

CHAPTER 20

Food Waste among Young Consumers in Developing Countries: Trends, Determinants, and Sustainability Challenges

Hafiza Javeria Shehzadi¹, Muhammad Umer Farrukh^{1,*}, Omar Abdullah Alkhateeb², Shazia Kousar⁴, Sana Butt¹, Muhammad Umair Ashraf³ & Ayesha Batool¹

¹Department of Economics, Faculty of Administrative and Management Sciences, Government College Women University Sialkot, Pakistan.

²Department of Agribusiness and Consumer Sciences, College of Agriculture & Food Sciences, King Faisal University, Al-Ahsa, Saudi Arabia

³Department of Sociology, Government College Women University Sialkot.

⁴Department of English Linguistics, University of Narowal, Pakistan

*Corresponding authors' email: umarfarrukh@outlook.com

Abstract

Food waste has become a critical global challenge with profound economic, environmental, and social implications, undermining efforts to achieve sustainable development and food security. In recent years, increasing attention has been directed toward food waste generated by young consumers, particularly university students, whose food consumption patterns, lifestyles, and purchasing behaviors significantly influence waste generation. This chapter provides a comprehensive review of the literature on food waste among young consumers in developing countries, with a special emphasis on institutional and university settings. It synthesizes the conceptual and theoretical foundations of food waste by drawing on the economic theory of consumer behavior, the Theory of Planned Behavior, institutional theory, and behavioral economics to explain the complex interplay between individual choices and structural factors. The chapter further examines global and regional evidence on food waste trends, highlighting differences between developed and developing countries and discussing the growing significance of consumption-stage waste in South Asia and Pakistan. Attention is given to the behavioral, socio-demographic, economic, and institutional determinants that shape food waste practices among university students, as well as the methodologies used to measure food waste in educational institutions. The review identifies important research gaps, including the lack of micro-level evidence from Pakistani universities, limited investigation of institutional determinants, and the absence of systematic evaluations of campus-based waste reduction interventions. By integrating theoretical insights and empirical evidence, the chapter develops a conceptual framework that links key determinants to food waste outcomes and establishes a strong foundation for future empirical research and policy interventions aimed at promoting sustainable food consumption and reducing food waste among young consumers in developing countries.

<https://doi.org/10.66529/book.9786277945039.2026.ch20>

Received: 24-April 2026 Revised: 20 June 2026 Accepted: 03 July 2026

Keywords: Food Waste; University Students; Consumer Behavior; Sustainable Food Consumption; Developing Countries

1. Introduction

Food waste has emerged as one of the most pressing global sustainability challenges, with significant economic, environmental, and social consequences. Despite substantial advances in agricultural productivity and food distribution systems, a considerable proportion of food produced for human consumption is lost or wasted across different stages of the food supply chain, with a large share occurring at the consumption stage (Gustavsson *et al.*, 2011). The wastage of edible food not only represents a loss of valuable resources such as land, water, energy, labor, and capital but also contributes to greenhouse gas emissions, environmental degradation, and increasing pressure on already fragile food systems. At a time when millions of people worldwide continue to face food insecurity and malnutrition, reducing food waste has become an essential

component of achieving the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger) and SDG 12 (Responsible Consumption and Production).

In recent years, growing scholarly attention has been directed toward food waste generated by young consumers, particularly within higher education institutions. Universities constitute a unique and important setting for food waste research because large numbers of students consume meals daily through cafeterias, hostels, canteens, and campus events. The food consumption behaviors established during university life often shape long-term dietary habits and lifestyle choices, making young adults a critical demographic for promoting sustainable consumption practices (Stancu *et al.*, 2016). University students are also exposed to a combination of individual, social, and institutional influences that affect food-related decisions, including limited time for meal planning, changing dietary preferences, peer influence, financial considerations, and the availability of subsidized or institutionally provided meals.

Existing research suggests that food waste among university students is not merely the outcome of individual behavior but rather the result of a complex interaction between behavioral, socio-demographic, economic, and institutional factors. Behavioral characteristics such as inadequate meal planning, impulsive food purchases, over-serving, and a low tendency to utilize leftovers have been identified as important drivers of food waste (Parizeau *et al.*, 2015). Similarly, socio-demographic factors, including income level, educational background, living arrangements, and dietary preferences, shape food consumption and disposal patterns. Social norms, peer influences, and personal values further affect attitudes toward food conservation and sustainable practices (Visschers *et al.*, 2016). At the institutional level, food service practices such as fixed portion sizes, limited menu flexibility, inconsistent food quality, and pricing strategies can significantly contribute to waste generation in university cafeterias (Whitehair *et al.*, 2013).

