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Food Waste Attitudes and Nudges in Addis Ababa

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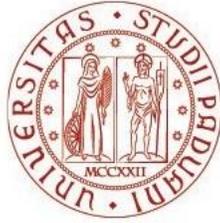
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Contents

Abstract

Every year, one-third of all food produced for human consumption goes to waste (FAO) indicating food waste is an increasing global issue. Food waste is defined as a loss in food quantity or quality caused by decisions and actions taken by retailers, food service providers, and consumers (FAO, 2019). It occurs at various supply chain stages, from production to consumer level. Food waste can vary significantly between countries and be influenced by cultural practices. This paper primarily aims to explore and understand the attitudes and behaviors of residents in Addis Ababa, Ethiopia regarding food waste. It also investigates the nudging techniques that would be more effective in shaping behaviors related to wastefulness concerning food that could have been saved from being wasted. This study bases its approach on the science of behavioral psychology and its relation to food waste. It accounts for the economic effect of food waste focusing on cultural and social beliefs and practices that would contribute to attitudes towards food waste. A mixed-methods approach was adopted combining qualitative and quantitative data in the development of the survey. The survey was distributed among residents of Addis Ababa, Ethiopia and data was gathered by questioning their attitudes and reporting their behavior. This analysis aims to provide significant insights regarding waste behaviors among residents of an urban city in the continent of Africa and contribute to the lessening of the gap that is observed while searching for an understanding of behaviors related to sustainability. It examines the nudging techniques that could be implemented to reduce food waste and enhance environmental well-being.

1. The Food Waste Challenge

Achieving sustainability in food systems remains challenging, as increased food production is met with a hefty amount of waste. Every day we risk accumulating waste either by overlooking or underestimating the amount we produce. This imbalance puts a strain on our ecosystem, exacerbating food insecurity, and causing economic losses. While food waste occurs at all stages – from production, and retail to household- the causes vary across cultures and economies. In Ethiopia, religious and cultural values promote conscious consumption of resources, particularly food and water. However, urbanization and modern lifestyle changes are contributing to increased waste, particularly in Addis Ababa. To address this problem, understanding food waste from all angles is crucial. This chapter investigates global and local food waste patterns, the cultural and religious factors that influence food waste attitudes, and major food waste contributors.

1.1. The Paradox of Increased Food Production and Waste

Food is a fundamental part of human life; we rely on it to receive sustenance and nourishment for our bodies. The food production industry plays an important role in supporting and leading global development and providing employment opportunities (Kuchhal et al., 2016). Being one of the largest markets globally it is certain to impact the environment, or more specifically, the waste that could be generated from operating on a large scale to feed the entire population is sure to weigh on the environment (Valdez, 2012). The inefficiencies that come with large food system operations affect the globe on multiple fronts. Food insecurity, food waste, and production losses are consequences that are shared by all nations to varying degrees.

The gravity of food waste in modern time is overwhelming. Examining the consequences of multiple factors is the steppingstone to potentially solving this growing global problem. The following sections will examine the impacts, causes, and potential solutions with a focus on household-level waste and behavioral interventions.

According to the Food and Agriculture Organization, primary crop production was approximated to be 9.6 billion tons in 2022 (FAO, 2022), which points towards steady growth to meet high demands. The increase in production over the past years follows the same pattern. With production geared towards covering increasing demand, it is safe to assume certain food categories would be higher than others. Cereals, fruits, vegetables, root plants, and tubers, as well as oilseeds and legumes, are considered primary crops. These crops make up a significant portion of the global diet regarding caloric intake, with differences in regional dietary patterns. The disparity in the distribution of these significant nutrition building blocks caused by a handful of factors creates a rupture in food insecurity and increased food waste production. The production numbers of other major food groups also affect the waste generated greatly. Dairy production takes the lead with annual global animal production with 981 million tons in 2024. (FAO, 2024). Meat production follows at approximately 355.7 million tons in 2022 (FAO, 2022), projected to increase to 374 million tons by 2024 (FAO, 2024). These data demonstrate the severity of the global food waste crisis. Every year, one-third of all food produced for human consumption goes to waste (FAO, 2011), and the Food Loss Index, developed by FAO, estimates that 14% of all food produced is lost, excluding the retail stage (FAO, 2019), which strengthens the claim that food waste is an increasingly global issue. Placing these numbers side by side, we can observe the rising food production that has the purpose of covering the demand caused by increased consumption being surpassed by the amount of food being wasted at different levels. Solving this complex, paradoxical phenomenon would require multi-faceted solutions that are aimed at breaking down the barriers and addressing issues that arise from different sources. Be it at the retail level, production waste, infrastructure improvements, or consumer and household, natural resources are being wasted the longer the problem is not examined and addressed.

1.2.   Global Food Waste Patterns

Considered as one of the foundational requirements to sustain life, food takes place at the center of all human activity. Food waste is defined as a loss in food quantity or quality caused by decisions and actions taken by retailers, food service providers, and consumers (FAO, 2019). It takes place at various stages of the supply chain, from production to consumer level. While food loss is concerned with the squandering of food products that occurs before the food reaches its consumers, food waste refers to, in this case, food that is intentionally discarded at the retail or consumption stages. The intention is a predecessor to the decision and action that leads to waste. Food waste can vary significantly between countries and be influenced by cultural practices. Data collected from different parts of the continent varies because of the differences in cultural norms, dietary habits, and socioeconomic status. Besides those factors, differences are attributed to the variations in methods used to record waste, the availability of resources to conduct research, and the GDP of the countries (Hermanussen et al.; 2023).

In North America, a 50% increase in food waste since 1974 has been seen as well as more than 55 million metric tons of food waste that would have been avoidable per year with a total cost of 198 billion dollars (Hall et al., 2009, Venkat, 2011). These jarring numbers might seem justified when compared to the large geographic area North America occupies, but they strengthen the imbalance that exists between production and loss. It is important to mention that these reported numbers depend highly on the quality and consistency of collected data as well as on the reports made region-wise and nationwide. The more consistent data is collected the more we can understand the severity of the problem, however, lack of resources and allocation of resources to the study of food waste in a certain area or country affects our understanding and perception of the phenomenon. In Asia, the most consistent studies are attributed to Japan with 60 kilograms of household waste produced per capita for the year 2024, which is a lower number than the years recorded before. (UNEP, 2024). This demonstrates the effectiveness of continuous reporting that allows for the study for policy improvements and interventions. In Europe, Portugal has the highest recorded estimate for food waste at above 160 kilograms per capita

per year with households being the major contributor followed by food service and retail (UNEP,2024). The UNEP (2024) report mentions that data collection for the continent of Europe is done by Eurostat and are widely scaled national representations instead of a collection of data points.

In the African context, despite having higher levels of food insecurity when compared to other continents, comprehensive data on food waste is lacking as reported by the UNEP Food Waste Index mainly in the retail and food service sectors (UNEP, 2024). The report roughly indicates that every day about a billion meals is wasted across the continent and Africa. This estimated number could weigh heavily on the nations that face hunger and famine challenges seasonally. However, the numbers recorded around household food waste indicate that the continent suffers from the same problem as the rest of the world. Reported in kilograms per capita per year estimates, Tanzania takes the lead with 245 kg/capita/year from all measurements taken from one study conducted in many cities across the country followed by Egypt and Nigeria with 207 and 189 kg/capita/year. (UNEP, 2024). These trends in figures showcase the roles population size and food consumption patterns play in compounding food waste.

1.3.   Cultural, Religious, and Geographic Influences on Food Waste

The attitude toward food waste regarding cultural practices and religious teachings is evident according to Beretta et al. (2013), who, in the *Handbook of Food Waste Prevention*, state, "Cultural and religious norms often play a critical role in shaping attitudes toward food waste, with many traditions emphasizing the moral obligation to minimize waste. The cultural impact and societal pressure of avoiding wasting food have different attitudes in varying countries around the globe. Most cultures are influenced by traditional values instilled thousands of years ago and they continue to live by it despite the changes in societal structure and life since those times. In Asia, a continent filled with multiple diverse cultures and religious practices, the

shared attitude toward food is focused on frugal practices and food insecurity (Kansal et al., 2022). A concept around regretting waste and the lost value of something not being used that positively provokes individuals to use all available resources in Japan, namely "mottainai" is a great example of how the values in cultural practices promote conscious consumption and awareness towards waste produced (Parfitt et al., 2010).

