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Generational Differences in Awareness and Eco-friendly Behavior among Women towards Household Waste Management with a Special Focus on AHP Waste

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ABSTRACT

Effective household waste management is crucial for addressing the challenges that arise from rapid urbanization. An increase in awareness of the environmental issues related to careless waste disposal, and a clear sense of responsibility for responsible resource use, waste segregation, and sustainable disposal practices at the household level may help to address the environmental impacts of household waste. Understanding the importance of awareness in describing human actions and eco-friendly behaviour, this study investigates the generational differences among women—across Generations X, Y, and Z. Data for 388 female respondents, grouped into 3 Generations is gathered through a convenience sampling method. The 16-item questionnaire, addressing awareness, concern for the environment and responsibility was analyzed using the non-parametric KWS test. The study summarizes the positive attitudes of younger generations towards careful waste disposal, waste segregation practices and intention to save natural resources.

Introduction

There are substantial environmental, health, and economic challenges often arise due to unsafe and inadequate waste disposal practices prevailing among the household. The term “household waste” is defined as the waste generated at domestic level due to everyday activities within home (Kontogianni et al., 2014). It comprises multiple categories, including food waste, vegetable and fruit peels, paper, plastic, polythene bags, other packaging materials, used batteries, broken glass, cardboard, and, of course, diaper waste (Munro, 2023). Whereas, a responsible behavior to preserves the environment and adopt effective practices of household waste management are key to sustainable development (Wan et al., 2019). The issue related to improper waste disposal,

prevail as modern and urbanized centers continues to grow (Rana, 2011). Today, developing countries, especially their urban areas, face immense challenges from rapid and unpredictable urbanization (Dagadu & Nunoo, 2011), particularly in terms of effective waste management (Vij, 2012). This calls for a proactive approach to raise public awareness and environmentally conscious behavior to address this problem (Colvero et al., 2020).

In this framework, the research sees women playing a key role in household waste management. With increased awareness, women can lead the way in promoting eco-friendly waste disposal practices, helping to reduce environmental impact and encourage responsible habits within the household. Their knowledge and involvement are crucial for fostering sustainable behaviors at home. This study seeks to understand the awareness levels of women across various age groups, later in this study described as generations, as well as their practices in adopting eco-friendly waste management behaviors. By analyzing the generational perspective, this research aims to identify specific patterns of awareness and attitudes, contributing valuable insights for targeted policy-making and educational initiatives. The findings are expected to explore various challenges and reasons for each generation that can help encourage more sustainable practices in individuals, households, and communities.

Statement of the Problem

Solid waste management has become a pressing issue now days, this situation become aggravating due to improper disposal practices and poor solid waste management. This not only contributes further to pollution and environmental degradation but also poses health risks. Despite increased awareness of these challenges, many communities struggle to adopt sustainable waste management practices. However, awareness and engagement in environmentally friendly practices can differ substantially across generations due to varying levels of exposure to environmental education, socio-cultural influences, and shifts in economic conditions. While younger generations may show greater environmental awareness due to increased exposure to climate change education and social media campaigns, older generations may hold different perspectives based on resource-conservation practices rooted in earlier life experiences. These generational differences in eco-friendly behavior and awareness levels are critical to understand, as they affect the implementation of sustainable practices at the household level and, by extension, impact broader community efforts in waste management.

This study aims to address the lack of research on how generational differences shape awareness and eco-friendly behavior among women in the context of solid waste management. In this context, the research envisions women playing an active role in managing household waste, especially in promoting responsible disposal practices for hygiene products. By increasing awareness and encouraging environmentally-friendly disposal methods, women can help reduce the environmental impact of these waste materials and foster a more sustainable approach to household waste management.

Research Objectives

1. To understand the generational differences in awareness level of solid waste management among women.
2. To analyze eco-friendly behavior patterns related to waste management practices among women across different generations.

