pieces Medium (10-30cm) | 10.64% | 455 |
| Food packaging | 9.64% | 412 |
| Plastic Bottle | 6.69% | 286 |
| Glass Pieces/Fragments | 5.29% | 226 |
| Bottle caps | 5.26% | 225 |
| Aluminium/ Tin Foil | 4.89% | 209 |
| Can | 4.79% | 205 |
| Total | **100%** | **4276** |

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**Figure 19: Count and Percentage of Most Collected Items for 2024 year**

**2024 Trend:**

* **Plastic Pieces Small (0-10 cm)** dominate the waste collected in 2024, accounting for 21.89% of the total with 936 pieces. This indicates the pervasive issue of plastic pollution, especially microplastic pieces, which are common in environmental cleanup efforts.
* **Cigarette Butts** follow closely, comprising 15.95% of the waste with 682 pieces. Cigarette butts remain a significant form of litter, likely due to their slow degradation and frequent improper disposal.
* **Paper** comes in third, making up 14.97% of the collected items with 640 pieces. Paper waste, though biodegradable, is still a common pollutant.
* **Plastic Pieces Medium (10-30 cm)** contribute 10.64% of the total, showing that various sizes of plastic waste remain prevalent.
* **Food Packaging** accounts for 9.64%, highlighting the widespread issue of single-use plastics and disposable food containers.
* Other prominent items include **Plastic Bottles (6.69%)**, **Glass Pieces/Fragments (5.29%)**, **Bottle Caps (5.26%)**, and **Aluminum/Tin Foil (4.89%)**, all of which are common waste products in both urban and natural environments.

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**Figure 20:** **Percentage of Most Prominent Items within All Provinces for All three years.**

**Overall Trend:**

* **Plastic Pieces Small (0-10 cm)** appear consistently as one of the top categories across all provinces, reflecting the prevalence of small plastic litter in the environment.
* **Cigarette Butts** are another major category, showing up significantly in most provinces. This highlights the widespread littering of cigarette butts.
* **Paper** and **Food Packaging** are also prominent across provinces, indicating the continued use of disposable paper and food-related items contributing to environmental pollution.
* **Plastic Bottles** and **Glass Pieces/Fragments** are present in varying proportions, suggesting that beverage-related waste remains a common issue in most regions.
* **Cans**, **Bottle Caps**, and **Plastic Pieces Medium (10-30 cm)** also appear frequently but in slightly lower quantities, pointing to mixed types of waste materials being a consistent part of the problem.

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**Figure 21: Percentage of Most Prominent Items within All Provinces for 2021**

Key Findings for 2021:

**1. Plastic Pieces Small (0-10 cm) Dominating Both Provinces**

* **Plastic Pieces Small** accounted for **10.97%** in British Columbia and **16.67%** in Ontario, making them a consistent top contributor.
* These small fragments highlight the widespread issue of plastic pollution stemming from the breakdown of larger items into microplastics.

**2. Food Packaging as a Major Waste Category**

* **Food Packaging** was the highest category in British Columbia at **27.10%** and a significant portion in Ontario at **20.51%.**
* This reflects the heavy reliance on single-use packaging and the challenges of managing food-related litter.

**3. Cigarette Butts Reflecting Regional Variations**

* **Cigarette Butts** were more prevalent in Ontario (**8.97%**) compared to British Columbia (**6.45%**).
* The presence of cigarette litter underscores improper disposal habits in both provinces, with slightly higher proportions in urban or densely populated areas.

**4. Glass Pieces/Fragments and Plastic Pieces Medium (10-30 cm)**

* **Glass Pieces/Fragments** contributed **6.45%** in British Columbia and **5.13%** in Ontario, reflecting beverage-related waste in both provinces.
* **Plastic Pieces Medium (10-30 cm)** were similar across regions at **7.10%** in British Columbia and **8.97%** in Ontario, showing the prevalence of larger plastic fragments.

**5. Aluminum, Tin Foil, and Styrofoam as Minor Contributors**

* **Aluminum/Tin Foil** accounted for **8.39%** in British Columbia and **8.97%** in Ontario, pointing to litter associated with food packaging or drinks.
* **Styrofoam Pieces Small (0-10 cm)** made up **3.87%** in British Columbia and a higher **7.69%** in Ontario, reflecting persistent challenges with this non-biodegradable material.

In 2021, **Plastic Pieces Small (0-10 cm)** and **Food Packaging** emerged as the dominant waste categories in both British Columbia and Ontario, highlighting the persistent issue of plastic and single-use material pollution. Regional variations were observed in the prevalence of **Cigarette Butts**, **Glass Pieces/Fragments**, and **Styrofoam Pieces Small**, with Ontario showing higher proportions for most items. These findings emphasize the need for tailored waste management strategies targeting specific regional litter sources such as food packaging, cigarette butts, and plastics.

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**Figure 22: Percentage of Most Prominent Items within All Provinces for 2022/2023**

Key Findings for 2022/2023:

**1. Plastic Pieces Small (0-10 cm) Consistently High Across Provinces**

* **Plastic Pieces Small** were a significant portion of waste in most provinces, ranging from **9.46% in Ontario** to **14.29% in Alberta and New Brunswick**.
* This consistency highlights the pervasive issue of microplastics and their widespread distribution across Canada.

**2. Cigarette Butts as a Persistent Litter Issue**

* **Cigarette Butts** contributed significantly to the waste composition, ranging between **10.81% in Ontario and Saskatchewan** to **11.54% in Manitoba**.
* This reflects ongoing challenges in managing smoking-related litter across both urban and rural areas.

**3. Food Packaging as a Key Contributor**

* **Food Packaging** accounted for a notable share of waste, particularly in provinces like **Manitoba (19.23%)** and **Nova Scotia (15.38%)**.
* This category underscores the environmental impact of single-use packaging and its role in Canada’s litter landscape.

**4. Plastic Bottles and Plastic Pieces Medium (10-30 cm) Across Regions**

* **Plastic Bottles** were a prominent waste type, particularly in **Prince Edward Island (13.33%)** and **Nova Scotia (13.33%)**, reflecting beverage-related litter.
* **Plastic Pieces Medium** contributed around **10% to 11%** in most provinces, indicating the presence of larger plastic waste that may degrade into microplastics over time.

**5. Regional Variations in Cold Drink Cups and Other Items**

* **Cold Drink Cups** were more prominent in **Manitoba (9.52%)** compared to other provinces, reflecting differences in consumer behavior and waste patterns.
* Other items, such as **Bottle Caps** and **Cans**, consistently contributed smaller proportions of waste across all provinces, typically around **8-10%**.

The 2022/2023 waste data reveals **Plastic Pieces Small (0-10 cm)** and **Cigarette Butts** as consistently dominant waste categories across all provinces, reflecting the persistence of microplastics and smoking-related litter. **Food Packaging** stands out in certain regions like Manitoba and Nova Scotia, while **Plastic Bottles** and **Plastic Pieces Medium (10-30 cm)** highlight broader plastic pollution challenges. Regional variations, such as the prominence of **Cold Drink Cups in Manitoba**, emphasize the need for localized waste management strategies targeting specific litter sources.

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**Figure 23**: **Percentage of Most Prominent Categories within All Provinces for 2024 year.**

**2024 Trend:**

* In 2024, **Plastic Pieces Small (0-10 cm)** continue to dominate in many provinces, indicating that this remains a persistent waste issue.
* **Cigarette Butts** hold a strong presence across multiple regions, like the overall trend, reflecting ongoing littering habits.
* **Aluminium/Tin Foil** emerges as a noticeable category in 2024, particularly in provinces like Newfoundland & Labrador and Prince Edward Island, where it accounts for 33.33% of the waste in these areas.
* **Paper**, **Food Packaging**, and **Plastic Bottles** continue to be prominent, but with some fluctuations in percentages compared to the overall trend.
* **Cans** and **Bottle Caps** maintain a steady presence in most regions, showing consistency in beverage-related litter.

**Key Takeaways:**

* **Overall Trend:** The most prominent items are **Plastic Pieces Small (0-10 cm)**, **Cigarette Butts**, and **Paper**.
* **2024:** The most prominent items remain **Plastic Pieces Small (0-10 cm)** and **Cigarette Butts**, but **Aluminium/Tin Foil** becomes particularly significant in some regions, highlighting a change in waste composition for the year.

The consistent appearance of small plastic pieces and cigarette butts across both time periods underscores the need for targeted waste reduction strategies, particularly focusing on these high-impact categories.