The most notable cultural influence and phenomenon that is shared across Europe is indulgence and avoiding uncertainty according to Pelau et al. (2020), and this is regarding fruit and vegetable waste. The integration of these cultural practices and customs into policies and initiatives to decrease waste is seen in both instances while having a moderation effect as well. In the Western world, particularly in Northern America, the higher level of food waste is attributed to the normalization of wasteful practices like throwing away excess food that could have been utilized, the promotion and purchasing of bulk produce at the retail level, and furthermore the portioning of meals either in fast food restaurants or at home lead to the creation of culture and attitude towards food that is essentially detrimental to the cause (Evans, 2012).

The significant differences between urban and rural contexts in the generation of higher amounts of waste could be consequences of limited infrastructure and the utilization of repurposed resources as well as differing lifestyles according to Gustavsson et al. (2011). This gap is widened by the lack of consideration of demographic variation in the African continent and the handling of such waste, as suggested by Tefera and Cheru (2020), who addressed the variations between age, education level, and income influence practices.

1.4.   Household Level Food Waste

Recent studies reveal that while many people are aware of the environmental implications of food waste, they frequently underestimate the extent of waste in their own families, assuming it is an issue created by shops or restaurants. The decisions

made by consumers contribute significantly to the generation of household food waste. According to WRAP, households account for 70% of food waste (6.7 million tons), followed by manufacturers at 16%, hotel, and food services at 12%, and the retail industry at 2% which is a significant amount considering the global environmental and hunger crisis. The environmental impacts are seen in the rising levels of man-made greenhouse gas emissions and failures in essential waste treatment facilities. While significant direct economic costs are associated with household food waste, indirect costs like water, labor, and energy amplify its burden on the *Anthropocene.* The unequal distribution of food waste within economic classes is argued by Stuart (2009), which highlights the paradox of the coexistence of hunger and waste and reflects deep social inequality within the same society. This brings us to the concern of food security and the ethics involved in wasting food that could have been consumed.

Scientific articles and literature are primary sources for understanding food waste behaviors, attitudes, and awareness. Several important factors have been studied regarding the generation of waste in the household. According to Quested et al. (2013), over-purchasing, improper storage, lack of meal planning, and social and cultural influences are the major contributors. Similarly, Stefan et al. (2013) explored the roles that attitudes, planning, and shopping practices play in household food waste and their link to psychological factors and waste generation. Even if negative attitudes towards discarded food don't lead to lower waste (Radzyminska et al., 2016), hedonic value and anticipated guilt affect the reduction and intention to waste (Olowa, 2017). The effect of planning has been reported to affect household generation indirectly (Stancu et al., 2016), while shopping practices like improper planning and online purchases are seen to affect household food waste directly (Yenerall, J., & Chen, R. 2023). Van der Werf et al. (2019) accounted for the topic of unaccounted waste, specifically household waste underestimation. They highlighted the consistent underestimation by household members regarding the amount of food waste they produce, often attributing it to external factors such as retailers or restaurants. Stancu et al. (2016) also mentioned the substantial amount generated in high-income countries.

The economic and social drivers of waste and their ability to influence waste generation have been analyzed by Gustavsson et al. (2011), linking higher-income households with surplus purchasing power and undervalued food prices with elevated amounts of waste. The repeated linking of these behaviors leads us to believe that although these factors might seem arbitrary, they are the most prominent contributors when it comes to household food waste.

As many other studies have highlighted, there is little to no data when it comes to household food waste. For instance, Parizeau et al. (2015) noted that studies on food waste from households are lacking in regions where social conventions and waste processing are different from the western world. This gap highlights the grand difference between the exploration of waste practices within countries and further strengthens the need for focused household-level research and better policy implications tailored to local contexts.

1.5.   Food Waste in Ethiopia and Addis Ababa

Cultural influences play a key role in forming food consumption and waste patterns. Ethiopia, a country deeply rooted in traditions that span thousands of years, has adapted ways of handling food waste. In Ethiopia, research suggests that the key predictors of intention to decrease household food waste are attitudes towards food waste generation, self-identity and perceived behavioral control (Abu Hatab et al. 2021). As a country that has endured multiple famines, the perception of food scarcity could have potentially shaped attitudes toward food consumption and waste. Additionally, frugality and avoiding unnecessary food wastage are promoted in Christian and Islamic teachings in the country shaping the general attitude towards food as a sacred resource (Esayas et al., 2020).

In Addis Ababa the capital of Ethiopia, challenges are evident in waste management in the urban areas. Presently, policies and reforms have yet to be put in motion to effectively protect the environment of the rapidly growing metropolitan area of Addis Ababa. Situated in the Horn of Africa region this nation boasts a diverse geography and climate. The great Rift Valley divides the country creating lush plains, savannas,

and deserts. Addis Ababa is situated close to the rift valley in the highlands at an altitude of about 2,355 meters. (Britannica, 2025). The city has over 5 million inhabitants, and of those numbers, around 70% live in densely populated areas, 30% have limited access to proper waste disposal facilities. (UN-Habitat, 2021). It has become the national hub for higher education, banking and insurance, and commerce (Britannica, 2025).

Several waste treatment plants have been established to accommodate the growing waste treatment demands of the metropolitan. However, of those only a few are functional. The biggest landfill in the city accounts for 85% of the collected waste and the rest is streamlined to an incineration plant that currently is not operational. (GIZ, 2023). The current system poses environmental and health risks over the city contributing to pollution, methane emissions, and spread of disease. Considering these drawbacks in the waste management system in the city, there is a visible and clear need for policies and managerial initiatives to reform the system.

At the household level, families often use all edible parts of food and repurpose inedible parts, such as bones and scraps, to feed animals, ensuring little is wasted. It would be sufficient to assume that this practice is prevalent in most households, but modern urban lifestyles may differ. Preserving and showcasing this culture of low-waste food utilization can be taken as one of the inputs to consider while developing waste reduction strategies.

Currently studies and data on food waste in Ethiopia or Addis Ababa are sparse. Addressing this issue requires an understanding of the factors that are behind food waste. The major drivers behind the creation of household food waste are identified to be reliant on consumer selection, behavior, and preferences. Taking a closer look to understand these behaviors and attitudes would help us discover the motives behind the actions that lead to waste at the household level. Hence, the combination and application of these approaches could lead to greater results in the attempt to remedy the damage caused to the environment by inefficient food consumption.

2. Decision Making and Behavioral Aspects of Food Waste

While uncovering the factors that influence food waste, behavioral studies help us understand the motives behind our actions that contribute to high amount of waste. Be it at the retail or household level, the demand for consumption of more food is the driving factor for production. The market answers the consumer's requests without considering the waste that is generated after every purchase. This points our inquiry into the direction of the decision-makers, the consumers, and the behaviors that lead to actions that might disregard sustainable food consumption.

2.1. The Theories Behind our Behaviors

Two major behavioral theories explain human behavior concerning the formation of habits and routines. The first one, the Theory of Planned Behavior, developed by Ajzen (1985), is based on perceived behavioral control and theory of reasoned action. Three factors are determined to influence human behavior, which are namely attitude towards behavior, subjective norms and perceived behavioral control (Ajzen, 1985). Building on these factors, we could be able to develop a method to understand how food waste behaviors are formed. Negative or positive attitudes and emotions towards wasting food could significantly weigh on the general behavior of an individual as well. Adding social, moral and descriptive norms to the model to reduce food waste have illustrated positive results in predicting behavior (Canova et al.; 2024; Chen, 2022).