Literature Review

While describing the household waste , one think of the food wastes, paper waste , plastic waste like packaging material, rags, metallic waste and broken glasses from residential areas (Fadhullah et al., 2022). The type of waste produced is influenced by the region, population size, social conditions, eating habits, main economic activities, and even the season (Alfaia et al., 2017). Waste generation is also influenced by regional culture, local customs and habits (Ibiapina et al., 2021). Together with factors like population size, social conditions, and economic activities, these cultural aspects shape the types and amounts of waste produced (Douglas, 2010). Some researchers suggest that individuals from lower socio-economic groups may place less emphasis on environmental issues, as their primary concerns are focused on employment and housing(Hopwood et al., 2005) . In the view of some researchers , generation of MSW is more than just a societal outcome; it reflects the level of development, the rate of social and economic change, and the path a society takes toward modernization (Brown, 2015).

It is observed that in rural and remote areas burying and open burning of household waste is a common practice, whereas the urban or semi-urban areas are often equipped with sufficient solid waste management services and often provided a storage bin in residential areas or alongside the roads (Kamaruddin et al., 2016). Without proper treatment, MSW can lead to severe environmental harm (Lavee & Nardiya, 2013). Brazil exemplifies a developing country with inadequate MSW management. In 2016, 78.3 million tons of MSW were generated, with 91% collected; the remaining 9% was left uncollected, ending up in vacant lots, rivers, streets, or openly burned (Alfaia et al., 2017). The open dumping of household waste results in a loss of visual appeal, harmful environmental effects, and significant public health risks (Abubakar et al., 2022).In many developing countries, open waste dumps become breeding grounds for pests like houseflies, mosquitoes, and rodents, leading to unsanitary conditions in surrounding communities (Chikowore, 2021). Residents often burn waste, leading to constant exposure to harmful chemicals and the inhalation of toxic fumes. Furthermore, human exposure to these hazardous gases, raising serious public health concerns (Fazzo et al., 2017). Research indicates that waste management issues, such as open dumping and waste burning, largely result from human behavior, suggesting that meaningful solutions require shifts in these behaviors (Ferronato & Torretta, 2019).

In the earlier literature in an effort to explore communities' knowledge, attitudes, and practices (KAP) analysis is done (Barr et al., 2005).In addition to this , numerous researcher have examined people's waste-related behaviors based on socio-demographic characteristics (Barr, 2007).Factors like education, income, age, and gender affect public awareness and attitudes toward waste management are also examined to understand waste disposal behavior of households (Zhao et al., 2021). A study revealed significant links between respondents' sex, age, and social class and their awareness, knowledge, and practices related to solid waste management in Nigeria (Agwu, 2012). As identified by the another researcher, higher levels of education and knowledge and decent income also supports better waste management behaviors (Handayani et al., 2018).

With a deep understanding of the fact that human attitudes and behaviors that derives eco-friendly practices may not be uniform and may vary across different demographic groups like, gender, age , generations and other socio-economic tiers (Kharbanda et al., 2022). There may be variety of factors describing these generational differences in environmental awareness and waste management practices. This may include exposure to environmental education (De Andrade Guerra et al., 2018),which emerged in response to 1960s threats like rising pollution,

overpopulation, and resource depletion (Stevenson & ebrary, Inc, 2013). Among the other factors as discussed in the earlier literature are the education level (Smol et al., 2018), environmental and socio-economic challenges (Henao-Rodríguez et al., 2024), and evolving cultural values (Yusuf & Fajri, 2022). Younger generations, for instance, may be more familiar with recycling norms and climate change awareness campaigns (Krajnc et al., 2022), while older generations may possess habits rooted in resource conservation due to economic or social influences (Ma & Xing, 2024). However, numerous studies indicate that awareness alone does not necessarily lead to pro-environmental behavior. An environmentally responsible person as an individual and community as whole, beyond simply having awareness, should have a foundational understanding of the environment and its issues. They must possess certain characteristics like a strong concern for environmental well-being, skills and motivation to address these challenges, and taking proactive steps for the support (Kollmuss & Agyeman, 2002).