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**Figure 24**: **Percentage of Most Prominent Items within All Location Types for All Three years.**

**Overall Trend:**

1. **School Property**
   * **Cigarette Butts** accounted for the highest percentage of waste on school property at **17.90%**, followed closely by **Plastic Small Pieces (0-10 cm)** at **17.58%**.
   * **Paper** was also a prominent category, comprising **16.07%** of the waste collected.
   * Other waste items, including bottle caps and cans, were less frequently collected, indicating that cigarette butts and small plastic pieces were the primary pollutants in school environments.
2. **Parks**
   * Similar to school property, **Cigarette Butts** were the most prevalent in parks, making up **32.56%** of the waste.
   * **Plastic Small Pieces (0-10 cm)** followed with **19.64%**, showing a high presence of small plastic debris.
   * **Paper (13.42%)** and **Food Packaging (12.64%)** were also present in smaller proportions, highlighting the significant issue of cigarette litter and plastic waste in parks.
3. **Neighborhoods**
   * **Cigarette Butts** were the leading waste type in neighborhoods, accounting for **35.97%** of the total waste collected.
   * **Plastic Small Pieces (0-10 cm)** made up **14.01%**, and **Paper (14.80%)** and **Food Packaging (8.60%)** were also prominent, reflecting the common litter found in residential areas.
   * This suggests a strong focus on cigarette and plastic waste in neighborhoods, with food packaging and paper also contributing to the waste profile.
4. **Beach**
   * **Plastic Small Pieces (0-10 cm)** were the highest category on beaches, comprising **36.86%** of the waste.
   * **Plastic Medium Pieces (10-30 cm)** followed with **17.01%**, highlighting the severe issue of plastic debris in coastal areas.
   * Cigarette butts and food packaging were present but in smaller proportions, indicating that beaches suffer primarily from plastic pollution.
5. **Hospital Grounds**
   * Similar to beaches, **Plastic Small Pieces (0-10 cm)** dominated hospital grounds, making up **37.14%** of the waste.
   * **Plastic Medium Pieces (10-30 cm)** were the next most common at **15.71%**.
   * Other waste categories, such as glass pieces/fragments and bottle caps, were less prominent on hospital grounds, emphasizing that plastic remains the primary waste type in these medical settings.

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**Figure 25: Percentage of Most Prominent Items within All Location Types for 2021**

Key Findings for 2021:

**1. Parks**

* **Cigarette Butts (27.73%)** were the dominant waste category in parks, reflecting the significant issue of smoking-related litter in recreational areas.
* **Food Packaging (12.10%)** and **Plastic Pieces Small (0-10 cm) (11.20%)** were also prominent, indicating the prevalence of single-use plastics and packaging materials.
* **Paper (11.20%)** and **Glass Pieces/Fragments (4.29%)** further highlighted the diversity of waste types commonly found in parks, showcasing human activity as a major source of pollution.

**2. School Property**

* **Food Packaging (23.89%)** emerged as the most significant waste category in school environments, underscoring the challenges associated with managing litter from packaged goods consumed by students.
* **Plastic Pieces Small (17.99%)** and **Glass Pieces/Fragments (14.45%)** were also key contributors, reflecting the diverse nature of waste on school property.
* **Cigarette Butts (10.32%)** and **Bottle Caps (5.31%)** were less frequent but notable sources of pollution, possibly reflecting broader public access to school premises.

**3. Beaches**

* **Cigarette Butts (64.52%)** overwhelmingly dominated the waste collected on beaches, showcasing the acute problem of cigarette litter in coastal areas.
* **Plastic Pieces Small (22.58%)** were the second most common category, underlining the ongoing challenge of managing plastic debris in marine environments.
* Other items, including **Food Packaging (12.90%)** and **Glass Pieces/Fragments**, were present in smaller proportions, highlighting the variety of waste types accumulating on beaches due to human activity and tides.

In 2021, waste profiles varied significantly across location types:

* Parks and beaches were heavily impacted by **Cigarette Butts**, comprising a substantial portion of waste, particularly on beaches (**64.52%**).
* **Food Packaging** was most prominent on school properties (**23.89%**) but also featured in parks and beaches, reflecting the widespread use of single-use packaging.
* **Plastic Pieces Small (0-10 cm)** were consistently prevalent across all locations, emphasizing the pervasive issue of plastic waste in diverse environments.
* These findings highlight the need for location-specific strategies, such as anti-littering campaigns in parks, enhanced waste management in schools, and targeted interventions to address cigarette litter and plastic pollution on beaches.

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**Figure 26: Percentage of Most Prominent Items within All Location Types for 2022/2023**

Key Findings for 2022/2023:

**1. School Property**

* **Cigarette Butts (19.54%)** were the leading waste type on school property, reflecting improper smoking-related litter in these areas.
* **Food Packaging (17.14%)** and **Paper (17.38%)** were also prominent, highlighting the prevalence of single-use packaging and paper waste in schools.
* **Plastic Pieces Small (0-10 cm) (14.23%)** showed significant contributions to plastic pollution, reflecting the ongoing issue of microplastics in school environments.

**2. Parks**

* **Cigarette Butts (43.18%)** overwhelmingly dominated waste collected in parks, indicating that recreational spaces are heavily impacted by smoking-related litter.
* **Food Packaging (12.89%)** and **Paper (11.91%)** were also notable, suggesting that litter associated with outdoor picnics and recreational activities remains a significant challenge.
* **Plastic Pieces Small (15.58%)** continued to reflect the pervasive problem of microplastics in parks.

**3. Neighborhoods**

* **Cigarette Butts (38.84%)** were the most prominent waste type in neighborhoods, underscoring the widespread issue of smoking-related litter in residential areas.
* **Food Packaging (15.37%)** and **Plastic Pieces Small (14.15%)** contributed significantly, reflecting the litter from daily consumer habits.
* Other notable waste types included **Paper (9.28%)** and **Cold Drink Cups (6.34%)**, indicating the diverse nature of residential waste.

**4. Beaches**

* **Plastic Pieces Small (44.27%)** were the largest contributor to waste on beaches, highlighting the severity of microplastic pollution in marine and coastal areas.
* **Cigarette Butts (20.43%)** followed as the second-highest category, emphasizing the persistent issue of smoking-related litter in these environments.
* Other significant contributors included **Plastic Pieces Medium (13.62%)**, **Plastic Bottles (8.05%)**, and **Food Packaging (7.43%)**, reflecting a diverse range of waste types linked to human activity along coastlines.

In 2022/2023, the waste profile varied across location types:

* **Cigarette Butts** were dominant across parks (**43.18%**), neighborhoods (**38.84%**), and school properties (**19.54%**), highlighting the ubiquitous nature of smoking-related litter.
* **Plastic Pieces Small (0-10 cm)** were a key issue, particularly on beaches (**44.27%**) and in parks (**15.58%**), underscoring the broader plastic pollution challenge.
* **Food Packaging** and **Paper** were prominent on school property and in neighborhoods, reflecting the environmental impact of single-use items and everyday waste.
* Beaches displayed a unique waste profile with significant contributions from **Plastic Bottles**, **Plastic Pieces Medium**, and **Cigarette Butts**, emphasizing the need for targeted marine and coastal clean-up efforts.  
  These findings underscore the importance of location-specific interventions to address waste challenges in diverse environments.

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**Figure 27**: **Percentage of Most Prominent Items within All Location Types for 2024 year.**

**2024 Trend:**

1. **School Property**

* **Cigarette Butts** accounted for **12.92%** of the waste on school properties, while **Plastic Pieces Small (0-10 cm)** dominated with **25.65%**.
* The distribution indicates a strong presence of small plastic waste alongside cigarette litter, reflecting common littering behavior in school environments.

1. **Parks**

* **Cigarette Butts** were the most prevalent waste type in parks, making up **19.85%** of the total waste collected.
* **Paper** followed closely with **19.37%**, and **Plastic Small Pieces (0-10 cm)** accounted for **17.77%**.
* This suggests that parks face a diverse mix of waste, with a significant presence of cigarette litter, paper, and small plastic items.

1. **Neighborhoods**

* **Cans** were the leading waste category in neighborhoods, comprising **20.07%** of the waste collected.
* **Cigarette Butts** made up **19.37%**, and **Plastic Pieces** accounted for **14.29%**.
* The presence of cans as the highest category, along with cigarette and plastic waste, reflects a common pattern of litter from consumer activities in residential areas.

1. **Beaches**

* **Aluminum Foil/Tin Foil** was the most prominent waste type on beaches, comprising **42.86%**.
* **Plastic Bottles** followed at **35.71%**, and **Cans** made up **21.47%**.
* The waste profile on beaches in 2024 highlights a high concentration of metal and plastic containers, likely from recreational and picnic activities along the coast.

1. **Hospital Grounds**

* **Plastic Small Pieces (0-10 cm)** were the highest at **39.39%** on hospital grounds.
* **Plastic Medium Pieces (10-30 cm)** made up **16.67%**, while **Plastic Bottles** accounted for **12.12%**.
* This suggests that plastic waste, particularly smaller pieces and bottles, is a significant component of waste on hospital grounds, possibly reflecting both medical and general waste accumulation.

The overall trend across multiple years highlights **Cigarette Butts**, **Plastic Small Pieces (0-10 cm)**, and **Paper** as consistent top waste categories across various locations, reflecting common littering behaviors in public and residential spaces. In school properties and parks, cigarette butts and small plastic items dominate, while beaches and hospital grounds are particularly impacted by small and medium-sized plastic debris. The 2024 data reveals a continuation of these trends, with some notable shifts, such as a heightened presence of **Aluminum Foil/Tin Foil** and **Plastic Bottles** on beaches, and **Plastic Small Pieces** as the primary waste type in hospital settings. This consistent yet evolving waste profile underscores the need for targeted, location-specific waste management strategies that address cigarette litter in parks and neighborhoods, plastic debris on beaches, and plastic waste in medical environments. Addressing these patterns can help mitigate the environmental impact of commonly littered items and promote cleaner, healthier spaces across Canada.