The second one is the Transtheoretical Model of Behavior Change with six stages and ten processes of change developed by Prochaska (1997). This model provides frameworks for understanding and fostering behaviors related to health and is proven to show advancements in changing behaviors (Prochaska et al.; 1997). Commonly this theory is paired with the Theory of Planned Behavior to predict behaviors that could be identified as primers for food waste behavior. The pairing of the processes of change with the factors that influence food behavior reveals the

intricacies of food waste management which are shaped by both external and internal influences ([Davison et al., 2020](#)).
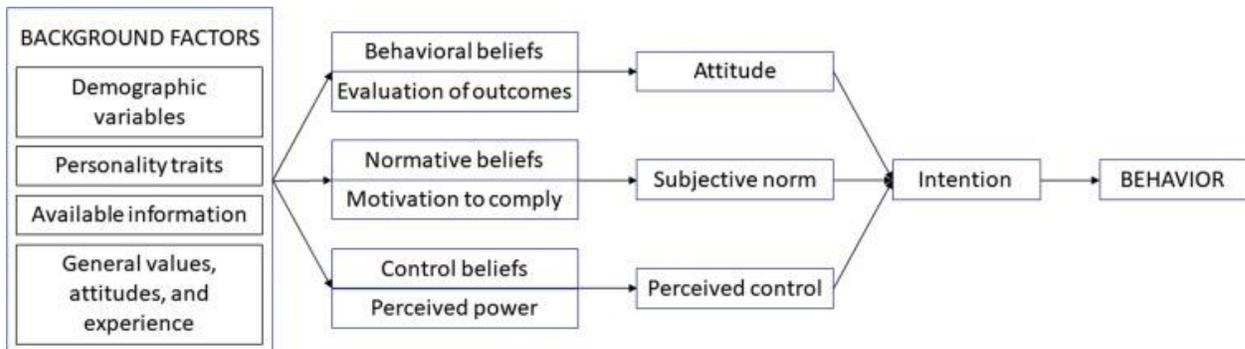

Figure 1. Diagram representing influence of background factors like personality trait on beliefs that shape attitude which ultimately affect intention and behavior. Adapted from Theory of Planned Behavior, Ajzen 1987

2.2.   Habits and Attitudes That Shape Us

Habits are formed due to repeated behaviors that originate from environmental cues that turn automatic over time [(Lally et al., 2013)](#). Cues are an important part of the habit formation process as they are the initial step. A cue is a stimulus that triggers a specific response, it's a primary step in the habit loop and can take many forms [(Duhigg, 2012)](#). The following step in habit loop is the routine which is the action prompted by the cue and finally the reward which is the positive outcome of the action.

There are determinants of habits that influence how specific habits are formed. Of these the cues tied to determining food waste habits are shopping, timing and social norms respectively. Shopping for food could lead to over-purchasing items that are promoted at supermarkets in bulk or at a discounted price which might increase the probability of waste ([Witzel et al., 2015](#)). In this case the cue would be the sign that shows the promotion on a sticker with the discount and the action tied to the cue would be adding the food item to the cart. Similarly, expiration dates on fresh produce and accessibility to seasonal food could lead to waste because of over purchasing

while observing wasteful eating behaviors in social settings could lead to desensitization to the behavior (Wilson et al., 2017; Russel et al., 2017).

The other factors that influence habit formation include repetition, emotional and cognitive biases, social and cultural influences and environmental factors. Repetitive actions form habits, scheduled and automatic disposal of food and consistent over preparation of meals are good representations of repetitive actions that lead to food waste (Newsome et al., 2014; Quested et al., 2013). These actions are integrated into our daily routines, and they could become negligible. Guilt towards wasted food and convenience habits are categorized under emotional and cognitive biases along with food safety concerns as they might lead to greater waste (Russel et al., 2017; Rowe et al., 2014). The identification of these behaviors can trigger negative emotions, but it is unlikely that those feelings alone would lead to breaking the habit.

Societal norms and cultural values are a key factor in how food habits are formed. Some cultures that view abundance and excess as positive could make waste seem acceptable risking the adaptation of these behaviors as norms in the culture (Witzel et al., 2016). Limitations in proper waste disposal infrastructure could also lead to the habitual accumulation in improper places and confusion with food labels and sizes would create the same problem by discarding food that's acceptable for consumption (Parizeau et al., 2015; Wilson et al., 2017). Acknowledging these crucial determinants that lead to the formation of negative or positive food habits is necessary to build an understanding of the behaviors that compound to food waste.

The development of attitudes is attested to the combination of various experiences and influences (Ajzen, 1991). Habits and attitudes are closely related; however, they are different psychological constructs. Habits are instinctive behaviors developed through the repetition of some actions while attitudes are judgements that evaluate the positive or negative feelings towards a subject (Wood et al.,2016; Ajzen, 1991). Although their relation to each other isn't direct, habits can influence attitudes gradually and the development of some habits could influence the formation of strong attitudes towards a subject. For example, shopping habits could shape the attitude towards food waste because of the development of a routine. The habit of

going to the grocery store daily to purchase fresh produce in bulk would ensure a constant supply of perishable items and therefore create constant pressure to consume the items before they spoil. This habit could form an attitude towards food waste as a trade off for the access to fresh produce further creating a negligent attitude regarding the amount of waste that is being accumulated. Attitudes are measured commonly through self-assessments and self-reports like the Likert scale that assesses agreement with attitude related statements using five scales of measurements. The measurements rely on accurate self-reporting which can leave space for discrepancies in reported behavior and actual behavior due to biases and situational factors.

Habits and attitudes play a crucial role in understanding food waste behavior as they impact how we perceive food, the waste it could create, and the sustainability measures we could be influenced to take. Positive attitudes towards sustainability and conscious resource consumption are associated with lower waste tendencies and indifferent or negative attitudes might create higher levels of waste (Stefan et al., 2013). Taking all these factors and dynamics into consideration, we would be able to create social awareness programs, educational content and policies that better benefit our environment and eventually decrease the amount of food waste.

2.3.   The Decisions We Make

From the various cognitive processes, we go through in our daily lives, the decisions we make are the most fundamental. The routine choices we make have the power to direct how our day goes and the way we live in the long term. These decisions may range from selecting a meal, picking one laundry detergent over the other, walking instead of taking public transportation and making large financial changes. Some of these selections we make have a compounding effect on our lives. For example, picking out the healthier version of our favorite items at the supermarket might direct us into making healthier nutritional choices down the line.

Decision making is the cognitive process that involves selecting a course of action from multiple alternatives and it is influenced by internal and external factors such as social norms, economic limitations and emotions (Kahneman, 2011). The steps that go into making decisions has been studied extensively and presented as algebraic sequences as well as multi step emotional and psychological processes (Wang et al., 2004).

Complex cognitive processes tend to affect many aspects of our lives, including the food and sustainability choices we make. The type of food we choose while shopping and the way we prepare it for our meal could affect the amount of waste that is produced from that single item. This is consistent with our tendency to rely on mental shortcuts or heuristics when making decisions. Heuristics are strategies we use to simplify our decision-making process, relying on them could potentially lead to poor decisions due to our tendency to ignore part of the information (Gigerenzer et al., 2011). These strategies anchor on our past experiences and our tendencies to stick to what we know and what is accepted socially. Regarding food waste behavior, these strategies could obstruct the recognition of our habits, making it difficult to break away and change our lifestyles to minimize waste. For instance, the default heuristic could be applied when buying groceries. The consumer may pick out the same types of produce weekly without checking their pantry or fridge to see if they still have it stocked. This would lead to waste as the consumer would eventually prefer to eat the freshest one.

2.4. Nudges and Choice Architecture

The study of human behavior and behavioral economics has brought forward a phenomenon known as a Nudge. Nudges are interventions that subtly guide decision-making while presenting options (Thaler, 2008). There are two distinct classifications of nudges, System 1 and System 2 nudges that operate automatically and consciously respectively (Lin et al., 2017; Weijers et al., 2020). The application and adaptation of nudges are versatile. Nudges are the product of choice

architecture and have since gained popularity in behavioral economics and policy making, and as choice architects professionals bear the responsibility of creating decisions that support beneficial choices (Thaler et al, 2010, Offodile et al., 2018).

Ample research has shown that nudges are effective in multiple contexts. In the context of waste management, a study made in the city of Beijing has shown the successful promotion of waste separation behaviors in residents by applying techniques that include physical interventions by staff and systems set up based on habit formation and environmental perceptions (Liang et al., 2023). Regarding sustainable and healthy consumption of food, nudges that are formulated on intuitive thinking seem more effective with impactful applications in nutrition (Blackford, 2021; Thorun et al., 2016).