Focusing on household waste goes beyond food scraps and other common items, as a major portion of urban household waste consists of single-use absorbent hygiene products, (Takaya et al., 2019) leading to increased concerns about their environmental impact (Demichelis et al., 2023). Earlier literature often overlooked the impact of single-use absorbent hygiene products, focusing primarily on food scraps and other common household waste (Tucker & Farrelly, 2016); (Knorr & Augustin, 2024) and (Von Massow et al., 2019). This gap is due to the limited understanding of the significant environmental concerns associated with these products in urban household waste. Some studies have started addressing the environmental impact of single-use absorbent hygiene products in household waste (Vaittinen et al., 2023). Few researchers highlighted the rising concern of non-biodegradable waste, including hygiene products, in urban settings (Kaza et al., 2018). Additionally, (Velasco Perez et al., 2020) explore disposal and environmental challenges of absorbent hygiene products, noting their prevalence in landfills. Similarly, a study by (Kaur et al., 2018) examines the waste management and environmental impacts of disposable hygiene items in municipal waste, emphasizing the need for improved disposal practices.

These absorbent hygiene products come under variety of range from such as disposable diapers for new born and training paints for toddlers, sanitary napkins designed for menstruators and adult diapers specially designed for adults to manage incontinence (Płotka-Wasylka et al., 2022). Designed for ultimate connivence and comfort, absorbent products offer a hygienic solution that meets user's need with dignity(Gray et al., 2018). Absorbent hygiene products allow individuals to manage personal care effortlessly in the course of modern life (Bender et al., 2017). Despite these materialistic advancements, absorbent products help to navigate through daily routines in a dignified manner with ease and efficiency(Fader et al., 2008). As highlighted by (Kanoo & Garg, 2023), the use of absorbent hygiene products is attributable to a change in lifestyle and improved social and economic living standards.

Disposable in nature, these absorbent products are purposefully design to align seamlessly with the fast-paced urban life and contribute to overall quality of life and well-being (Getliffe et al., 2007). The ability of disposable diaper to quickly absorb moisture, ensure dryness and maintain personal cleanliness makes it desirable to address the demands of busy individuals and families(Gibson et al., 2013). In addition to meet hygienic needs and serving as indispensable item for individuals across all age groups and genders, these products embody convenience and comfort (Kama & Barak-Brandes, 2013). While disposable diapers offer convenience, they come with a significant environmental impact (Mendoza et al., 2019). A single use disposable diaper is make up of about 4% of municipal solid waste and rank as the third largest single consumer item in landfills, discarded after only one use (Schenck et al., 2023). MSW dumped in landfill sites are considered

as a fourth largest source of emission for non-carbon dioxide emissions and ultimately contributes to greenhouse gas emissions and climate change (Maria et al., 2020).

Besides offering practical solution for human well-being, these single use diapers bring serious logistic, health and environmental challenges when disposed of inappropriately (Rahman et al., 2021). Super absorbent Polymers (SAPs), plastic and wood pulp are commonly found elements in the conventional disposable diapers and responsible for microplastic pollution (Yang et al., 2024). Disposable diaper is a major contributor to the accumulation of non-biodegradable materials and pathogens, posing risks to both the environment and human health (Kordecki et al., 2022a). Thus, efficient management of solid waste becomes a new challenge for growing urban areas. (Abas & Wee, 2014). As described by (Arena et al., 2016), the amount of waste generated by conventional absorbent product is related to various economic, social and cultural factors. The traditional method of handling absorbent product waste is to mix it with other household waste, which is then sent to its final destination, either transported to landfill sites or Incinerated. Even in Europe recycling of absorbent product waste is done at a very small scale.