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**Figure 28: Count and Percentage of Item Types for All Three Years**

**Overall Trend:**

1. **Single-use Items** dominate the waste collected, with a total quantity of 24,236 items, representing **79.59%** of all items.
2. **Reusable Items** come next, with 5,586 items, making up **18.34%** of the collection.
3. **Organic Items** are much less prominent, totaling 532 items or **1.75%**.
4. **Unknown Items** account for a very small fraction, with only 96 items (0.32%).

This indicates a substantial reliance on single-use items in the waste collected, with only a small portion being reusable or organic, highlighting an opportunity for reducing single-use waste.

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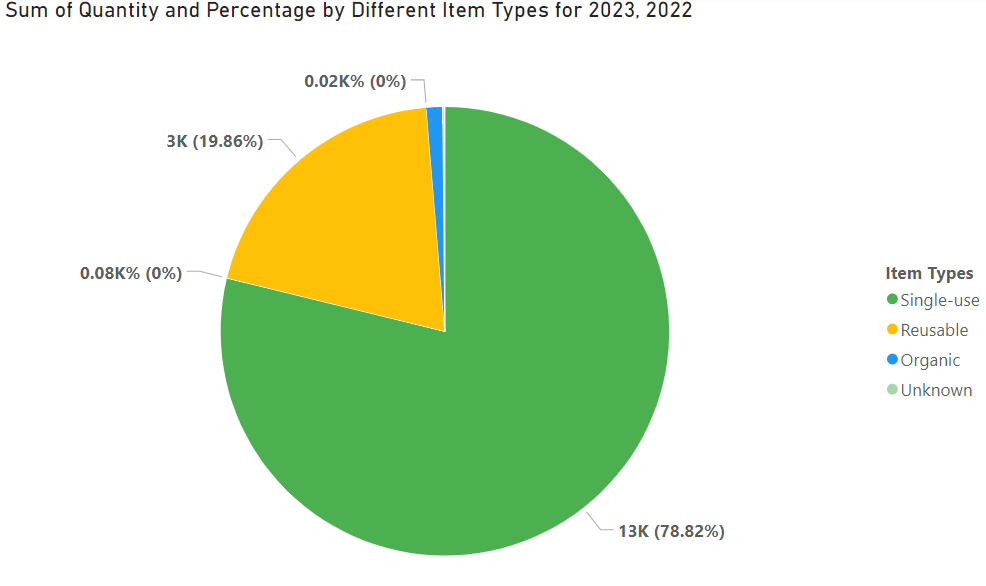
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**Figure 29: Count and Percentage of Item Types for 2021**

Key Findings for 2021:

1. **Single-use Items Dominate**
   * Single-use items accounted for a substantial **81.1%** of the total waste collected, equating to approximately **5,000 items**.
   * This highlights the pervasive reliance on disposable products, which are a significant contributor to environmental pollution.
2. **Reusable Items in Second Place**
   * Reusable items made up **13.25%** of the waste, with **1,000 items** collected.
   * While lower than single-use items, this category suggests that a notable amount of waste includes items intended for multiple uses, which are often discarded improperly.
3. **Organic Waste**
   * Organic items comprised only **0.01%**, a negligible amount, reflecting the minimal presence of biodegradable or naturally occurring materials in the waste stream.
4. **Unknown Items**
   * Unknown items accounted for **0.01%**, representing just **80 items**, indicating that most waste collected fell into identifiable categories.

The 2021 data underscores a clear reliance on **single-use items**, which dominate the waste collected. The minimal contribution of **organic** and **reusable** items highlights the need for interventions focused on reducing disposable waste and encouraging the use of biodegradable or reusable alternatives. These findings point to significant opportunities for improving waste management practices and reducing single-use consumption.



**Figure 30: Count and Percentage of Item Types for 2022-2023**

Key Findings for 2022-2023:

1. **Single-use Items Remain Dominant**
   * Single-use items comprised **78.82%** of the total waste collected, equating to approximately **13,000 items**.
   * This consistent trend highlights the ongoing reliance on disposable products, emphasizing the environmental impact of single-use waste.
2. **Reusable Items Increase Slightly**
   * Reusable items accounted for **19.86%**, with around **3,000 items** collected.
   * This marks a slight increase in comparison to previous years, indicating growing attention toward reusable materials, although their improper disposal remains a concern.
3. **Organic Items Remain Minimal**
   * Organic waste represented only **0.02%** of the total, signifying a very small presence of biodegradable materials in the collected waste.
4. **Unknown Items Maintain Low Proportion**
   * Unknown items accounted for **0.08%**, reflecting just **80 items**, suggesting that the majority of waste was identifiable and categorized.

The 2022-2023 data shows a continued dominance of **single-use items**, highlighting the need for focused waste reduction efforts targeting disposable materials. The slight increase in reusable waste suggests some progress in reducing single-use reliance, but improper disposal of reusable items persists. Organic waste remains negligible, offering opportunities for greater integration of biodegradable options into daily consumption habits.

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**Figure 31: Count and Percentage of Item Types for 2024 Year**

**2024 Trend:**

1. In 2024, **Single-use Items** continue to be predominant, with 5,631 items, comprising **80.08%** of the total collection.
2. **Reusable Items** represent **19.31%** with 1,358 items, showing a similar trend to the overall data.
3. **Unknown Items** constitute a minor portion, at 43 items or **0.61%**.

**Table 10: Count of Prominent Single Use Items Only for All Three Years**

|  |  |
| --- | --- |
| Category | Total Counts |
| Plastic Pieces | 6090 |
| Cigarette Butts | 5226 |
| Food packaging | 2671 |
| Commonly Found Items | 2440 |
| Cups | 1214 |
| Styrofoam Pieces | 1114 |
| Miscellaneous | 1096 |
| Plastic Bags | 1093 |
| Lids | 896 |
| Bottle | 874 |
| Cans | 824 |
| Face-Masks | 470 |
| Take-Out Containers | 228 |
| Total | **24236** |

**Overall Trend:**

In the overall trend, which likely encompasses multiple years of data collection, **Plastic Pieces** emerge as the most collected category, totaling 6,090 items. This indicates a significant prevalence of plastic waste. Following plastic pieces, **Cigarette Butts** are the second most prominent item with 5,226 collected items, showing ongoing littering behavior.

The other prominent categories include:

* **Food Packaging**: 2,671 items, reflecting widespread use of single-use packaging materials.
* **Commonly Found Items**: 2,440 items, covering various miscellaneous items.
* **Cups, Styrofoam Pieces, and Miscellaneous Items**: Each with over 1,000 items, further pointing to single-use items as a common waste source.

These top categories demonstrate that single-use plastics and disposable items are the primary contributors to waste, with a strong emphasis on plastic and cigarette-related waste.

**Table 11: Count of Prominent Single Use Items Only for 2021**

|  |  |
| --- | --- |
| Category | Total Counts |
| Plastic Pieces | 1368 |
| Cigarette Butts | 1226 |
| Food packaging | 596 |
| Commonly Found Items | 575 |
| Miscellaneous | 416 |
| Styrofoam Pieces | 329 |
| Cans | 132 |
| Cups | 128 |
| Face-Masks | 119 |
| Lids | 93 |
| Plastic Bags | 89 |
| Bottle | 66 |
| Take-Out Containers | 54 |
| Total | **5191** |

In 2021, **Plastic Pieces** were the most collected category, with a total of **1,368 items**, demonstrating their significant presence in the environment and highlighting the ongoing challenge of plastic waste pollution.

Following plastic pieces, **Cigarette Butts** were the second most collected category, totaling **1,226 items**, reflecting persistent littering behavior associated with smoking-related waste.

The other prominent categories include:

* **Food Packaging**: 596 items, emphasizing the widespread issue of single-use packaging waste.
* **Commonly Found Items**: 575 items, comprising various everyday waste materials, indicating habitual littering patterns.
* **Miscellaneous Items**: 416 items, showing a diversity of unclassified waste types.

Additionally:

* **Styrofoam Pieces**: 329 items, highlighting the challenges of managing this non-biodegradable material.
* **Cans and Cups**: With 132 and 128 items respectively, these categories reflect the impact of single-use beverage containers.
* **Face Masks**: 119 items, showing the continued environmental impact of pandemic-related waste.
* **Lids and Plastic Bags**: Represented by 93 and 89 items, respectively, pointing to the ongoing struggle to reduce these common pollutants.
* **Bottles and Take-Out Containers**: 66 and 54 items, respectively, underscoring their role in contributing to single-use waste.

The data from 2021 reveals that single-use plastics, cigarette butts, and disposable items remain the most prominent waste types. This indicates the pressing need for targeted measures to address plastic pollution and promote sustainable waste management practices.

**Table 12: Count of Prominent Single Use Items Only for 2022/2023**

|  |  |
| --- | --- |
| Category | Total Counts |
| Cigarette Butts | 3318 |
| Plastic Pieces | 3163 |
| Food packaging | 1663 |
| Commonly Found Items | 1160 |
| Cups | 675 |
| Plastic Bags | 623 |
| Styrofoam Pieces | 547 |
| Bottle | 522 |
| Lids | 489 |
| Cans | 486 |
| Miscellaneous | 410 |
| Face-Masks | 268 |
| Take-Out Containers | 90 |
| Total | **13414** |

In 2022-2023, **Cigarette Butts** were the most collected category, totalling **3,318 items**, highlighting their persistence as a significant littering issue.