In the study of consumer behavior and economics various nudges have been identified as most effective in shaping decision making processes. Choices made influenced by default options, disclosure of effects, social norms and commitment are derived from the application of nudges (Thaler et al., 2008). This nudge could be utilized by retailers in ways that could increase their revenue or sustainability. A positive example of this nudge would be a food product retailer presenting a low waste option of a ready-made meal either by decreasing the portion or swapping out whole produce. In this case the consumer is presented with the sustainable option first but is left with the freedom to select the original product. Individuals are more likely to act on information that is boldly displayed and accessible, this nudge is easily applicable in households by displaying the items that need to be consumed before their expiration dates at an easily visible location (Kahneman, 2011; Wilson et al., 2017). Social norms are another nudge that are effective in shaping food waste behavior, by highlighting the sustainable behavior of other individuals' consumers could be nudged to act the same way (Schultz et al.,2007). Pairing social norms with commitment nudges could be highly effective in influencing consumers to make sustainable choices.

2.5. Intersection Between Nudges and Food Waste Behavior

Nudges are the leading applicable references and studies for understanding choice engineering and policymaking to help alleviate social problems. Thaler and Sunstein's (2008) groundbreaking discovery and exploration of nudging has enabled the alteration of behavior without restraining choice while anchoring default settings and societal norms to positive changes. Their application to daily life has proven them to be influential systematic instruments of positive behavior change, demonstrated in Kallbekken (2013) work, a reduction of food waste with the application of behavioral interventions like reducing plate portions and sizes without affecting satiety. These studies collectively have provided a great deal of insight into how the intersection of both nudges and food waste behaviors can aid in creating strong policies. However, the lack of studies on food waste behaviors in Addis Ababa marks a sizeable gap in the contribution to the progress and outlook. Food waste behaviors in urban settings and households tend to gravitate towards wasting food because of their access to prepackaged items and a restricted time to prepare food, according to Parizeau et al. (2015).

Based on a systematic review conducted by Barker et al. (2021) to understand what kind of nudges would be most effective in the food waste context, three types of nudges have been identified as follows: social norms, reminders, and disclosure. Social norms rely on leveraging individuals' desire for conformity in society and are more effective in small-scale as opposed to large-scale applications, as privacy concerns might arise (Nahmias et al., 2019). Reminders, from a literature review point of view, seem to have mixed performances. They are proven to be effective in mediating behaviors that could lead to waste behavior and healthier food selection but could potentially be negative with repetition (Ong et al., 2023; Olivier et al., 2019). According to Barker et al. (2021), disclosure or revealing the associated costs of food waste has been identified as one of the optimal nudges to shape food behaviors. When we can step back and visualize how much the waste we produce

affects us economically we could be more motivated to change our behaviors.

Changes to the Decision Environment

- Social proof
- Order effects
- Opt-out default
- Limiting the number of options
- Simplifying messaging
- Creating friction
- Upselling
- Emphasizing a loss or gain (Framing)
- Removing friction
- Suggested donation amounts (Anchoring)
- Commitment devices
- Subliminal cues that influence a behavioral response (Priming)
- FOMO
- Just-in-time prompts
- Social norms
- Reciprocity
- Conveying a sense of ownership (the Endowment Effect)
- Activating social identities
- Visual cues
- Rewards and punishments
- Adding an irrelevant alternative to the choice set (the decoy effect)

Transparent — Non-Transparent

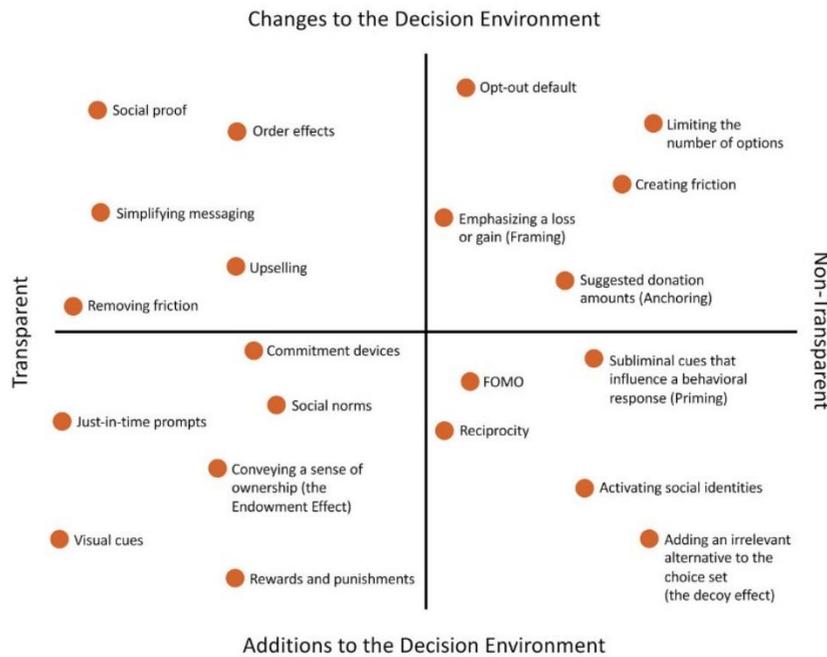**Additions to the Decision Environment**

Figure 2. Types of Nudges in Decision Making. A quadrant chart that categorizes nudges based on two dimensions of transparency as Transparent and Non- Transparent and the modifications on decision environment. The nudges listed in the quadrants influence decision making by shaping behavior. Adapted from Siemer, R. (2019, March 23). An overview of the various types of nudges.

Nudging techniques have shown promising results in influencing food waste behaviors, however their applications in different cultural and urban contexts are yet to be explored. The continued study and incorporation of these techniques have the potential to provide a greater understanding of the positive effect they could have on curbing the behaviors of consumers, even at the household level.

The combined approach of incorporating attitude and behavioral as well as motivating factors into food waste awareness at the household level could have the effect of decreasing the amount of waste produced individually. In the following chapters we will apply these strategies to understand how behavioral components affect food waste attitudes and we will test the applicability of nudging techniques in day-to-day lives.

3. Research

3.1.   The Aim of the Study

Building on the background presented in previous chapters, which highlighted the global underestimation of food waste and the specific lack of household food waste data in Addis Ababa (UNEP, 2024), this study aims to investigate the relationship between food waste attitudes and behaviors in the city. It explores the extent of awareness residents have towards the household food waste they produce as well as how this awareness is related to their self-reported behaviors. Additionally, by presenting visual reminders, verbal prompts, and digital tools, this study aims to understand the most preferred nudges that could be applied in creating food waste awareness and behavior change in the growing urban environment.

3.2.   The Hypothesis Developed

Based on previous findings showing that recognition of the environmental and economic consequences of food waste would lead to the expression of concern regarding behaviors (Visschers et al., 2016), we can hypothesize that:

H1. The perceived importance of reducing food waste will be positively correlated with awareness of the environmental impact of food waste

There is a consistent gap between perceived and actual food waste because of the underestimation of the amount of waste produced by individuals (Van Herpen et al., 2019). Based on this finding we can hypothesize that:

H2. There is a statistically significant difference between participants' awareness of their household food waste and their self-reported food waste levels

Cultural traditions may shape perceptions of abundance, hospitality, and respectful food consumption practices (Evans, 2011). Social norms and religious teachings often emphasize the value of food and the moral obligation to avoid waste thus we hypothesize that:

H3. Stronger cultural and religious beliefs will be positively correlated with negative attitudes toward food waste.

Purchasing items in bulk often leads to over-purchasing, which increases the likelihood of food spoilage and waste (Koivupuro et al., 2012). Based on the studies that associate shopping for fresh produce in bulk with increased waste we hypothesize that:

H4. Food waste attitudes and behaviors regarding bulk shopping habits and increased food waste are positively correlated.

According to the Theory of Planned Behavior, self-efficacy and behavioral control are important in shaping waste-reducing actions (Ajzen, 1991), based on this study we can hypothesize that:

H5. The use of decision-making tools like meal planning or shopping lists is positively correlated with lower self-reported food waste.

3.3. Methodology

This study draws on modified and adjusted related questionnaire designs and existing literature to fit the specific context and research objectives.