People often have limited knowledge regarding waste types, leading them to mix municipal solid waste and biomedical waste. As discussed by (Sreekumar & Pandey, 2024), this lack of understanding prevents effective differentiation between municipal solid waste and bio-medical waste. General municipal waste, focuses on segregation, recycling, and safe disposal, while the Bio-Medical Waste Management specifically target healthcare waste, requiring specialized treatment to minimize health risks. Absorbent hygiene products, often treated as biomedical waste due to the risk of infection from bodily fluids, also have a significant environmental impact (Velasco Perez et al., 2020) . One of the primary issues is the accumulation of plastic waste when these products are disposed of, which contributes to long-term pollution (Kordecki et al., 2022b). Unfortunately, majority of the conventional sanitary pads are composed of 90% plastic, making each one comparable to four plastic bags (Universitas Brawijaya et al., 2021). There are various challenges associated with the management of AHP waste. Among all, mixing AHP waste with other solid waste, informal waste collection methods and poor or no infrastructure for collection , segregation and their treatment contribute to the problem(Velasco Perez et al., 2020).

Domestically, people often discard sanitary napkins and baby diapers in plastic wrap provided with the disposable product along with other domestic solid waste. People often behave differently while at home or in public places (R et al., 2018). Women usually dispose of menstrual products and baby nappies along with the other domestic trash whereas in the public restroom, women manage these disposable products differently (Elledge et al., 2018a). They are often least bothered of disposing used diapers properly in the trash bin. If public washrooms are not equipped with a trash bin, these diapers, and sanitary pads are usually left wrapped / unwrapped at the corner of the restroom. People often directly flushed down used diapers to the toilet without thinking about the potential for choking hazards. Flushing AHPs composed of polyacrylate, directly down the toilet are the major cause of sewage system blockages (Crow et al., 2008) and backflow (Panjwani et al., 2023).

Commercial absorbent napkins are composed of plastics and polymers that do not disintegrate easily and decompose over a period one year. The material clog the sewer pipeline when do not easily pass through thus resulting in urban flooding (Kashyap et al., 2016). People often discard AHP waste along with the other domestic waste by wrapping them in polythene bags which ultimately results in a slower degradation time (Panjwani et al., 2023). There is a high economic cost associated with irresponsible treatment of diaper waste along with other solid waste (Płotka-Wasylka et al., 2022).

Besides the serious environmental impact, collection of AHP waste and unclogging the sewer pipelines is matters of dignity and hygiene for informal workers. Sewage workers directly expose to unhealthy conditions without the required safety gear or instruments (Hassan et al., 2021). These workers clear the napkin-clogged drainage with bare hands. This exposes the workers to diseases and dangerous substances (R et al., 2018). Sanitary napkins drenched in an infected woman or girl's blood may carry HIV and hepatitis viruses, which expose the workers to harmful chemical and pathogen (Colón et al., 2011). Single-used sanitary waste remains contagious up to six months when thrown in the open sites and landfills (Panjwani et al., 2023).The raw material used to manufacture single-use AHP are of great concern for human health and environment both. These are composed of low-quality petroleum-based plastic, like polyethylene and polyester. Around 500 to 800 years are required for complete degradation (R et al., 2018).

Water contamination is another problem associated with menstrual waste thrown into rivers and other water bodies by the people who live by riverbank. Micro-plastics (less than 5 mm is size) in water pose a serious risk to aquatic ecosystems (Rezania et al., 2018) and human health (Rahman et al., 2021). These blood-soaked materials served as havens for dangerous micro-organisms and germs (Sepadi, 2022). Disposable feminine hygiene items and sanitary napkins flushed down the toilet can contaminate rivers and streams, alter wildlife's hormones, and allow pathogens to enter the food chain (R et al., 2018).

Depending on societal and cultural norms and taboos surrounding menstruation, and menstruation blood, used sanitary napkins are disposed of in a variety of ways, such as burying, burning, tossing them in the open, and using routine waste disposal systems (Elledge et al., 2018b). Every day, the non-biodegradable waste from single-use feminine sanitary napkins find their way to open sites, thus resulted in clogs sewer pipes when flushed down carelessly , and/or being dumped in landfills (R et al., 2018). The Absorbent hygiene products when soaked in human blood area great source of pathogen dissemination (Weisbrod & Van Hoof, 2012). There is always a significant risk that animals will expose human excreta to pests that spread disease when AHP waste is disposed of in open areas or landfills (Velasco Perez et al., 2020).