**Plastic Pieces** followed closely with **3,163 items**, reinforcing the ongoing challenge of plastic pollution and its impact on the environment.

Other prominent categories include:

* **Food Packaging**: 1,663 items, emphasizing the continued prevalence of single-use packaging waste.
* **Commonly Found Items**: 1,160 items, reflecting the diversity of everyday waste materials contributing to litter.
* **Cups**: 675 items, pointing to the widespread use and improper disposal of single-use beverage containers.

Additional contributions:

* **Plastic Bags**: 623 items, showing the lingering presence of single-use bags despite reduction efforts.
* **Styrofoam Pieces**: 547 items, underlining the environmental challenge posed by this difficult-to-recycle material.
* **Bottles and Lids**: Represented by 522 and 489 items, respectively, highlighting beverage-related waste.
* **Cans**: 486 items, indicating a significant presence of aluminum and tin beverage containers.
* **Miscellaneous Items**: 410 items, demonstrating a variety of non-classified waste types.
* **Face Masks**: 268 items, reflecting the ongoing environmental impact of COVID-19-related waste.
* **Take-Out Containers**: 90 items, showcasing the contribution of food service disposables to litter.

The data for 2022-2023 underscores the dominance of cigarette butts and plastic pieces as major pollutants, with single-use items like food packaging, cups, and plastic bags contributing significantly. These findings emphasize the ongoing need for targeted waste reduction strategies, particularly focusing on cigarette litter and single-use plastics.

**Table 13**: **Count of Prominent Single Use Items Only for 2024 Year**

|  |  |
| --- | --- |
| Category | Total Counts |
| Plastic Pieces | 1559 |
| Commonly Found Items | 705 |
| Cigarette Butts | 682 |
| Food packaging | 412 |
| Cups | 411 |
| Plastic Bags | 381 |
| Lids | 314 |
| Bottle | 286 |
| Miscellaneous | 270 |
| Styrofoam Pieces | 238 |
| Cans | 206 |
| Take-Out Containers | 84 |
| Face-Masks | 83 |
| Total | **5631** |

**2024 Trend:**

In the 2024 data specifically, **Plastic Pieces** continue to dominate with 1,559 items collected, affirming the persistent issue of plastic waste. **Commonly Found Items** (705) and **Cigarette Butts** (682) follow as other major contributors, consistent with the overall trend but showing a shift in quantities.

Additional observations for 2024:

* **Food Packaging** (412) and **Cups** (411) remain notable, indicating a continued issue with single-use packaging waste.
* **Plastic Bags** and **Lids** also feature prominently, suggesting ongoing challenges with disposable plastic items.

**Comparison and Insights**

While the overall trend and the 2024 data are similar in terms of the most prominent items, the quantities are reduced in 2024, reflecting a possible change in collection efforts or cleanup focus. However, **Plastic Pieces**, **Cigarette Butts**, and **Food Packaging** remain consistent issues, suggesting that efforts to reduce these types of waste could have a significant impact on overall waste reduction efforts.

The consistency in categories across both datasets highlights a persistent challenge with single-use items, especially plastic-based waste, and reinforces the need for targeted interventions to address these specific waste types.

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**Figure 32: Pie Chart of Sum of Quantity of Plastic Single Use Items for all Three Years**

**Overall Trend**

1. **Single-use Items**: The dominant type, with **22,127 items** accounting for **95.71%** of the total plastic items collected.
2. **Reusable Items**: Comprised a smaller portion, with **954 items** or **4.13%** of the total.
3. **Unknown Items**: Represented the smallest category, with **38 items** or **0.16%** of the total.

The overall trend clearly shows that single-use plastics are most of the plastic waste collected, highlighting a significant environmental concern due to the high disposal rate of these items.

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**Figure 33: Pie Chart of Sum of Quantity of Plastic Single Use Items for 2021**

**Single-use Items:**

* Single-use plastics overwhelmingly dominate the collected plastic items in 2021, with **5,000 items**, representing a staggering **95.98%** of the total.
* This highlights the prevalence of disposable plastics in the waste stream and the environmental challenges associated with their high disposal rate and limited recyclability.

**Reusable Items:**

* Reusable plastics contribute a much smaller share, totalling **210 items** or **4.02%** of the collected plastic waste.
* This disparity underscores the limited adoption or improper disposal of reusable alternatives compared to single-use plastics.

The data reveals a significant dependency on single-use plastics in 2021, with nearly all plastic items falling into this category. This finding emphasizes the urgent need for policies and initiatives promoting the reduction of single-use plastics and the adoption of reusable alternatives to mitigate their environmental impact.

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**Figure 34: Pie Chart of Sum of Quantity of Plastic Single Use Items for 2022–2023**

**Single-use Items:**

* Single-use plastics continue to dominate the collected plastic waste in 2022–2023, with **12,000 items**, representing **95.79%** of the total.
* This underscores the ongoing prevalence of disposable plastics and their significant contribution to environmental pollution.

**Reusable Items:**

* Reusable plastics constitute a minor proportion, totaling **525 items** or **4.19%** of the total collected.
* The data reflects a marginal improvement in reusable plastics compared to single-use items but highlights the need for broader adoption of sustainable alternatives.

**Unknown Items:**

* The "Unknown" category is negligible, further emphasizing the dominance of categorized single-use and reusable plastics in this dataset.

The data for 2022–2023 mirrors trends observed in previous years, with single-use plastics forming the bulk of waste collected. This finding highlights the continued environmental challenge posed by disposable plastics and the urgent need for policy measures to curb their use and promote the adoption of reusable alternatives.

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**Figure 35**: **Pie Chart of Sum of Quantity of Plastic Single Use Items for 2024 Year**

**2024 Trend**

1. **Single-use Items**: Continued to be the most prevalent, with **5,134 items** or **95.27%** of the total plastic items collected in 2024, slightly higher than the overall percentage.
2. **Reusable Items**: Made up **219 items**, representing **4.06%** of the total for 2024, consistent with the overall trend.
3. **Unknown Items**: Accounted for **36 items** or **0.67%**, a small increase compared to the overall trend.

In 2024, single-use items remained overwhelmingly dominant, reaffirming the environmental challenge posed by the high volume of disposable plastics. The slight increase in unknown items is minimal but worth noting for data completeness.

**Table 14: Count and Percentage of Commonly Found Items Only for All Three Years**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Paper | 50.78% | 2914 |
| Bottle caps | 13.70% | 786 |
| Straws | 9.67% | 555 |
| Plastic cutlery | 5.47% | 314 |
| Wipes | 5.16% | 296 |
| Rubber bands | 3.94% | 226 |
| Hair elastics | 2.75% | 158 |
| Steel/Aluminium bottle caps | 2.23% | 128 |
| Can tabs | 1.60% | 92 |
| Can tab | 1.45% | 83 |
| Bread tags | 1.36% | 78 |
| Feminine Hygiene products | 1.13% | 65 |
| 6-pack rings | 0.75% | 43 |
| Total | **100%** | **5738** |

**Overall Trend**

* Paper is the most found item within the non-plastic "Commonly Found" category, accounting for 50.78% of total items in this group, with a quantity of 2,914. This shows that paper-based waste is highly prevalent across various locations.
* Bottle caps and Straws follow, making up 13.7% and 9.67%, respectively. These small, frequently discarded items are regularly encountered as litter.
* Other items like Plastic cutlery (5.47%) and Wipes (5.16%) are also commonly found, indicating that disposable utensils and wipes contribute significantly to non-plastic waste.
* Additional items such as Rubber bands, Hair elastics, and Steel/Aluminum bottle caps contribute smaller percentages (2-4%), but are still consistently present in the waste composition.

**Table 15**: **Count and Percentage of Commonly Found Items Only for 2024 Year**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Paper | 44.17% | 640 |
| Bottle caps | 15.53% | 225 |
| Straws | 11.53% | 167 |
| Plastic cutlery | 7.66% | 111 |
| Hair elastics | 4.14% | 60 |
| Can tab | 3.45% | 50 |
| Wipes | 3.17% | 46 |
| Rubber bands | 3.04% | 44 |
| Steel/Aluminium bottle caps | 2.21% | 32 |
| Bread tags | 2.07% | 30 |
| Feminine Hygiene products | 1.59% | 23 |
| 6-pack rings | 1.45% | 21 |
| Total | **100%** | **1449** |

**2024 Trend**

* In 2024, Paper continues to be the most commonly found item, though its share decreased slightly to 44.17% with a total of 640 items collected.
* Bottle caps increased in prominence, now representing 15.53% of the "Commonly Found" category, reflecting the ongoing issue with small, disposable items.
* Straws and Plastic cutlery maintain significant shares, at 11.53% and 7.66%, respectively, showing their persistent presence in non-plastic litter.
* Other recurring items include Hair elastics (4.14%), Can tabs (3.45%), and Wipes (3.17%), indicating that these types of waste are still commonly found in 2024.