This experiment utilizes a quantitative and qualitative survey-based approach to understand attitudes toward food waste and measure the effectiveness of specific nudge techniques to curb consumer behavior. The survey aims to understand consumers' behaviors that could lead to food waste at the household level The survey consisted of 28 questions divided into six thematic sections. The questions were arranged as a combination of multiple-choice, Likert scale, and open-ended formats to measure attitudes and self-reported behaviors related to food waste. The survey items were formulated by extracting core principles from existing literature on the Theory of Planned Behavior and Nudge Theory (Ajzen, 1998; Thaler etal.,2008). The questions in the survey are presented as a unified set of questions; however, for analytical purposes, they are categorized into two sections. The initial section

aims to collect the demographics, behaviors, and attitudes of residents toward the food waste they produce in their households. The following section focuses on testing their attitudes and applications toward the nudges that are believed to bring awareness to the amount of waste they produce and help avoid the generation of excess food waste. The questions were presented in two languages, English and Amharic.

3.4.   Questionnaire Divisions

The survey began with the question "Indicate the gender you identify with". Answer choices were "Male", "Female" and "Non-Binary". Under the question "Age" participants were asked to categorize themselves within the ranges of 18-24. 25-34, 35-45 and 46 and above. Age was classified with the life stages approach, making the divisions into late adolescence, early adulthood, and mid-adulthood, respectively assuming the differences in individuals' priorities and habits across life phases. The question "Are you a resident of Addis Ababa" was used to determine the inclusion and exclusion criteria of the respondents. In addition to resident status, the survey included a question on household configuration ("How would you describe your household size?"), which was presented to help vaguely determine the composition of people in a household. Participants were presented with the option to choose between "Single", "Couple, with children". "Couple no children" and "Shared Household" additionally the option to select "Other" was given to understand if other familiar configurations were present within the respondents. This section had 4 questions in total.

Food Waste Awareness and Attitudes questions were adapted based on insights from research on food waste awareness and consumer attitudes, emphasizing how increased awareness can correlate with lower waste (Visschers et al., 2016). They were designed to evaluate the participants' baseline comprehension of food waste as a societal, environmental, and personal issue. Participants were asked how familiar they were with the environmental impact of food waste using a scale from

"Not aware" to "Well Aware". They were also asked to rate the importance of reducing food waste by order of importance with responses on a 5- point scale ranging from "Not Important" to "Extremely Important". **The Cultural and Social Influences on Food Waste** questions were three questions designed to understand the effect the social, cultural, and religious beliefs could have on participants, to observe their dispersion and gauge their ability to reinforce or shape behaviors. They investigated the extent of food waste behaviors and how they are shaped by societal and religious values. Participants were asked to rate their level of agreement ranging from "Strongly agree" to "Strongly disagree" on a 5-point scale to the question "In your community or culture, is wasting food viewed negatively or frowned upon?". The question that followed asked participants to rate the importance of following cultural or religious beliefs about food regarding avoiding waste to them and were given options ranging from "Very important" to "Not important" on a 4-point scale. Social influence was measured by asking how frequently respondents felt influenced by family, friends or community members to avoid food waste with options ranging from "Always" to "Often" on a 5-point scale.

Questions in the section Current Food Waste Behaviors were informed by empirical research on household habits related to food purchasing, storage, and disposal, identifying behaviors that frequently lead to food waste. They were designed to understand the activities that the participants undertake during their day-to-day lives. Questions included whether participants handle grocery shopping and whether they check their fridge before buying more groceries. They were also asked how frequently they check food items before they spoil and how often they purchase perishable items in bulk with response options ranging from "Never" to "Always" on a 5- point scale. The next question was on the estimate of their household food waste each week and the response options were "None", "Less than 10%", "10 – 20%", "20 – 30%" and "More than 30%". One open-ended question was included in this section asking them to state if they find themselves buying more food than they need and if so, why, to understand the reason behind their actions. We asked the respondents to mention all the methods of reducing food waste they're familiar with like "Meal Planning", "Composting", "Storing Methods", "Freezing Leftovers". The final question

was asked to understand how often they use leftovers or repurpose food in their households with answer options from "Always" to "Never". With all these questions we could better understand the patterns and problem areas regarding their habits that could lead to unwanted waste as well as their awareness. This section included a total of 10 questions.

In the **Nudges and Interventions for Reducing Household Food Waste** section, five questions were provided to investigate nudges and interventions, such as digital tools, visual reminders and prompts, and store discounts, which have been shown to impact food waste reduction behavior. Participants were asked to how likely they would be to use an app that reminds them of expiring food items, ratings were provided on Likert-type scales ranging from "Very unlikely" to "Very appealing". An initial question was presented on how helpful they would find visual reminders like magnets and signs with tips to reduce food waste in their kitchens. Participants were asked to rate their likeliness to respond to visual prompts like fridge stickers, a marker label system for open items in the fridge and a designated eat soon shelf on a Likert- type scale from "Very unlikely" to "Very likely". Questions such as "How appealing would you find the following digital tools to help manage food waste in your household?" were presented with response options with multiple levels of appeal ranging from "Very unappealing" to "Very appealing" on a five point scale with "Neutral" as a midpoint There was a final question on how likely their household might be to take advantage of store discounts on food items close to their expiration date with options from "Very unlikely" to "Very likely". **Questions on Intentions and Personal Changes** were grounded in the Theory of Planned Behavior (Ajzen, 1991), which links behavioral intentions to actual actions and is particularly relevant for sustainable behaviors. These set of final 3 questions were included in the survey to see how much the participants' attitudes could have changed and to measure their affinity for making a change. Participants were asked how motivated they felt to reduce their household food waste and were given four options ranging from "Not at all" to "Highly Motivated". This question was followed by a question inquiring which personal change they are most likely to make regarding

their food waste habits and were given the options to select from "Use a shopping list and meal plan", "Buy fewer perishable items at a time", "Use reminders for expiration dates", "Eat leftovers regularly" and the last option was "Other" with a blank space to understand which changes they were to make apart from the ones provided. The final question was an open-ended answer one with a prompt to understand which barriers prevent them from reducing waste which would provide qualitative insights into their motivation and personal challenges.

3.5. Population, Sampling and Statistical Analysis

The survey targeted individuals aged 18–50 residing in Addis Ababa, Ethiopia, with varying lifestyles. Nonprobability convenience sampling was used by creating the survey on Google Forms. Inclusion criteria included being 18 years older and a resident of the city. Distribution was made via online platforms and communities, including WhatsApp groups, Instagram Stories, and X posts. Private data like names and emails were not collected in the survey. The inclusion and exclusion criteria were mentioned in the description of the form as well as on the distribution platforms. A total of 79 responses were collected, and of those, 75 responses were used in the final analysis of the data. The analysis of the collected data was conducted in a mixed-methods approach using descriptive and inferential methods of statistical analysis on Minitab software. Descriptive statistics was used initially to visualize and summarize the data to extract insights on demographic distribution, trends in food waste behavior, influence of societal norms, attitudes and habits, as well as efficacy of nudging strategies. The measures used included mean, frequencies, and standard deviation. Inferential statistics were conducted following descriptive statistics to test positive and negative correlations between variables. Most of the data was collected using ordinal Likert-scale responses and accordingly non-parametric tests were applied. A Spearman's rank correlation and correlation matrix was used to assess relationships between the ordinal variables and understand the direction of association between two ordinal variables.

3.6.   Ethical Considerations

The study follows ethical standards set for scientific research and ensures the rights and privacy of all participants are respected throughout the design of the questionnaire and the analysis of the data collected from it. Participation in the survey was completely voluntary, and informed consent was communicated at the beginning of the questionnaire with an introductory statement stating the purpose and the intended use of the data collected. No private or identifiable information was collected; demographic questions were designed to gather only broad data given categories to maintain anonymity. Furthermore, the tone of the questions was neutral and free from judgment, as the nature of the questions centers around personal habits and beliefs.