Absorbent hygiene products are a significant source of household solid waste, and as users, we are the primary contributors to this problem. Users of absorbent hygiene products span all age groups, from infants to the elderly, highlighting their widespread necessity at diverse stages of life. It’s a common understanding that different generations exhibit different life style and consumption pattern. This study provides a comparative analysis of women across three generations—X, Y, and Z—examining their awareness, environmental concerns and ecofriendly behavior. It aims to identify which generation of women is most environmentally conscious and what steps they can take to improve waste management and disposal efforts.

Methodology

The present study is interesting in a way it shares survey results from Karachi, Sindh, Pakistan with the special focus on female perspective analyzed by generations. This study evaluates the knowledge and awareness level related to household waste management and how this knowledge contributes in defining their ecofriendly activities and effort to limit activities that are harmful for the environment.

The study is based on a structured questionnaire shared electronically by email, and social media groups. Availability of the sufficient budget and time limit, it was agreed by the researchers to float the questionnaire using electronic platforms. The questionnaire was composed by the author based on the determinants discussed in earlier literature, and few question are adopted from earlier

literature (Lakatos et al., 2018; Henao-Rodríguez et al., 2024) with the little modification to better reflect the specific cultural and societal context of our study population.

Sample Size

The study employed a convenience sampling method by distributing the questionnaire through private sector academic institutions in Karachi, Sindh, Pakistan facilitating easy access to female participants within the target demographic. The included sample of female participants was comprised of students, faculty members and administrative staff. Selection of participants was done considering to include those with the clear sense of responsibility towards environment. Thus, to represent Gen Z, the sample includes children from high schools only. This approach allowed for efficient data collection from a population segment relevant to the study's objectives. Participants from the pilot study were excluded from the final sample to maintain data integrity. The pre-testing helped the author to redefine and restructure some of the questions. Few questions were discarded acknowledging the advice from the field expert regarding the difficulty level of questions and a demanding completion time.

For the information of the respondents, a brief introduction regarding the importance of the research was included alongside the questionnaire. It was also available online between the May, 2024 to September 2024.

The final number of responses received 388, as the sections in the questionnaire were restricted as compulsory to proceed with the next section, we did not find any difficulty related to incomplete responses. Therefore, the final sample consisted of 388 respondents. Sample size was calculated with 95% confidence interval and 5% margin of error.

The final sample of 388 female respondents is further divided as, Generation X, Y and Z generations. The structure of the final sample is as follows:

- Generation X (Born between 1965- 1979)

- Generation Y (Born between 1980-2000)

- Generation Z (Born after 2000)

Limitation of the study

In this study the inclusion criteria were an educated female, with no less than high school education to better understand the objective of the study and provide their true responses. As for data collection we only approached to private sector academic institutes where all of the participants belong to a sound education and economic background. Their perceptions and practices related to household waste management might not be generalized for the individuals from the less privilege class.

Development of Items and Sample Selection

All questionnaire items were designed based on insights from the literature review. Five field experts, representing diverse genders and academic and professional backgrounds, reviewed the questionnaire to assess the clarity and importance of the items.

The final questionnaire comprised of 16 items defined to assess respondents' awareness level and knowledge and attitude towards the environment. For analysis, the Kruskal-Walli's test was

performed using SPSS 21. KWS test is a non-parametric method as an alternate approach to one way ANOVA. The post Hoc test, Dunn-Bonferroni is further analyzed where necessary. The KWS test was conducted based on the following assumptions.

Dependent variable is measured on an ordinal scale (5-point Likert scale). The Independent variable, here in our case is Generations defined as Gen X, Gen Y and Gen Z. Independence of observations is preserved as each respondent strictly belongs to a single Generation and there is no dependency among groups. KWS is a non-parametric test so there is no need to check for equality of variance assumption to run the test.