The literature also emphasizes that awareness of the environmental and ethical implications of food waste does not necessarily translate into waste-reducing behavior. Many students recognize the negative impacts of food waste, yet practical constraints and behavioral tendencies often prevent them from adopting more sustainable consumption practices. This disconnect between knowledge and action has led researchers to increasingly apply interdisciplinary theoretical perspectives, including the economic theory of consumer behavior, the Theory of Planned Behavior (Ajzen, 1991), institutional theory, and behavioral economics, to better understand the motivations and constraints underlying food waste behavior.

Against this background, a comprehensive review of the literature is essential for synthesizing existing knowledge, identifying the key determinants of food waste among young consumers, and highlighting areas where further research is required. Although a substantial body of international literature exists, evidence from developing countries remains comparatively limited, particularly regarding university settings where food waste behavior is shaped by distinct social, cultural, and institutional conditions. In Pakistan, existing studies have largely focused on household food waste and post-harvest losses, while relatively little attention has been devoted to food waste among university students or the role of institutional food service systems in influencing waste generation.

Accordingly, this chapter critically reviews the national and international literature on food waste among young consumers, with a particular emphasis on university and institutional settings in developing countries. It begins by discussing the conceptual and theoretical foundations of food waste and the principal frameworks used to explain food waste behavior. The chapter then reviews global and regional evidence on food waste trends and examines the growing importance of consumption-stage waste in developing countries, particularly Pakistan. This is followed by an analysis of food waste within university and institutional settings and a detailed discussion of the behavioral, socio-demographic, economic, and institutional determinants of food waste. The chapter also reviews existing approaches to measuring food waste and identifies key methodological and empirical gaps in literature. Finally, it develops a conceptual framework that links the major determinants of food waste to expected outcomes and provides the theoretical foundation for the empirical analysis undertaken in the present study.

2. Conceptual and Theoretical Foundations of Food Waste

Food waste is a complex and multidimensional phenomenon that cannot be adequately explained through a single theoretical perspective. The generation of food waste results from the interaction of economic decision-making, behavioral intentions, social norms, institutional arrangements, and psychological influences. Consequently, understanding food waste behavior, particularly among university students and young consumers, requires an interdisciplinary framework that integrates insights from economics, psychology, sociology, and organizational studies (Thyberg & Tonjes, 2016; Visschers *et al.*, 2016). Such an approach helps explain why individuals continue to waste food despite recognizing its economic value, environmental implications, and ethical significance.

The existing literature suggests that food waste in university settings is shaped not only by individual preferences but also by the institutional context within which food choices are made. Consumption decisions are influenced by factors such as food pricing, meal plans, portion sizes, social interactions, time constraints, and campus food service practices. Therefore, theoretical frameworks that account for both individual behavior and structural influences are essential for understanding the determinants of food waste and for designing effective interventions to reduce it.

This section reviews the principal theoretical perspectives that have been widely applied in food waste research. It begins with the economic theory of consumer behavior, which explains food waste from the perspective of rational decision-making and utility maximization. It then examines the Theory of Planned Behavior (TPB), one of the most influential behavioral models for explaining food waste intentions and actions. The discussion subsequently turns to institutional theory, which highlights the role of organizational structures and food service systems in shaping consumption patterns, followed by the behavioral economics perspective, which emphasizes the importance of cognitive biases and heuristics in food-related decision-making. Together, these theoretical frameworks provide an integrated foundation for understanding food waste behavior among young consumers and support the conceptual framework adopted in the present study.

2.1. Economic Theory of Consumer Behavior and Food Waste

The economic theory of consumer behavior posits that individuals make rational choices aimed at maximizing utility while operating within budget constraints (Becker, 1965). Consumers are expected to allocate their resources in ways that provide the greatest level of satisfaction. However, in the context of food consumption, rational decision-making does not necessarily prevent food waste. When food is relatively affordable or readily available, individuals may purchase or serve quantities that exceed their actual needs, resulting in food disposal (Aschemann-Witzel *et al.*, 2015).