4. Results

4.1.   Demographics

Across the population sample of selected respondents, female respondents were most represented, accounting for 60.8% of the total population, followed by male respondents at 37.8% and non-binary respondents at 1.4%, accounting for a very small proportion of the sample. The age ranges that were largely represented were 18-24 and 25-34, accounting for 35% and 24%, respectively. The representation of the age range 46 and above declined, with only 12% representation. Single-person households were the most common across all age groups and genders, despite a concentration of "Couple, with children" respondents under the age ranges of 35-45 and 46 and above. In the younger age groups, shared households were prevalent, particularly in the age range 18-34. More varied household composition was observed in the older age range respondents, as they reported an increased proportion of couple households, both with and without children. A small segment of family households, with family units shared with siblings, was recorded. Gender

differences were observed in household composition, with a higher representation of female respondents in single and shared environments. These findings show most of the respondents as being in the age range 18-24 and living in single or shared households.
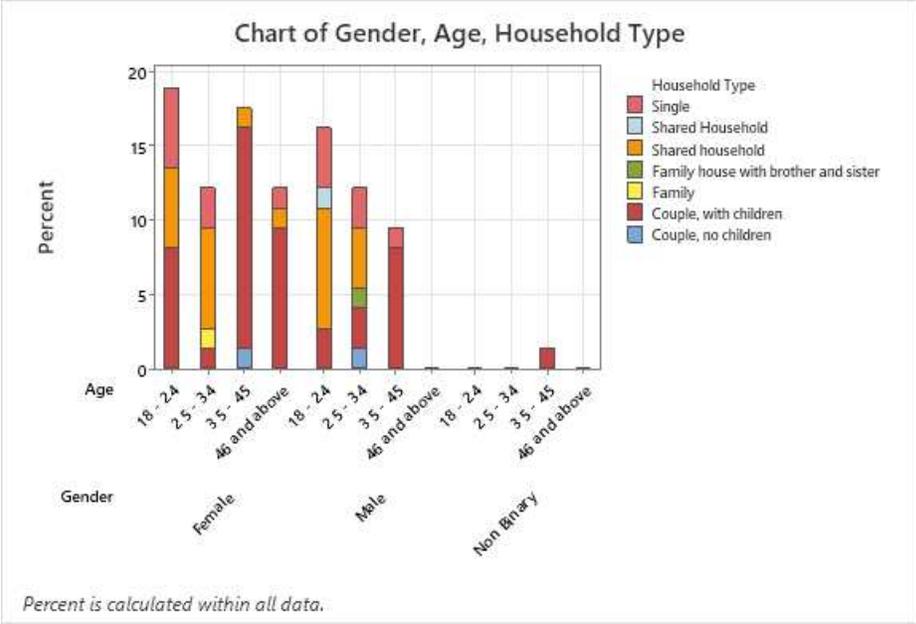

Figure 3. The distribution of participants by gender, age group, and household type is illustrated. Percentages were calculated within the total sample.

4.2.   General Attitudes and Awareness

For the questions under this section, the answers were clearly indicative of the respondents' familiarity with the environmental impact of food waste on the Likert scale ranging from 1 (Not Familiar) to 5 (Well Aware), with most of the responses (25) recorded on the midpoint of the scale, followed by 18.9% of the responses landing on "Well Aware." The lowest familiarity rating was selected by 12 participants, accounting for 16% of the total. On the question regarding the perceived importance of reducing food waste, most respondents rated the issue as "Moderately Important" on the scale, accounting for 51.4% of the answers. This suggests a moderate recognition of the importance without extremities. The other 40.5% rated the issue as "Very Important," indicating a higher level of environmental concern. A minority of responses were recorded as "Slightly Important," accounting for 8.1%,

and no responses were recorded as "Not Important" or "Extremely Important." These findings suggest that participants have a moderate level of awareness and concern about the environmental impact of food waste. The perceived importance of reducing food waste is comparatively higher, which might suggest a gap in awareness despite concern for the environment.
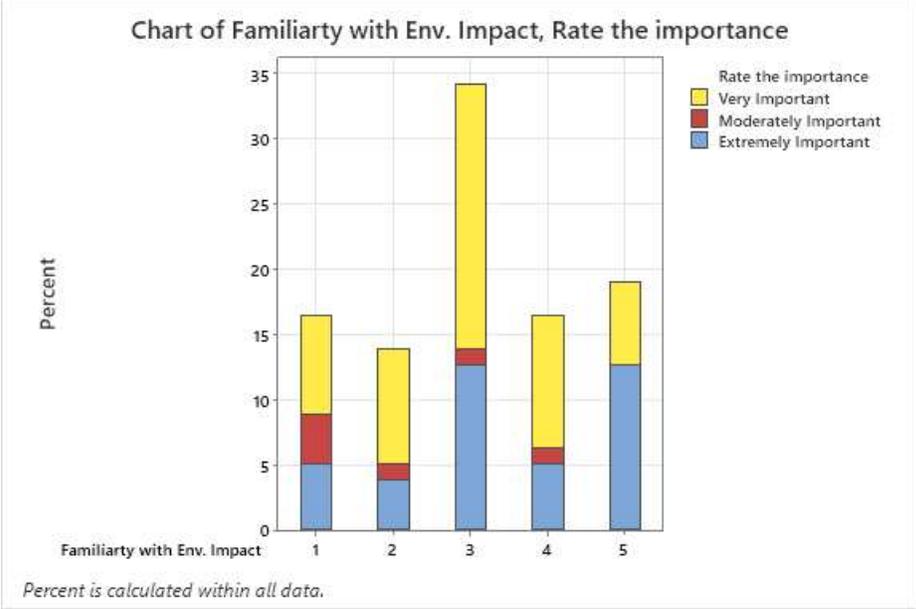

Figure 4. Bar Chart illustrates familiarity with environmental impact and importance of reducing food waste.

4.3.   Cultural and Social Influences

Three questions were asked in this section to assess the social, religious, and cultural influences on food waste. Most responses regarding food waste being viewed negatively in their cultures were recorded as "Strongly Agree," accounting for 44.6% of the total responses. The following responses were recorded under "Agree," with 31% of the responses. Both answers together account for 75.7% of the total responses, indicating a highly negative view of food waste. The importance of following cultural and religious beliefs about food waste was recorded similarly, with many responses under "Very Important," accounting for 55.4% of the total. The second-largest category of answers in this section falls under "Important," with 24.3% of responses. The lowest category of answers makes up 20.3% of the answers, under "Somewhat Important" and "Not Important." Under societal

influence, respondents reported that they are "Always" influenced by family, friends, and community to avoid food waste, accounting for 32.4% of the population. This category is the largest, followed by responses that state they are "Sometimes" influenced, accounting for 29.7% of the population. The smallest recorded segments fall under the responses "Often," "Rarely," and "Never," with a total of 18.9%, 9.5%, and 9.5%, respectively. The sum of the largest categories is more than half of the population, indicating that societal influence is a significant factor in food waste avoidance. This section of data highlights that cultural and social influences significantly affect attitudes toward food waste. The largest segments in all charts suggest that the majority of the group's report being affected by these influences.
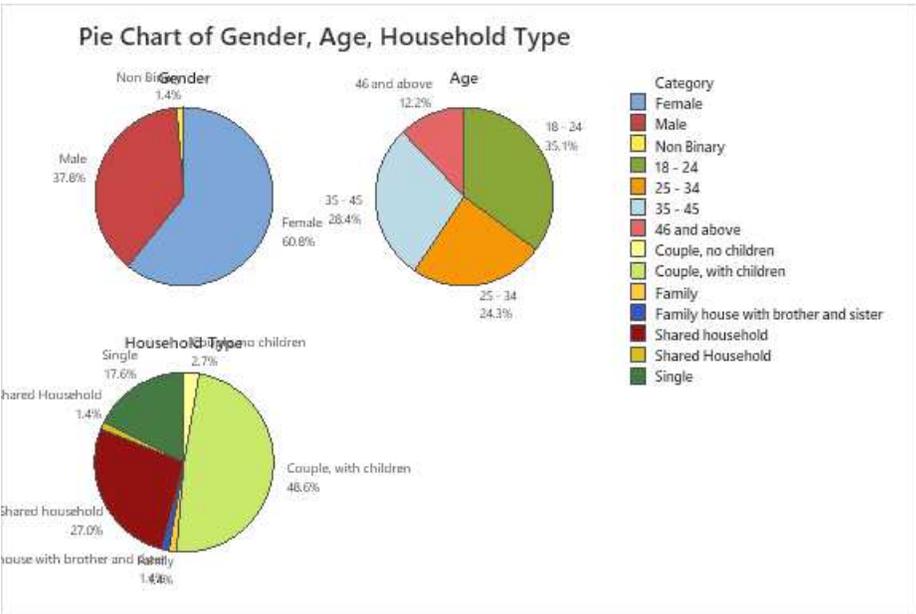

Figure 5. Pie chart of Demographics illustrating Gender, Age and Household type representation