Table 1: Questions reflecting Awareness

(Not aware at all (1) to very aware (5)
I am aware of common environmental problems
Careless waste disposal is harmful for environment
I am aware waste segregation is a good practice
I am aware AHPs significantly contribute to household waste
I am Aware of risks associated with careless disposal of AHP waste
I am aware of AHPs' environmental impact.

Table 2: Questions reflecting concern for the environment

(Never (1) to Always (5)
Do you throw household waste outside your home
Do you throw litter out of your car window
Do you look for the waste bin around you when you are in some public place
If segregated waste bins are installed around you, do you carefully select the bin to throw litter
Do you maintain your durable machines and repair it to extend their life?
Do you reuse or recycle something rather than throw it?
Do you prefer a specific means of transport due to environmental concerns?
Do you dispose of AHP waste with other household waste

Table 3: Questions reflecting the responsibility feel

(Never (1) to Always (5)

I print as little as necessary
I segregate paper waste
I segregate plastic waste
I segregate metallic waste
I carefully dispose of broken waste separately and carefully
I prefer to use cloth shopping bags or reuse plastic bags
It is my responsibility to report a burst pipe and over flowing
It is my duty to save water and electricity

Table 4: Demographics of respondents

Employed	99 (25.5%)	**Generation X**	42 (11%)	**High School**	97 (25%)
Self-employed	33 (8.5%)	**Generation Y**	195 (50%)	**Graduate**	214 (55%)
Students	229 (59%)	**Generation Z**	151 (39%)	**Post Graduates**	77 (20%)
Home Makers	27 (7%)				

Results and Discussion

Figure:1 Word Cloud of the word absorbent hygiene Product waste as decribed by the respondents

Credit: The image is created through freewordcloudgenerator.com

Table 4 summarizes respondents demigraphic information. Where 11% female respondents belongs to Generation X, 50% from Generation Y and 39% from generation Z. 20 % respondets were post graduate students and 55% are university graduates with 25% high school students. 25.5% respondents were employed and 8.5% were sel-employed. 59% were students and only 7% were homemakers.

The following table 5, summarizes the results of KWS test ran for different questions assessing the awarness level. For the questions, A2, “Careless waste disposal is harmful for environment” and A5, “I am Aware of risks associated with careless disposal of AHP waste”, a significant median difference is found.

The significant p-values, highlighted in the table 5.1, shares the results of Post-Hoc test , shows that there is a difference exist between awarness level of Gen X and both Gen Y and Gen Z on the question about careless disposal practices harming the environment. This indicates a likely generational variations in environmental awareness and sense of responsibility. Gen X may exhibit a less urgent perception of the impact of individual disposal habits, perhaps viewing careless disposal as a minor or less direct threat. In contrast, Gen Y and Gen Z, who have been more exposed to environmental education, social movements, and climate change discussions, are likely to have heightened awareness of how individual actions contribute to environmental harm. This finding is aligned to earlier literature (Ghouse et al., 2024), exposure to enrionemental education plays an important role in shaping pro environmental behavior of young generations. This may help to conclude younger generations are more likely to perceive careless disposal as direct harm to envrionment and reflects a high sense of concern for environment

Table 5: Hypothesis test to assess the Awareness level

Question Number	Sig. Value	Decision
A1	0.203	Don't Reject Ho
A2	**0.004**	**Reject Ho**
A3	0.538	Don't Reject Ho
A4	0.087	Don't Reject Ho
A5	**0.001**	**Reject Ho**
A6	0.076	Don't Reject Ho

Table 5.1 Pairwise difference for A2 (Careless waste disposal is harmful for environment)

X	**Y**	**0.023**
X	**Z**	**0.001**
Y	Z	0.067

In the likewise manner, table 5.2, shows the significant difference between Gen Y and Gen Z on the question of careless disposal of AHP waste being harmful may stem from nuanced differences in environmental sensitivity and social conditioning. While both generations are environmentally conscious, Gen Z has been exposed to even more intense messaging on climate change and waste management due to the rapid growth of environmental activism and social media campaigns during their formative years. This heightened exposure may lead Gen Z to be more cautious and aware of the specific harms of careless waste disposal, even in cases like diaper waste . Whereas Gen Y, while environmentally aware, may not have had the same constant reinforcement around specific waste categories, potentially leading to a slightly less stringent view on individual responsibility regarding the AHP waste. This generational shift might indicate that even within environmentally aware generations, the intensity and focus of environmental messaging can influence views on specific disposal behaviors.