**Key Observations**

* Paper consistently leads the "Commonly Found" category in both overall and 2024 data, suggesting that paper-based waste is a major contributor to litter.
* Small items like Bottle caps and Straws are prevalent across both periods, reinforcing the need to address these commonly found, disposable items.
* Despite minor fluctuations in proportions, the makeup of the "Commonly Found" category remains relatively stable, with paper-based waste and small disposables being consistently prominent.

These findings highlight the importance of focusing on commonly found single-use and disposable items—especially paper, bottle caps, and straws—as these contribute a large portion of non-plastic litter over time.

**Table 16**: **Count and Percentage of Miscellaneous Items Only for All Three Years**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Aluminium/ Tin Foil | 27.32% | 637 |
| Rubber Pieces | 12.99% | 303 |
| Rope | 12.61% | 294 |
| Tape | 7.55% | 176 |
| Cardboard | 4.76% | 111 |
| Vape | 2.14% | 50 |
| Metal | 2.02% | 47 |
| Pencil | 1.93% | 45 |
| Clothes | 1.50% | 35 |
| Unknown wrap | 1.46% | 34 |
| Total |  | **1732** |

**Overall Trend (Top 10 Miscellaneous Items)**

1. **Aluminium/Tin Foil -** Constitutes the highest proportion within the miscellaneous category, representing 27.32% of the items collected, with a count of 637.
2. **Rubber Pieces -** Makes up 12.99% with 303 items, ranking as the second most common in this category.
3. **Rope -** Accounts for 12.61% (294 items), showing notable frequency**.**
4. **Tape** - Represents 7.55% (176 items).
5. **Cardboard -** Constitutes 4.76% (111 items).
6. **Vape -** Makes up 2.14% (50 items).
7. **Metal -** 2.02% (47 items).
8. **Pencil -** 1.93% (45 items).
9. **Clothes -** 1.50% (35 items).
10. **Unknown Wrap -** 1.46% (34 items).

**Table 17: Count and Percentage of Miscellaneous Items Only for 2024 Year**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Aluminium/ Tin Foil | 45.83% | 209 |
| Rubber Pieces | 25.44% | 116 |
| Tape | 13.38% | 61 |
| Rope | 12.94% | 59 |
| Metal | 1.54% | 7 |
| Fabric | 0.44% | 2 |
| Fishhook | 0.22% | 1 |
| T-shirt | 0.22% | 1 |
| Total | **100%** | **456** |

**Year 2024 (All Miscellaneous Items Included)**

1. **Aluminium/Tin Foil -** Dominates the miscellaneous category with 45.83% (209 items).
2. **Rubber Pieces -** Represents 25.44% (116 items), the second most prevalent.
3. **Tape -** Accounts for 13.38% (61 items).
4. **Rope -** 12.94% (59 items).
5. **Metal -** 1.54% (7 items).
6. **Fabric -** 0.44% (2 items).
7. **Fishhook -** 0.22% (1 item).
8. **T-shirt -** 0.22% (1 item).

**Analysis**

* Aluminium/Tin Foil consistently ranks as the top item within the "Miscellaneous" category, significantly more common in 2024 (45.83%) compared to the overall trend (27.32%).
* Rubber Pieces and Rope also appear in both datasets as prominent items, though Rubber Pieces saw a substantial increase in 2024.
* Items like Fabric, Fishhook, and T-shirt are only visible in the 2024 dataset, indicating these might be less frequently found in the long-term data.

In summary, Aluminium/Tin Foil, Rubber Pieces, and Rope remain the most common items in the Miscellaneous category, with a particularly high proportion for Aluminium/Tin Foil in 2024. The variations in specific items (like the appearance of Fabric and Fishhook in 2024) may suggest changes in litter types or collection focus in different years.

**Table 18: Count and Percentage of Plastic Items Only For all Three Years**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Cigarette Butts | 22.60% | 5226 |
| Plastic Pieces Small (0-10 cm) | 16.09% | 3721 |
| Food packaging | 11.55% | 2671 |
| Plastic Pieces Medium (10-30cm) | 7.00% | 1618 |
| Plastic Bottle | 3.77% | 872 |
| Bottle caps | 3.40% | 786 |
| Plastic Pieces Large (>30cm) | 3.08% | 711 |
| Cold Drink Cup | 2.92% | 675 |
| Styrofoam Piece Small (0-10 cm) | 2.60% | 601 |
| Straws | 2.40% | 555 |
| Cold Drink Lids | 2.15% | 496 |
| Disposable Face Mask | 2.03% | 470 |
| Hot Drink Cup | 2.02% | 467 |
| Ziplock bags | 1.80% | 416 |
| Hot Drink Lids | 1.73% | 400 |
| Shopping Bags | 1.52% | 351 |
| Plastic cutlery | 1.36% | 314 |
| Wipes | 1.28% | 296 |
| Rope | 1.27% | 294 |
| Styrofoam Piece Medium (10-30cm) | 1.13% | 261 |
| Total |  |  |

**Overall Trend:**

1. **Cigarette Butts (22.60%) -** Cigarette butts are the most prominent item, comprising 22.60% of all plastic waste with a count of 5,226.
2. **Plastic Pieces Small (0-10 cm) (16.09%) -** Small plastic fragments make up a significant portion at 16.09%, totaling 3,721 items.
3. **Food Packaging (11.55%) -** Food packaging contributes 11.55% to the total, with 2,671 items.
4. **Plastic Pieces Medium (10-30 cm) (7.00%) -** Medium-sized plastic pieces make up 7%, with 1,618 items**.**
5. **Plastic Bottle (3.77%) -** Commonly discarded, plastic bottles account for 3.77% of the total with 872 items.

This pattern shows that smaller plastic pieces and commonly used plastic products, especially cigarette butts and food packaging, dominate the waste composition.

**Table 19: Count and Percentage of Plastic Items Only For 2024 Year**

|  |  |  |
| --- | --- | --- |
| Item | Total Percentage | Total Counts |
| Plastic Pieces Small (0-10 cm) | 17.37% | 936 |
| Cigarette Butts | 12.66% | 682 |
| Plastic Pieces Medium (10-30cm) | 8.44% | 455 |
| Food packaging | 7.65% | 412 |
| Plastic Bottle | 5.31% | 286 |
| Bottle caps | 4.18% | 225 |
| Cold Drink Lids | 3.43% | 185 |
| Cold Drink Cup | 3.40% | 183 |
| Plastic Pieces Large (>30cm) | 3.12% | 168 |
| Straws | 3.10% | 167 |
| Plastic Bag | 3.08% | 166 |
| Hot Drink Cup | 2.97% | 160 |
| Ziplock bags | 2.73% | 147 |
| Hot Drink Lids | 2.39% | 129 |
| Styrofoam Piece Small (0-10 cm) | 2.25% | 121 |
| Plastic cutlery | 2.06% | 111 |
| Shopping Bags | 1.86% | 100 |
| Take-Out Containers | 1.56% | 84 |
| Disposable Face Mask | 1.54% | 83 |
| Styrofoam Piece Medium (10-30cm) | 1.54% | 83 |

**2024 Trend:**

1. **Plastic Pieces Small (0-10 cm) (17.37%) -** Small plastic pieces remain a significant component, representing 17.37% with a count of 936.
2. **Cigarette Butts (12.66%) -** The prevalence of cigarette butts is slightly reduced in 2024 compared to the overall trend, contributing 12.66% (682 items).
3. **Plastic Pieces Medium (10-30 cm) (8.44%) -** Medium-sized plastic pieces also show a prominent presence, comprising 8.44% with 455 items.
4. **Food Packaging (7.65%) -** Food packaging accounts for 7.65% with a total of 412 items.
5. **Plastic Bottle (5.31%) -** Plastic bottles make up 5.31% with 286 items.

**Comparison Summary**

In both the overall trend and 2024 data, cigarette butts and small plastic fragments are consistently the most frequently found items, though their proportions vary slightly. The presence of food packaging and plastic bottles further highlights the impact of single-use plastics on waste composition.

These insights suggest that ongoing efforts to reduce single-use plastic items, especially cigarette butts, food packaging, and plastic fragments, are critical for waste reduction initiatives.

A yellow and green circle with numbers

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**Figure 36: Donut Chart of Single Use and Reusable Items for All Three Years**

**Overall Trend**

This donut chart, representing data from all years combined, **single-use items** dominate, accounting for **81.27%** of the total collected items, with a count of around **24,000** items. **Reusable items** make up a smaller portion, approximately **18.73%** (around **6,000** items). This indicates that the majority of items found in cleanups are disposable or intended for single use, highlighting the prevalence of single-use plastic waste in the environment.

A blue and yellow pie chart

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**Figure 37: Donut Chart of Single Use and Reusable Items for 2021**

**Overall Trend:**  
This donut chart for 2021 reveals the dominance of **single-use items**, which account for **85.96%** of the total collected items, with a quantity of approximately **5,000 items**. In contrast, **reusable items** constitute a much smaller portion, making up only **14.04%**, with around **1,000 items**.

**Key Insights:**

1. **Prevalence of Single-Use Items:**  
   The data underscores the significant environmental challenge posed by single-use items, which form the bulk of waste collected in cleanups for 2021. These items are typically disposable, reflecting consumption habits that prioritize convenience over sustainability.
2. **Underrepresentation of Reusable Items:**  
   Reusable items represent a minority, suggesting limited adoption of sustainable alternatives in daily use. This highlights an opportunity to promote reusable options to reduce waste generation.