Within university environments, subsidized cafeteria meals, fixed meal plans, and limited direct financial responsibility can reduce students' perception of the economic value of food. Consequently, the marginal cost of discarding uneaten food appears relatively low, increasing the likelihood of waste. Economic theory also emphasizes concepts such as opportunity cost and diminishing marginal utility. When the effort required to store, preserve, or reuse leftover food exceeds the perceived benefits, individuals may choose to dispose of surplus food instead. Moreover, academic workload and time constraints often encourage students to prioritize convenience over efficient food management (Parizeau *et al.*, 2015). From this perspective, food waste occurs because the perceived costs of preventing waste are considered greater than the expected benefits, particularly in environments where food is abundant or subsidized.

2.2. Theory of Planned Behavior (TPB) and Food Waste

The Theory of Planned Behavior (TPB), developed by Ajzen (1991), is one of the most influential frameworks for explaining food waste behavior. TPB proposes that an individual's behavior is primarily determined by behavioral intention, which in turn is influenced by three key constructs: attitude toward the behavior, subjective norms, and perceived behavioral control.

In the context of food waste, students' attitudes toward food conservation, environmental sustainability, and ethical consumption significantly shape their intentions to minimize waste (Stancu *et al.*, 2016). However,

subjective norms, including peer influence, social dining habits, and cultural expectations, may encourage over-serving or excessive food consumption. Likewise, perceived behavioral control plays a crucial role in determining whether individuals can effectively avoid wasting food. Factors such as flexible portion sizes, access to food storage facilities, availability of leftovers, and time management affect students' ability to translate positive intentions into responsible behavior.

Empirical evidence indicates that even when students express a strong commitment to reducing food waste, situational constraints often limit their capacity to act accordingly (Visschers *et al.*, 2016). This gap between awareness and actual behavior is a recurring finding in literature and highlights the value of TPB as a framework for understanding the psychological and social processes underlying food waste in university settings.

2.3. Institutional Theory and Organizational Influences

While individual choices are important, food waste in universities cannot be fully understood without considering the institutional environment in which those choices occur. Institutional theory emphasizes the influence of organizational structures, formal rules, social norms, and administrative practices on individual behavior (Scott, 2008; Wang *et al.*, 2021). From this perspective, food waste is not solely the result of personal decisions but is also shaped by the design and operation of institutional food systems.

Within universities, factors such as standardized portion sizes, inflexible meal plans, limited menu customization, and inconsistent food quality have been identified as major contributors to food waste (Whitehair *et al.*, 2013). When institutional food service practices fail to align with students' preferences and actual consumption needs, food waste becomes an unintended but systematic outcome. For example, fixed portion policies may result in unavoidable leftovers, while limited dining hours can force students to discard food due to scheduling conflicts.

The absence of structured waste reduction initiatives, including awareness campaigns, trayless dining programs, portion control strategies, and food redistribution systems, may further reinforce wasteful consumption behavior (Papargyropoulou *et al.*, 2014). Institutional theory therefore broadens the analysis of food waste by highlighting that sustainable food consumption depends not only on individual responsibility but also on the policies and operational practices of organizations.

2.4. Behavioral Economics Perspective on Food Waste

Behavioral economics integrates psychological insights into traditional economic models to explain deviations from purely rational decision-making (Kahneman, 2011; Ozanne *et al.*, 2022). Unlike classical economic theory, which assumes that individuals consistently make optimal choices, behavioral economics recognizes that decisions are often influenced by cognitive biases, heuristics, habits, and emotional responses.

In the context of food consumption, behavioral biases such as over-optimism, present bias, and loss aversion significantly influence food waste behavior. University students may overestimate their future appetite, leading them to purchase or serve more food than they can consume. Present bias encourages immediate gratification, such as selecting larger portions or multiple food items, without adequately considering the likelihood of future waste. Similarly, food that is perceived to be less fresh or slightly less appealing may be discarded prematurely despite remaining edible (Aschemann-Witzel *et al.*, 2015).

Behavioral economics also emphasizes the importance of default options and choice architecture. Automatically providing large portion sizes, bundled meal deals, or fixed menus can increase food waste even in the absence of deliberate wasteful intentions. By understanding these behavioral tendencies, policymakers and university administrators can develop effective behavioral "nudges" that encourage more sustainable consumption patterns. Interventions such as smaller default portion sizes, improved menu flexibility, better information provision, and food waste awareness campaigns can help reduce waste without restricting consumer choice.