Table 5.2 : Pairwise difference for A5 (I am Aware of risks associated with careless disposal of AHP waste)

X	**Y**	**0.731**
X	**Z**	**0.084**
Y	Z	0.000

Table 6, shows the results of KWS test, for the questions related to concern for the environment. For the two questions, "Do you throw household waste outside your home" and "Do you throw litter out of your car window" targeting the individuals to describe how concerned they are for the environment and how this care is reflected through their actions. For both the questions, a significant difference is found in median behavior among different generations. To further investigate for this difference table 6.1 and table 6.2 summarizes the results from post hoc test, that helps to understand where actaully a difference exist.

A significane p value for difference between Gen Y and Gen Z (0.001) in their views on throwing litter outside the home may be linked to the increased environmental focus in Gen Z's upbringing. Gen Z has grown up in a time where there is stronger societal disapproval of littering due to the rise in environmental campaigns (Agrawal et al., 2023), school syllabus on sustainability, and social media influence. Gen Y, while also environmentally aware, may not have experienced this

same level of consistent reinforcement around the unacceptability of littering, leading to a slightly more lenient perspective. This difference highlights how younger generations, exposed to rigorous environmental messaging from a younger age, may have stricter attitudes on issues like littering, even on a personal level outside their homes.

As discussed above, the significant differences of (0.010) between Gen X and Gen Z, and a Gen Y and Gen Z (0.001), on the question of throwing litter out of a car window likely highlight Gen Z's more stringent stance on littering. What we conclude is Gen Z tends to have a heightened intolerance for littering behaviors, including actions like discarding waste out of car windows, which they might view as careless and environmentally irresponsible.

This may help to conclude that both Gen X and Gen Y, have some sense of understanding that littering is bad for mother earth, their stance may not be as strict as Gen Z. This is possibly due to the reason Gen X, especially, grew up in a time when environmental awareness campaigns were not as widespread or intense as they are now, which could result in a somewhat more tolerant attitude. The difference in the opinion of Gen Y and Gen Z may be attributable to differing levels of environmental awareness and advocacy they've been exposed.

As discussed by the researcher (Dwidienawati et al., 2021), the difference in their behavior may be attributable to other factors like the family customs and cultural norms. As Gen Y is more blessed to be raised in a complete family, the enjoyed the attention and guidance both as compared to Gen Z, who are mainly raised by single parent.

Table 6: Hypothesis test for the Environmental Concern

Question Number	Sig. Value	Decision
EC1	**0.031**	**Reject Ho**
EC2	**0.001**	**Reject Ho**
EC3	0.277	Don't Reject Ho
EC4	0.364	Don't Reject Ho
EC5	0.494	Don't Reject Ho
EC6	0.061	Don't Reject Ho
EC7	0.221	Don't Reject Ho
EC8	0.541	Don't Reject Ho
EC9	0.079	Don't Reject Ho

Table 6.1: Pairwise difference for EC1(Do you throw household waste outside your home)

X	**Y**	**0.840**
X	**Z**	**0.148**
Y	Z	0.004

Table 6.2: Pairwise difference for EC2 (Do you throw litter out of your car window)

X	Y	0.482
X	**Z**	**0.010**
Y	**Z**	**0.001**

Table 7: Hypothesis test for Responsibility Feel

Question Number	Sig. Value	Decision
FR1	0.070	Don't Reject Ho
FR2	0.136	Don't Reject Ho
FR3	0.114	Don't Reject Ho
FR4	**0.000**	**Reject Ho**
FR5	**0.044**	**Reject Ho**
FR6	0.084	Don't Reject Ho
FR7	0.128	Don't Reject Ho
FR8	**0.031**	**Reject Ho**