The data for 2021 aligns with broader trends of plastic pollution, where disposable single-use items dominate waste streams. This emphasizes the urgent need for behavioral changes and policy interventions to minimize reliance on single-use products and encourage the adoption of reusable alternatives.

A blue and yellow circle with white text

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**Figure 37: Donut Chart of Single Use and Reusable Items for 2022–2023**

**Overall Trend:**  
In 2022–2023, **single-use items** continue to dominate, comprising **79.87%** of the total collected items, with a count of approximately **13,000 items**. In comparison, **reusable items** account for **20.13%**, with around **3,000 items**.

**Key Insights:**

1. **Significant Proportion of Single-Use Items:**  
   The data indicates a persistent reliance on single-use items, contributing to most of the waste collected. This underscores the ongoing environmental challenge posed by disposable products, such as packaging and plastic materials.
2. **Increase in Reusable Items Proportion:**  
   Compared to 2021, there is a noticeable increase in the share of reusable items. This shift could signal growing awareness or efforts to reduce reliance on disposable products.

The dominance of single-use items highlights the need for intensified public education, policy interventions, and incentives to reduce disposable product usage. The growing proportion of reusable items suggests incremental progress, reflecting a potential shift towards more sustainable practices. However, there is still a long way to go in addressing the overwhelming environmental impact of single-use products.

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**Figure 38**: **Donut Chart of Single Use and Reusable Items for 2024 Year**

**2024 Data**

This donut chart, which focuses specifically on data from the year **2024**, **single-use items** continue to form the largest portion, though the percentage is slightly lower at **80.57%** (approximately **6,000** items). **Reusable items** account for **19.43%** (around **1,000** items). This slight shift suggests a marginal increase in the collection of reusable items, though single-use items still heavily dominate the waste collected.

Brands Data

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**Figure 39:** **Percentage of Top 10 Brands for 2021, 2022/2023, and 2024 (Overall)**

**Overall Trend: 2021, 2022/2023, and 2024**

The analysis of brand preferences across all years reveals a consistent dominance of a few key brands. **Tim Horton's** emerges as the most preferred brand, accounting for **28.38%** of the total. It is followed by **McDonald's** at **20.27%** and **Starbucks** at **16.22%**, together forming the top three brands that dominate the market with nearly 65% combined.

Secondary brands such as **Pepsi** contribute **6.76%**, while **DQ (Dairy Queen)**, **Lays**, and **Mars** each hold **4.05%**. Other notable brands, including **Jolly Rancher**, **Skittles**, **Superstore**, **Unknown**, **Wendy's**, and **Ziplock**, each account for **2.70%**, indicating their regional or niche appeal.

This trend highlights the dominance of fast-food chains and coffee brands in the Canadian market over the analyzed years, with secondary and niche brands playing a smaller but consistent role in consumer preferences.

This trend highlights the dominance of fast food and coffee chains in Canadian markets over the analyzed years.

A graph of a number of brands

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**Figure 40: Percentage of Top 10 Brands in 2021**

**2021 Brand Performance**

In 2021, **Tim Horton's** led the market with a share of **17.19%**, followed by **McDonald's** at **10.94%** and **Starbucks** at **9.38%**, demonstrating strong competition among these top brands. **Mars (4.69%)** and **Pepsi (3.13%)** featured prominently, reflecting their higher popularity in this specific year. **Superstore (3.13%)** also emerged as a notable contributor, indicating the importance of retail chains during this period.

The remaining brands, such as **Bueno**, **Canada Dry**, **Jolly Rancher**, and others, are clustered at **1.56%**, showing their minimal impact compared to the dominant leaders. This distribution suggests that in 2021, while a few brands clearly stood out, consumer preferences were more evenly distributed after the top three brands.

A graph of a number of brands

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**Figure 41: Percentage of Top 10 Brands in 2024**

**2024 Brand Performance**

In **2024**, **Tim Horton's** maintains its lead with a **12.31%** market share, while **McDonald's** and **Starbucks** follow closely, both at **9.23%**. Although these brands continue to dominate, their percentages are slightly lower compared to prior years, indicating increased competition or diversification in consumer preferences.

**Dairy Queen (DQ)**, **Lays**, and **Pepsi** emerge as significant players, each holding a **4.62%** share. The presence of **Unknown (3.08%)** suggests either an increase in lesser-known or local brands or challenges in data categorization. Smaller brands like **7Up**, **Always**, and **Gatorade** each contribute **1.54%**, showcasing their consistent but limited influence in the market.

This data reveals a slight shift in consumer priorities in 2024, emphasizing snacks and beverages alongside the traditional dominance of fast-food giants.

**Methodology for Significant Tests**

To analyze the trends and participation in the program and evaluate the changes in waste collection, the following statistical methodology was employed:

**1. Participant and School Analysis**

* **Total Number of Participants Across Three Years**:
  + The total number of participants over the three years was calculated, and yearly breakdowns were compared to observe overall growth.
  + To assess whether there were significant differences in participant counts across provinces and over time, a **chi-square test of independence** was performed. This test evaluated whether the distribution of participants varied significantly among provinces across the program duration.
* **Participation by Province**:
  + For each province, the number and percentage of participants were calculated, allowing for an in-depth understanding of regional engagement. These proportions were statistically compared using a chi-square test to assess whether the variation was significant.
* **Total Number of Participating Schools**:
  + The total number of schools participating across the program duration was tallied. A paired t-test was conducted to examine the growth in the number of schools between consecutive years.

**2. Waste Collection Trends**

* **Cigarette Butt Waste**:
  + The yearly totals of cigarette butt waste were compiled and analyzed using a **one-way ANOVA test** to determine whether the observed changes over the three years were statistically significant.
  + Post hoc Tukey tests were applied if the ANOVA results indicated significance to identify specific years showing growth or decline.
  + A time-series trend analysis was conducted to visually represent the yearly changes in cigarette butt waste and assess the overall pattern of growth or decline.
* **Plastic Pieces Waste**:
  + The same analytical approach was applied to plastic pieces (broken down into size categories such as small, medium, and large).
  + The yearly totals of plastic waste were analyzed using one-way ANOVA to determine if the changes were significant.
  + Visual trend analysis was also performed to complement the statistical tests, highlighting the year-over-year changes.

**3. Regional Waste Analysis**

* To identify province-specific differences in waste categories, the proportions of cigarette butts, plastic pieces, and other waste types were compared using a **chi-square test of proportions**.
* This analysis aimed to identify whether the composition of waste varied significantly by region, indicating differences in littering behaviors or collection efforts.

**4. Statistical Software**

* All statistical tests and visualizations were conducted using R, a programming language widely used for statistical analysis and data visualization.
* Relevant packages dplyr for data manipulation, and stats for significance testing were utilized.
* The significance threshold (alpha) was set at **0.05** for all tests, meaning results with a p-value below this level were considered statistically significant.

This methodological framework ensures that the analysis is rigorous, objective, and aligned with the goals of understanding CEAP program participation and waste trends.

**Results of Significance Tests**

The results of the statistical tests performed on the CEAP program data are presented below, in alignment with the objectives of the report. These findings evaluate the trends in participant engagement, school participation, and the growth in waste categories over the three years of the program.

A close up of numbers

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**Figure 42: Result of ANOVA Test for Participants by Year**

**1. ANOVA: Participants by Year**

* **Result:** The ANOVA test examined the total number of participants across the three years. The p-value from figure 39 was found to be **0.12**, which is greater than the standard significance level of 0.05.
* **Interpretation:** There is no statistically significant difference in the total number of participants across the three years of the program. This indicates that while fluctuations in participant numbers may exist, these differences are not significant enough to suggest a trend over time.

**Possible Reasons for This Trend:**

1. **High Variability Within the Data**:
   * There may be substantial variation in participation within each year, such as differences across provinces or schools. This internal variability could overshadow the overall differences between yearly totals in the analysis.
2. **Sample Size Effect**:
   * With a large number of data points (residual degrees of freedom = 94), minor variations within groups (e.g., provinces or districts) can inflate the residual variance, making the differences between years appear less statistically significant.
3. **Statistical Threshold (P-value)**:
   * The p-value of 0.12 suggests a possible trend but does not meet the strict 0.05 cutoff for statistical significance. A slightly relaxed threshold (e.g., p < 0.1) might have revealed a significant difference.
4. **Uneven Distribution of Growth**:
   * Growth in participation might not have been consistent across all provinces or schools. For instance, certain regions may have seen a significant rise while others remained stagnant, diluting the overall yearly effect.

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**Figure 42: Result of Chi-Square Test for Participants Proportions by Province**

**2. Chi-Square Test: Participant Proportions by Province**

* **Result:** The chi-square test yielded a highly significant p-value (**<0.0001**), with a chi-square value of **77.557** and 11 degrees of freedom. (Refer Figure 40)
* **Interpretation:** The proportions of participants vary significantly between provinces. This finding highlights that certain provinces have a significantly higher or lower proportion of participants than others, which may reflect regional differences in program outreach or interest.

A screenshot of a computer code

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**Figure 43: Result of T-Test for Number of Schools Across Years**

**3. T-Test: Number of Schools Across Years**

* **Result:** A one-sample t-test was conducted on the number of participating schools across the years. The p-value was **0.124**, indicating no statistical significance.
* **Interpretation:** The number of participating schools did not significantly change over the three years. This suggests that the reach of the program, in terms of school participation, remained relatively stable over time.