4.4.   Food Waste Behaviors

For this section of the questions, we used an additional exclusion criterion to extract the most accurate data inferences. The respondents who answered "No" to the question "Are you aware of the amount of food wasted in your household each week?" were excluded from the analysis of their answers, as their replies would negatively affect the reports they make regarding the amount of food waste they

observe. Of the total non-sectioned population, 54% of the respondents answered "Yes," leaving the remaining 46% to be excluded. Most respondents reported frequently checking their food items for spoilage, with the largest portion of this group falling under "Almost," followed by "Always." A reported 90% of the respondents check their fridge or pantry before shopping to replenish their households, and this habit is seen to be associated with a higher frequency of checking for spoilage, suggesting a linked action or behavior. Household food waste estimates per week show that most respondents believe they waste "Less than 10%," making up 60% of the responses, followed by "10-20%" at 25%. Very few responses fell under "More than 30%," indicating a low self-reported perception of food waste within the surveyed population. 77.5% of respondents confirmed responsibility for doing their own grocery shopping, leaving only a small proportion of respondents not taking primary responsibility. Respondents who were "Sometimes" and "Often" purchasing perishable items frequently made up most of the data, with both categories at 32.5%. This highlights a higher tendency to frequently buy perishable items. For the open-ended answer regarding buying more food than necessary, most of the responses were "No," with varying phrases explaining their reasons. A few responses were observed under "Yes," with the most notable reasons associated with market price fluctuations, hosting guests, minimizing the number of trips to the grocery store, and larger family sizes. Regular use of meal planning and shopping lists was reported, with a combined 77.5% using these tools "Regularly" (40%) and "Occasionally" (37.5%), highlighting a higher use of these strategies. The data under this section reflect a strong responsibility and effort to minimize food waste. Additionally, among familiar methods to reduce food waste, participants most frequently mentioned "freezing leftovers," accounting for 18.9% of the responses. This was followed by "meal planning" and a combination of all methods, accounting for 15.4% and 13.5%, respectively. Finally, under leftover food usage, 55% of the total population's responses were recorded under "Sometimes," followed by 31% of the respondents answering "Always."

4.5.　　Nudges and Interventions

This section explores how participants rated the helpfulness and appeal of various interventions and nudges. Most of the participants reported that they would be "Very unlikely" (28.4%) and "Neutral" (24.3%) to use apps that remind them of expiry dates, followed by close proportions of "Unlikely" (17.6%) and "Likely" (16.2%). Regarding the helpfulness of visual reminders in their kitchens, respondents answered that they would find them "Very helpful," accounting for 44.3% of the total responses, followed by 36.7% who found them "Moderately helpful." There were smaller proportions of responses for "Not helpful at all" (10%) and "Extremely helpful" (8.9%).

Three visual prompts were evaluated in terms of the respondents' likelihood of utilizing them to help manage food items before they spoil. Most participants reported that they would be "Likely" (37.8%) and "Neutral" (29.7%) to use stickers on their fridges with reminders to check and eat leftovers as visual prompts. A similar proportion was recorded for a marker or label system for tracking open food items, with 32.5% of respondents finding the likelihood of using it as "Neutral" and 29.7% reporting "Likely." The likelihood of using a shelf labeled "Eat soon" for items close to expiration was recorded as "Likely" (33.8%), followed by "Neutral" (25.7%).

Four digital tools were assessed for their appeal to help manage food waste. The results show varying levels of appeal across all the tools, with the most positively rated tool being "Digital tools that suggest recipes," with 31.1% of respondents selecting "Very appealing" and 23% selecting "Appealing." A digital tool for sharing excess food with neighbors also garnered a positive response, with 27% selecting "Appealing" and 21.6% selecting "Very appealing." The remaining responses were distributed evenly among "Neutral" (16.9%) and "Very unappealing" (20.3%). For "An app that tracks food purchases and expiration dates," the responses were balanced, with 24.8% each selecting "Neutral" and "Very appealing." However, 18.9% of responses fell under "Very unappealing," showing some resistance to app use. Notifications for reminding foods nearing expiration were accepted less positively, with 33.8% of the responses falling under "Appealing" and 13.5% under "Very

appealing." A larger portion reported "Neutral" (20.3%) and "Very unappealing" (13.5%), indicating some resistance and hesitation.

For the question on the likelihood of participants taking advantage of store discounts on items close to their expiration date, responses were distributed well across the scale, with the highest proportion selecting "Likely" (28.4%), followed by equal proportions of "Very unlikely" and "Neutral" at 25.7%. A small portion of participants selected "Unlikely" (13.5%), and only 6.8% selected "Very unlikely" to use this strategy while shopping.
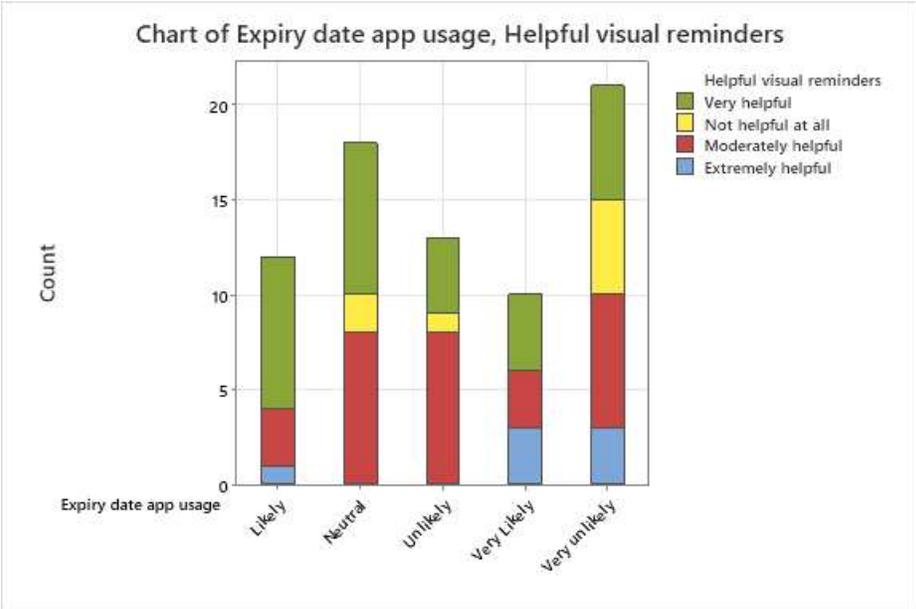

Figure 6. Bar Chart of Interventions, likelihood of using an app that notifies food products nearing expiry date and helpfulness of visual reminders in the kitchen illustrated.

4.6.   Intention and Personal Changes

For the final section of the questionnaire, participants were asked to rate their motivation to reduce food waste in their households. Most of the responses were under "Highly motivated" (51.4%) and "Moderately motivated" (39.2%), showing an overall high level of motivation. A smaller proportion reported lower levels of motivation, with 8.1% under "Slightly motivated" and 1.4% under "Not motivated." Regarding the personal changes they would make to reduce food waste, the most

frequently chosen response was "Buy fewer perishable items at a time," accounting for 36.5% of the responses, followed by "Use a shopping list and meal plan" at 28.4%. The response "Eat leftovers regularly" was recorded at 24.3%. "Use reminders for expiration dates" and "Already doing" were recorded under small proportions, at 9.5% and 1.4%, respectively. Finally, participants reported a large variety of barriers that prevent them from reducing food waste in their kitchens. Even though their responses were highly specific and varied, a section of responses attributed it to poor time management, unstructured shopping habits, not planning their meals, and the general unpredictability of food waste in their households.
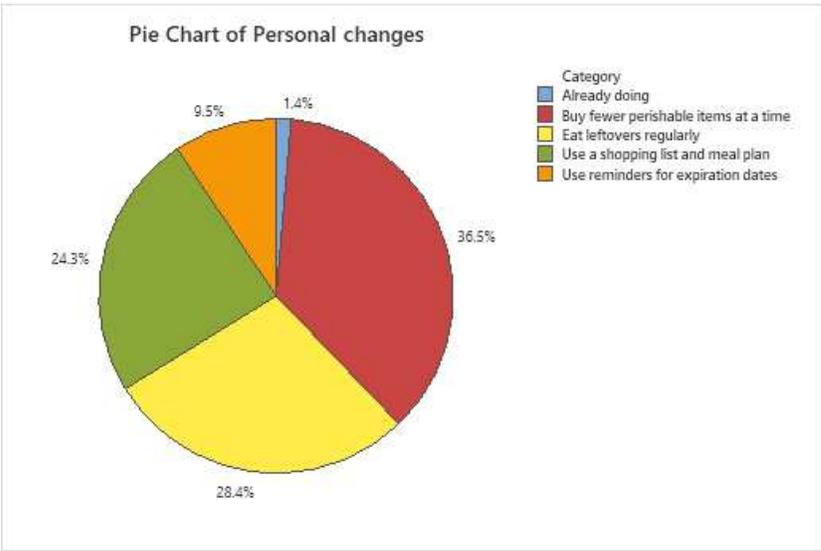

Figure 7. Chart of Personal Changes, participants reported making the chance of buying fewer perishable items and eating leftovers regularly

4.7.   Hypothesis and Correlation Testing Results

H1. The perceived importance of reducing food waste will be positively correlated with the awareness of the environmental impact of food waste.