Taken together, the economic theory of consumer behavior, the Theory of Planned Behavior, institutional theory, and behavioral economics provide a comprehensive and complementary framework for understanding food waste among young consumers. These theoretical perspectives demonstrate that food waste is driven by the interaction of economic incentives, psychological motivations, social influences, and institutional arrangements, thereby providing a strong conceptual foundation for the empirical investigation undertaken in this study.

3. Global Evidence on Food Waste

Food waste is widely recognized as one of the most significant global challenges affecting food security, economic stability, and environmental sustainability. Despite improvements in agricultural productivity and food supply systems, a substantial proportion of food produced for human consumption is lost or wasted every year across different stages of the food supply chain (Gustavsson *et al.*, 2011). While food losses often occur during production, storage, and transportation, recent research has increasingly focused on waste generated at the consumption stage, as this accounts for a considerable share of total food destruction, particularly in urban and institutional settings (Gustavsson *et al.*, 2011). Understanding the magnitude, patterns, and implications of food waste at the global level is essential for designing effective waste reduction strategies and promoting sustainable food systems.

3.1. Magnitude and Patterns of Food Waste Worldwide

Globally, food waste occurs in both developed and developing countries, although its scale and characteristics vary considerably across regions. According to the Food and Agriculture Organization (FAO), nearly one-third of all food produced for human consumption is either lost or wasted annually (Gustavsson *et al.*, 2011). This level of waste represents a substantial inefficiency within global food systems and poses serious challenges for food security and sustainable resource management.

The patterns of food waste differ according to income levels, dietary habits, and the organization of food systems. In many countries, a significant proportion of food waste occurs at the household and food service levels, including restaurants, hotels, and institutional cafeterias (Thyberg & Tonjes, 2016). Empirical studies indicate that highly perishable food items, such as fruits, vegetables, prepared meals, and bakery products, are among the most frequently wasted commodities. At the consumption stage, behaviors such as over-serving, inadequate meal planning, excessive purchasing, and limited awareness of the consequences of food waste contribute substantially to overall waste generation (Graham-Rowe *et al.*, 2015; Aschemann-Witzel *et al.*, 2015; Knezevic *et al.*, 2019; Kaur *et al.*, 2021). Food waste is particularly prevalent in settings where food is relatively affordable, readily accessible, or provided through fixed-portion systems, such as universities and workplace dining facilities.

3.2. Food Waste in Developed and Developing Countries

The literature identifies important differences in food waste patterns between developed and developing countries. In high-income economies, food waste is concentrated largely at the retail and consumption stages, where edible food is frequently discarded due to aesthetic standards, oversized portions, changing consumer preferences, and convenience-oriented lifestyles (Parfitt *et al.*, 2010). Higher income levels and evolving consumption patterns further reinforce these trends, making food waste primarily a behavioral and attitudinal issue rather than one of food availability (Secondi *et al.*, 2015).

By contrast, food waste and food loss in developing countries have historically been associated with inefficiencies at the production, post-harvest, storage, and transportation stages because of inadequate infrastructure, limited access to technology, and weak supply chain management. However, recent evidence suggests that consumption-stage food waste is increasing in many developing countries due to rapid urbanization, rising incomes, changing dietary habits, and the expansion of institutional food services. In urban and educational settings, greater availability of prepared food, changing lifestyles, and increasing reliance on cafeterias and canteens have contributed to growing levels of consumer food waste. As a result,

the distinction between developed and developing countries is becoming less pronounced, with behavioral and institutional factors playing an increasingly important role across both contexts.

3.3. Environmental and Economic Consequences of Food Waste

Global literature consistently highlights the severe environmental, economic, and social consequences of food waste. From an environmental perspective, wasted food represents a substantial loss of valuable natural resources, including land, water, energy, labor, and agricultural inputs that were invested in its production, processing, and distribution (Gustavsson *et al.*, 2011). Furthermore, the disposal of food waste generates significant greenhouse gas emissions, particularly methane released during the decomposition of organic waste in landfills, thereby contributing to climate change and environmental degradation (Gustavsson *et al.*, 2011).

From an economic standpoint, food waste imposes considerable financial costs on households, businesses, institutions, and national economies. Resources allocated to food production, transportation, storage, and preparation are effectively squandered when food is discarded before consumption (Thyberg & Tonjes, 2016). In institutional settings such as universities, food waste not only increases operational and procurement costs but also reduces the overall efficiency of food service systems and resource utilization.