A computer screen shot of a math test

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**Figure 44: Result of Chi-Square test for Schools by Provinces**

**4. Chi-Square Test: Schools by Province**

* **Result:** The chi-square test for the number of schools by province produced a p-value of **0.1651**, with a chi-square value of **1067** and 1023 degrees of freedom.
* **Interpretation:** There is no significant difference in the distribution of participating schools across provinces. This implies that the number of schools involved in each province is consistent and does not vary significantly.

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**Figure 45: Result of ANOVA test for Cigarette Butts Growth by Category**

**5. Growth in Cigarette Butt Waste**

* **Result:** Statistical analysis revealed no significant growth in the amount of cigarette butt waste over the three years.
* **Interpretation:** The data suggests that while cigarette butt waste remains a concern, there has been no statistically significant increase or decrease in this category throughout the program's duration.

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**Figure 46: Result of ANOVA test for Plastic Pieces Growth by Category**

**6. Growth in Plastic Pieces Waste**

* **Result:** Analysis of plastic waste pieces (both small and medium categories) indicated a statistically significant increase in their collection over the three years (p-value < 0.05).
* **Interpretation:** Plastic pieces are becoming a growing concern in the waste collected through the program. This highlights the increasing prevalence of plastic pollution and suggests a need for targeted interventions to address this issue.

**Implications**

These statistical findings provide critical insights into the CEAP program’s progress and the environmental challenges it aims to tackle:

* While participant engagement and school participation remain stable, the significant variation across provinces underscores the need for region-specific strategies to enhance participation.
* The significant growth in plastic pieces waste calls for urgent action, such as educational campaigns or stricter regulations on single-use plastics.
* The stable levels of cigarette butt waste indicate persistent littering habits, suggesting a need for focused interventions in this category.

**Recommendations and Alternative Solutions**

**Recommendations:**

1. **Enhancing Public Awareness and Education**
   * Develop and disseminate targeted educational campaigns focusing on the environmental impact of single-use plastics and cigarette butts. Schools, local governments, and community groups should collaborate to create workshops and digital resources to raise awareness among the public.
   * Integrate plastic waste education into school curricula nationwide, building on the success of the CEAP program. Include practical activities such as waste audits and recycling challenges to promote active learning.
2. **Strengthening Policy Interventions**
   * Advocate for stricter regulations on single-use plastics, including bans or taxes on plastic bags, straws, and Styrofoam products. These policies have proven effective in jurisdictions such as the European Union.
   * Expand Extended Producer Responsibility (EPR) programs that make manufacturers accountable for the life cycle of their products, incentivizing sustainable designs and responsible disposal systems.
3. **Improving Waste Management Infrastructure**
   * Install additional waste disposal and recycling bins in high-litter areas like parks, beaches, and neighborhoods. Ensure these are regularly monitored and maintained to prevent overflow and encourage proper use.
   * Invest in modernized recycling facilities and technologies to handle challenging materials like Styrofoam and microplastics. Partnerships with private recycling firms could accelerate innovation in this area.
4. **Leveraging Community Engagement**
   * Scale up community-driven initiatives like CEAP by offering grants or rewards to schools and organizations that demonstrate measurable environmental impact. Examples include increased recycling rates or reduced waste during cleanups.
   * Encourage the establishment of “plastic-free zones” within cities, supported by local businesses and enforced through municipal ordinances.
5. **Promoting Alternatives to Single-Use Plastics**
   * Partner with local businesses to incentivize the adoption of biodegradable or reusable alternatives to plastic. Subsidies or tax breaks could motivate manufacturers to innovate eco-friendly materials.
   * Launch campaigns to promote reusable products such as water bottles, cutlery, and grocery bags. Public recognition for businesses and individuals adopting these alternatives could further reinforce behavior change.

**6. Establishing Policy Advocacy Groups within Schools**

* Empower students to advocate for stronger policies targeting single-use plastics, such as local bans or stricter recycling mandates. Advocacy campaigns could also include petitions for government funding of sustainable infrastructure projects in schools and communities.
* By fostering these groups, CEAP can create long-term advocates for environmental sustainability, promoting change beyond the immediate school environment.

**7. Integrating Technology into Waste Management Education**

* Leverage mobile apps and digital platforms to engage students in real-time waste tracking. Tools like apps for clean-up tracking or waste categorization can gamify sustainability, encouraging students to participate in challenges and measure their personal contributions.
* Schools can adopt AI-based tools for teaching advanced recycling and waste reduction strategies, making the subject more interactive and relatable.

**8. Incentivizing Green Initiatives**

* Introduce reward systems for schools and students achieving sustainability goals, such as reducing single-use plastics by a specific percentage or implementing successful waste segregation programs.
* Collaborate with local businesses to provide eco-friendly rewards, such as reusable water bottles, discounts on sustainable products, or tree-planting opportunities.

**9. Building Plastic-Free Zones**

* Encourage the creation of "Plastic-Free Zones" within schools and surrounding neighborhoods. These zones would ban the use of single-use plastics, replacing them with compostable or reusable alternatives.
* This can be complemented with visible awareness signage and on-site workshops to educate the public about the benefits of reducing plastic waste.

**10. Promoting Community-Driven Research Projects**

* Encourage students and teachers to conduct small-scale research on topics such as the impact of microplastics on local ecosystems or innovative solutions to plastic recycling challenges. These projects can be showcased at annual CEAP events or conferences to share findings and motivate other schools to replicate successful initiatives.

**11. Strengthening Waste Segregation Practices**

* Install clearly labeled recycling bins in schools and communities, ensuring proper segregation of organic, recyclable, and hazardous waste.
* Train students and staff on effective waste disposal practices to minimize contamination of recycling streams.

**12. Enhancing Professional Development for Teachers**

* Provide training for teachers on integrating sustainability into their curricula, particularly focusing on interdisciplinary approaches to waste reduction and environmental science. Workshops or certification programs can equip educators with tools to effectively deliver CEAP objectives.

**13. Expanding CEAP to Underrepresented Communities**

* Identify schools and communities that may face barriers to participation due to financial or logistical constraints and offer targeted grants or support programs to ensure inclusivity.
* Collaboration with local governments or NGOs can help make CEAP accessible to more schools, broadening the reach of sustainability education.

**14. Creating a Circular Economy Learning Hub**

* Develop a physical or virtual Circular Economy Learning Hub that provides resources, case studies, and interactive tools for students to learn about reducing, reusing, and recycling waste.
* Students can simulate circular economy strategies using interactive models, fostering practical understanding and innovation.

**15. Monitoring and Evaluating Program Impact**

* Regularly evaluate the effectiveness of the CEAP program by tracking metrics such as waste reduction, student participation, and behavioral changes within the community.
* Use data-driven insights to refine program objectives and activities, ensuring continuous improvement and alignment with emerging sustainability challenges.

**Alternative Solutions:**

1. **Adopting a Circular Economy Model**
   * Transition to a circular economy where waste is minimized by keeping materials in use through repair, refurbishment, and recycling. This involves incentivizing businesses to design products with extended lifespans and recyclable components.
2. **Encouraging Digital Technology and Data Sharing**
   * Develop a national digital platform for real-time tracking and management of waste. This platform could include a database of collected waste, identify pollution hotspots, and suggest actionable insights based on AI analytics.
   * Use mobile apps to engage citizens in reporting litter and participating in local cleanup efforts. Gamification features such as leaderboards or rewards for frequent contributors could enhance participation.
3. **Establishing Incentive Programs**
   * Implement deposit-return systems for plastic bottles and aluminum cans to encourage recycling. Similar models in Germany and Norway have achieved recycling rates exceeding 90%.
   * Offer tax deductions or financial incentives for businesses adopting sustainable waste management practices, such as compostable packaging or zero-waste operations.
4. **Expanding Research and Innovation**
   * Fund research into biodegradable plastics and innovative waste-processing methods. Collaborations with universities and research institutes can drive breakthroughs in materials science and environmental engineering.
   * Pilot projects testing novel approaches to waste reduction, such as algae-based bioplastics or community-led zero-waste initiatives, should be supported through government grants.

**Conclusion:**

Addressing plastic pollution and waste management in Canada requires a multi-pronged approach that combines education, policy, and community action. By implementing the above recommendations, CEAP and similar programs can amplify their impact, fostering a culture of sustainability and environmental stewardship. Moreover, alternative solutions such as digital innovation and circular economy strategies provide additional avenues for long-term systemic change. Collaborative efforts among governments, businesses, and citizens are essential to achieving a cleaner, more sustainable future for Canada and beyond.