Table 7, summarizes the findings of KWS test, reporting a median difference among the views of three generations reflecting the sense of responsibility for metallic waste segregation (0.000). Segregation of metal waste may not be a routine practice, but a significant difference is observed between Gen Y and Gen Z. Realizing Gen Z, having been exposed to rigorous recycling campaigns, environmental education, and social media advocacy, tends to adopt waste segregation as a normative, almost mandatory behavior. This finding is little similar to earlier research by (Dwidienawati et al., 2021), who observed a significant difference between Gen Y and Gen Z regarding their pro environmental behavior.

For the next question, Careless disposal for broken glass where a significant result is observed reflects a more conscious and responsible behavior to avoid the possible harm to those who are providing door to door waste collection services.

For Gen X, who grew up with less emphasis on waste segregation, may not see separating broken glass as a routine part of disposal practices. In contrast, Gen Y and Gen Z have been more exposed to the environmental importance of sorting waste, including materials like glass, which require specific disposal to avoid harm and ensure proper recycling. This distinction shows how younger generations tend to adopt stricter waste separation practices, driven by greater exposure to environmental education and norms around safe waste management.

For the final question on attitudes toward conserving electricity and water, a significant difference was observed in the median level of responsibility reported for saving these resources.

The post Hoc test in table 7.3, shows a significant value (0.016) for Gen X and Gen Z. This may reflect that Gen X and Gen Y may also recognize the value of conserving resources, they may not view these actions with the same level of urgency or habitual commitment as Gen Z. Gen Y, having been influenced by environmental movements, may be more inclined toward conservation than Gen X but still less so than Gen Z, for whom resource-saving behaviors are frequently emphasized in school, media, and social discussions. These finding are aligned with the earlier literature that school education and family norms are linked to disposal practices (Ibiapina et al., 2021).

Table 7.1: Pairwise difference for FR4 (I separately collect metallic waste)

X	**Y**	**0.285**
X	**Z**	**0.006**
Y	Z	0.004

Table 7.2: Pairwise difference for FR5 (I try to dispose glass waste separately and carefully)

X	Y	0.278
X	**Z**	**0.034**
Y	**Z**	**0.047**

Table 7.3: Pairwise difference for FR8 (I always try to save water and electricity)

X	Y	0.105
X	**Z**	**0.016**
Y	Z	0.063

Conclusion

Effective waste management is crucial for environmental protection and public health both. To cater the challenges, there is a need to understand the risks associated with the careless waste disposal practices prevailing in the society. The findings from this study highlight that women across different generations—X, Y, and Z—demonstrate varying levels of environmental concern and commitment to sustainable waste disposal practices. What this research found is

across generational lines, younger generations (Gen Y and Gen Z) consistently demonstrate stronger commitment to protect environment through greater awareness and more proactive behaviors compared to older generations (Gen X). A heightened sense of responsibility and sensitivity is observed in the behavior of Gen Z. Whether we describe their actions in terms of waste segregation (such as metallic and glass waste) or resource conservation (like saving water and electricity). Gen Y also exhibits increased environmental responsibility, albeit slightly less intense than Gen Z.

In contrast, to younger generations, Gen X tend to view some environmentally responsible actions as less urgent or habitual, likely due to lower exposure to intense environmental messaging during their formative years. This generational trend highlights a progressive increase in environmental consciousness, with younger generations adopting stricter norms around waste disposal, recycling, and resource conservation, influenced by sustained environmental education and advocacy. Despite for the realization for the risks associated with unsafe disposal of AHP waste, the research did not find any significant difference in their actions of disposing of AHP waste with other household waste. These insights open new avenues for future research, which could explore how family norms, cultural expectations, and stigmas impact waste disposal behaviors and environmental responsibility. By examining these factors, future studies could deepen our understanding of how social and cultural norms shape household waste management practices and inform strategies to promote more sustainable behaviors around AHP disposal.

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