A Spearman correlation was performed to test the relationship between the perceived importance of reducing food waste and their familiarity with the environmental impact of reducing food waste. The correlation of the two variables

was found to be weak but positive, with a correlation coefficient of 0.27 (p<0.05). This suggests that there is a weak but significant relationship.

H2. There is a significant difference between participants' awareness of food waste and their self-reported household food waste levels.

Spearman correlation tests were performed to test the relationship between participants' awareness of food waste and their self-reported food waste levels. The variables tested were environmental impact familiarity, importance of reducing food waste, amount wasted per week, and food waste estimate per week. The correlation between environmental impact familiarity and awareness of the amount wasted per week was found to be positive but weak, with a significant correlation coefficient of 0.29 (p<0.05), suggesting that participants with greater awareness of environmental impact might report slightly higher amounts of food waste. The importance of reducing food waste and awareness of amount wasted per week had a very weak relation, with a correlation coefficient of 0.01(p>0.05), indicating that participants' perceived importance of reducing waste had almost no statistically significant relationship with the amount of food they reported wasting.

H3. Stronger cultural and religious beliefs will be correlated with negative attitudes toward food waste.

A Spearman correlation was performed to test the relationship between cultural and religious beliefs about food and wasting food viewed negatively. The correlation was found to be positive and weak, with a significant correlation coefficient of 0.25(p<0.05). As cultural and religious beliefs about food become more important, participants viewed food waste more negatively.

H4. Food waste attitudes and behaviors regarding bulk shopping habits and increased food waste are positively correlated.

A Spearman correlation was performed to test the relationship between bulk shopping habits and increased food waste in households by testing two variables (buying perishable items in bulk and amount of food waste). The correlation was

found to be very weak, with a coefficient of 0.02 (p<0.05), suggesting that there is an insignificant relationship between the two variables.

H5. The use of decision-making tools like meal planning or shopping lists is positively correlated with reduced food waste behaviors.

A Spearman correlation was performed to test the relationship between the use of decision-making tools such as meal planning and shopping list use and self-reported food waste behavior, such as food waste estimate. The correlation was found to be weak and positive, with a significant correlation coefficient of 0.24(p<0.05) , indicating that participants who use meal planning and shopping lists tend to report slightly lower levels of food waste.

Variable	M	SD	1	2	3	4	5	6
1. Importance of reducing food waste	3.3243	0.6217	_					
2. Familiarity of environmental impact	3.068	1.317	0.2726	_				
3. Amount of food wasted per week	0.5405	0.5018	0.0114	0.2994	_			
4. Cultural and Religious beliefs	2.284	0.994	0.0604	0.1636	-0.0014	_		
5.Negative views about wasting food	2.973	1.238	-0.0590	0.0356	-0.1103	0.2544	_	
6. Buying perishable items in bulk	2.149	1.029	0.2303	0.1769	0.0165	0.0392	-0.1412	_

Table 1. Descriptive statistics and spearman correlation of variables

5. Discussion

5.1.   The Results

The study focused on investigating the attitudes and behaviors of residents in Addis Ababa to gain a better understanding of their habits and decision-making patterns regarding food waste. It also examined the societal factors behind food waste and preferences to nudges as a sustainability tool to minimize food waste. The results from the survey provide insights into all the factors that determine the environmental weight food waste impacts on urban cities and individuals at the household level.

The results revealed that most of the participants were aware of the environmental impact of food waste with most of them recognizing its importance of reducing it. However, despite their awareness there was a gap between participants' acknowledgement of the consequences and their self-reported food waste levels resonating with findings from other studies that highlight the disconnect between environmental awareness and action (Stancu et al., 2016). The correlation between the perceived importance of reducing food waste and environmental impact was weak but significant, indicating that their strong awareness didn't translate strongly into their actions aligning with findings that reveal that knowledge of environmental issues does not always translate into action (Rowe et al., 2014).

Cultural and religious influences had a significant impact on attitudes towards food waste. The positive but weak correlation between strong cultural and religious beliefs about food and negative views towards food waste highlights the need for additional actionable methods to incorporate into day-to-day life to bridge the gap between culture, attitudes and actions.

Regarding daily life and food waste behaviors participants reported a low level of food waste, with most of the estimated waste being under 10% of food per week. A little more than half of the respondents admitted that they were aware of the amount of food waste they produce which was also associated with a higher frequency of

habits like checking their pantries before shopping. The use of meal plans and shopping lists as decision making tools was positively correlated with low self-reported waste strengthening previous studies that state that strategic planning can help reduce household waste (Stancu et al., 2016).

When evaluating the preference of nudging strategies, a significant portion of participants found visual cues like fridge magnets and stickers to be helpful, indicating a slight favoritism towards cheaper and simpler nudges. Participants did not show a notable amount of preference to one nudge strategy or tool. However, digital tools such as apps for tracking foods that were close to expiration date received mixed responses with some participants admitting they were reluctant to use them. This highlights potential difficulties and barriers when presenting digital tools as nudges due to the varying levels of comfort and ease while using technology.

5.2.   Limitations

This study is subject to several limitations, with the most significant one being the small sample size. The limited number of participants compromises statistical and external validity as the sample is not representative of the larger population. The utilization of a digital-based questionnaire excludes individuals with limited internet access or digital literacy, which could potentially sway the demographic toward more technologically literate populations. The design of the survey might limit the interpretations made around behavioral change and cultural influences due to the exploratory nature of the questions and may require follow-up research for deeper understanding of the trends Furthermore, the analysis of the nudges only reflects preferences rather than testing their effectiveness. A larger sample size might have led to varied and diverse responses that would provide a deeper insight into preferences and the amount of food wasted weekly.

6. Conclusion

Achieving sustainability in food systems remains challenging as increased food production is met with a significant amount of waste. The gravity of food waste from production to consumption stages not only strains the environment but exacerbates food insecurity and food loss. At the household level poor shopping habits, poor planning and improper food storage are the major contributors to waste. The study shed light on the relationship between food waste attitudes, nudges and behaviors in Addis Ababa amid a global food waste crisis.

The findings indicate that the presence of moderate awareness of the environmental impact of food waste does not strongly correlate with reduced food waste behaviors. Cultural and religious beliefs influence attitudes but not actionable behaviors suggesting the need for more tailored interventions. The use of decision-making tools like meal plan and shopping list was associated with lower self- reported food waste supporting the idea that strategic and practical behaviors reduce waste. Nudging strategies and interventions received mixed results with no significant preference to one or the other. The most notable result from the exploration of the preferences of nudges is that there is a reluctance to adapt and use digital tools. This highlights the importance of providing accurate context when designing interventions in terms of technological accessibility and comfort.

The study underlines the importance of multifaceted interventions that combine education on environmental factors, cultural and societal considerations and practical tools to effectively reduce food waste. Future and extended research could explore the long-term effectiveness of interventions to reduce food waste particularly in under-studied and under-represented parts of the world where cultural practices might significantly differ from those in more developed areas. Gaining a better understanding of the diversity that exists in those regions is essential. to further refine the role of nudges in food waste behavior. The continued investigation of additional factors that intersect besides attitudes, behaviors and interventions would provide more sustainable solutions and policy measures for reducing food waste.

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