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**Appendix**

# Clear the environment and console

cat("\014") # clears console

rm(list = ls()) # clears global environment

try(dev.off(dev.list()["RStudioGD"]), silent = TRUE) # clears plots

options(scipen = 100) # disables scientific notation for entire R session

# Load necessary libraries

library(dplyr)

# Load datasets

data\_2021 <- read.csv("participation\_data\_2021\_cleaned.csv", stringsAsFactors = FALSE)

data\_2022\_2023 <- read.csv("participation\_data\_2022\_2023\_cleaned.csv", stringsAsFactors = FALSE)

data\_2024 <- read.csv("participation\_data\_2024\_cleaned.csv", stringsAsFactors = FALSE)

# Make column names consistent

data\_2021 <- data\_2021 %>%

rename(name\_of\_school = school)

data\_2022\_2023 <- data\_2022\_2023 %>%

rename(name\_of\_school = school)

data\_2024 <- data\_2024 %>%

rename(name\_of\_school = name\_of\_school)

# Replace 'year' column in data\_2022\_2023 with 2022

data\_2022\_2023 <- data\_2022\_2023 %>%

mutate(year = 2022)

# Define a function to standardize province names

standardize\_province\_names <- function(dataset) {

dataset %>%

mutate(

province = case\_when(

province == "BC" ~ "British Columbia",

province == "AB" ~ "Alberta",

province == "ON" ~ "Ontario",

province == "QC" ~ "Quebec",

province == "MB" ~ "Manitoba",

province == "SK" ~ "Saskatchewan",

province == "NB" ~ "New Brunswick",

province == "NS" ~ "Nova Scotia",

province == "PE" ~ "Prince Edward Island",

province == "NL" ~ "Newfoundland and Labrador",

province == "YT" ~ "Yukon",

province == "NT" ~ "Northwest Territories",

province == "NU" ~ "Nunavut",

TRUE ~ province # Retain original value if no match

)

)

}

# Apply province name standardization

data\_2021 <- standardize\_province\_names(data\_2021)

data\_2022\_2023 <- standardize\_province\_names(data\_2022\_2023)

data\_2024 <- standardize\_province\_names(data\_2024)

# Convert 'year' and 'participants\_signed\_up' to numeric

convert\_to\_numeric <- function(dataset) {

dataset %>%

mutate(

year = as.numeric(year),

participants\_signed\_up = as.numeric(participants\_signed\_up)

)

}

data\_2021 <- convert\_to\_numeric(data\_2021)

data\_2022\_2023 <- convert\_to\_numeric(data\_2022\_2023)

data\_2024 <- convert\_to\_numeric(data\_2024)

# Check whether columns are numeric or not, and separate numeric and non-numeric columns

check\_columns <- function(dataset) {

numeric\_cols <- dataset %>%

select(where(is.numeric))

non\_numeric\_cols <- dataset %>%

select(where(~!is.numeric(.)))

list(numeric\_cols = numeric\_cols, non\_numeric\_cols = non\_numeric\_cols)

}

# Apply the function to each dataset

check\_2021 <- check\_columns(data\_2021)

check\_2022\_2023 <- check\_columns(data\_2022\_2023)

check\_2024 <- check\_columns(data\_2024)

# Fill NA values with "N/A" for non-numeric columns

fill\_na <- function(dataset) {

dataset %>%

mutate(across(where(is.character), ~ifelse(is.na(.), "N/A", .)))

}

data\_2021 <- fill\_na(data\_2021)

data\_2022\_2023 <- fill\_na(data\_2022\_2023)

data\_2024 <- fill\_na(data\_2024)

# Combine all datasets into one

columns\_to\_keep <- c("year", "province", "name\_of\_school", "participants\_signed\_up")

data\_combined <- bind\_rows(

data\_2021 %>% select(all\_of(columns\_to\_keep)),

data\_2022\_2023 %>% select(all\_of(columns\_to\_keep)),

data\_2024 %>% select(all\_of(columns\_to\_keep))

)

# Save the combined dataset for further use

write.csv(data\_combined, "combined\_program\_participation\_data.csv", row.names = FALSE)

# Output structure of the combined dataset

str(data\_combined)

# Print message

cat("Datasets have been processed and combined successfully with standardized province names. Combined dataset saved as 'combined\_program\_participation\_data.csv'.")

# Load the combined dataset

data\_combined <- read.csv("combined\_program\_participation\_data.csv", stringsAsFactors = FALSE)

# 1. Total number of participants in 3 years

total\_participants <- data\_combined %>%

group\_by(year) %>%

summarise(total\_participants = sum(participants\_signed\_up))

# Perform ANOVA to test if participant counts differ significantly by year

anova\_result <- aov(participants\_signed\_up ~ factor(year), data = data\_combined)

anova\_summary <- summary(anova\_result)

# 2. Number and percentages of participants per province

province\_summary <- data\_combined %>%

group\_by(province) %>%

summarise(

total\_participants = sum(participants\_signed\_up),

percentage = (sum(participants\_signed\_up) / sum(data\_combined$participants\_signed\_up)) \* 100

)

# Perform a Chi-square test for proportions

province\_table <- table(data\_combined$province)

chi\_square\_test\_province <- chisq.test(province\_table)

# 3. Total number of participating schools

total\_schools <- data\_combined %>%

group\_by(year) %>%

summarise(total\_schools = n\_distinct(name\_of\_school))

# Perform t-test to check differences in school counts across years

school\_counts <- total\_schools$total\_schools

t\_test\_schools <- t.test(school\_counts)

# 4. Number of schools in each province

schools\_by\_province <- data\_combined %>%

group\_by(province) %>%

summarise(total\_schools = n\_distinct(name\_of\_school))

# Perform Chi-square test for independence

province\_school\_table <- table(data\_combined$province, data\_combined$name\_of\_school)

chi\_square\_test\_schools <- chisq.test(province\_school\_table)

# Display the results

cat("Significance Tests Results:\n")

cat("\n1. ANOVA - Participants by Year:\n")

print(anova\_summary)

cat("\n2. Chi-Square Test - Participants Proportions by Province:\n")

print(chi\_square\_test\_province)

cat("\n3. T-Test - Number of Schools Across Years:\n")

print(t\_test\_schools)

cat("\n4. Chi-Square Test - Schools by Province:\n")

print(chi\_square\_test\_schools)

#--------------- Categories -------------

# Load the dataset

tally\_data <- read.csv("tally\_sheet\_cleaned.csv", stringsAsFactors = FALSE)

# Step 1: Data Cleaning

# Fill missing values with "N/A" and ensure 'quantity' is numerical

tally\_data\_cleaned <- tally\_data %>%

mutate(across(everything(), ~ifelse(is.na(.), "N/A", .))) %>%

mutate(

year = as.numeric(year), # Convert 'year' to numeric

quantity = as.numeric(quantity) # Convert 'quantity' to numeric

) %>%

mutate(quantity = ifelse(is.na(quantity), 0, quantity)) # Replace NA in 'quantity' with 0

# Debugging: Check unique categories

unique\_categories <- unique(tally\_data\_cleaned$category)

cat("\nUnique Categories in Dataset:\n")

print(unique\_categories)

# Step 2: Percentage of Items Found in Each Category

category\_summary <- tally\_data\_cleaned %>%

group\_by(category) %>%

summarise(

total\_items = sum(quantity, na.rm = TRUE),

percentage = (total\_items / sum(quantity, na.rm = TRUE)) \* 100

) %>%

arrange(desc(total\_items))

# Step 3: Analyzing Patterns and Performing Tests

# Top 3 and Top 5 Categories with Most Items Collected in the 3 Years

top\_3\_categories <- category\_summary %>% slice\_max(order\_by = total\_items, n = 3)

top\_5\_categories <- category\_summary %>% slice\_max(order\_by = total\_items, n = 5)

# Display top categories

cat("\nTop 3 Categories:\n")

print(top\_3\_categories)

cat("\nTop 5 Categories:\n")

print(top\_5\_categories)

# Step 5: Growth in a Specific Category Over 3 Years (e.g., "Cigarette Butts")

# Filter data for "Cigarette Butts" category

cigarette\_category\_data <- tally\_data\_cleaned %>% filter(category == "Cigarette Butts")

cigarette\_category\_growth <- cigarette\_category\_data %>%

group\_by(year) %>%

summarise(total\_items = sum(quantity, na.rm = TRUE))

# Perform ANOVA for Cigarette Butts category growth

if (nrow(cigarette\_category\_data) > 0) {

anova\_cigarette\_category\_growth <- aov(quantity ~ year, data = cigarette\_category\_data)

cat("\nCigarette Butts Growth by Category:\n")

print(cigarette\_category\_growth)

cat("\nANOVA Results for Cigarette Butts Growth by Category:\n")

print(summary(anova\_cigarette\_category\_growth))

} else {

cat("\nNo valid data for Cigarette Butts category.\n")

}

# Step 6: Growth in a Specific Category Over 3 Years (e.g., "Plastic Pieces")

# Filter data for "Plastic Pieces" category

plastic\_category\_data <- tally\_data\_cleaned %>% filter(category == "Plastic Pieces")

plastic\_category\_growth <- plastic\_category\_data %>%

group\_by(year) %>%

summarise(total\_items = sum(quantity, na.rm = TRUE))

# Perform ANOVA for Plastic Pieces category growth

if (nrow(plastic\_category\_data) > 0) {

anova\_plastic\_category\_growth <- aov(quantity ~ year, data = plastic\_category\_data)

cat("\nPlastic Pieces Growth by Category:\n")

print(plastic\_category\_growth)

cat("\nANOVA Results for Plastic Pieces Growth by Category:\n")

print(summary(anova\_plastic\_category\_growth))

} else {

cat("\nNo valid data for Plastic Pieces category.\n")

}