The social and ethical implications of food waste are equally significant. In many parts of the world, particularly in regions affected by poverty and food insecurity, the disposal of edible food stands in sharp contrast to the persistent inability of vulnerable populations to meet their nutritional requirements. This contradiction has intensified calls for more sustainable consumption patterns and more efficient food management practices at individual, institutional, and policy levels.

Overall, the global evidence demonstrates that food waste is a complex and multidimensional phenomenon shaped by the interaction of consumer behavior, institutional practices, and broader socio-economic conditions. The patterns and consequences identified in the international literature provide an essential foundation for understanding food waste in specific contexts, particularly among young consumers and within university environments in developing countries such as Pakistan.

4. Food Waste in Developing Countries and Pakistan

Food waste in developing countries has traditionally been associated with losses occurring at the production, storage, transportation, and distribution stages of the food supply chain due to inadequate infrastructure, limited technological capacity, and weak cold-chain systems. However, recent research indicates that consumption-stage food waste is becoming an increasingly important challenge, particularly in rapidly urbanizing societies where changing lifestyles and dietary patterns are reshaping food consumption behavior (Gustavsson *et al.*, 2011; Thi *et al.*, 2015). Institutional environments such as universities, hostels, and cafeterias are emerging as significant sources of food waste because they combine large-scale food provisioning with dynamic and often unpredictable consumption patterns.

The growing concern over food waste among young consumers is especially relevant in developing countries, where the coexistence of food insecurity and increasing levels of edible food disposal presents a major sustainability paradox. Rising incomes, greater availability of prepared and convenience foods, urban migration, and evolving social norms have altered food consumption habits among university students and other young adults. These trends have increased the importance of understanding the behavioral and institutional drivers of food waste within educational institutions, where daily food consumption is concentrated and intervention opportunities are readily accessible.

4.1. Food Waste in South Asia

Evidence from South Asian countries suggests that food waste at the consumption stage is increasing, particularly among university students and urban youth populations. Studies indicate that factors such as inadequate meal planning, oversized portions, irregular eating schedules, and limited awareness regarding the economic and environmental consequences of food waste contribute significantly to plate waste in

institutional settings (Aschemann-Witzel *et al.*, 2015). Universities, where students often rely on cafeterias and hostel dining facilities, provide an environment in which convenience frequently takes precedence over efficient food utilization.

Institutional characteristics also play a crucial role in shaping food waste behavior across South Asia. Fixed portion sizes, limited menu flexibility, buffet-style serving systems, and standardized meal plans often result in food quantities that exceed actual consumption needs. Although many students are aware of broader concerns related to food security and environmental sustainability, this awareness does not always translate into responsible consumption practices. Social norms, peer influence, group dining behavior, and convenience-oriented food choices frequently override intentions to minimize waste (Stancu *et al.*, 2016). These findings suggest that food waste among university students is influenced by a complex interaction of individual behavior and institutional arrangements rather than by knowledge deficits alone.

4.2. Food Waste Trends and Challenges in Pakistan

In Pakistan, most of the existing research on food waste has concentrated on household-level waste and post-harvest losses within agricultural supply chains. Comparatively little attention has been given to consumption-stage food waste, particularly within higher education institutions. Nevertheless, emerging evidence suggests that food waste is becoming an increasingly significant issue in urban universities, where food is readily available through cafeterias, hostels, and nearby restaurants and cafés (Gustavsson *et al.*, 2011).

Studies focusing on Pakistani university students identify several determinants of food waste, including limited awareness of appropriate portion sizes, a preference for taste and variety over necessity, irregular meal schedules, and insufficient concern for the management of leftovers. Institutional factors further intensify the problem. Large serving portions, inconsistent food quality, limited menu choices, and the absence of formal food waste management or redistribution programs contribute to higher levels of plate waste in university dining facilities. In addition, cultural norms emphasizing hospitality, generosity, and food abundance may unintentionally encourage over-serving and the disposal of edible food (Thi *et al.*, 2015).

Economic considerations also influence food waste behavior among students. Subsidized cafeteria meals and limited direct financial responsibility reduce the perceived economic cost of wasting food, weakening incentives for careful consumption. Moreover, demanding academic schedules, time constraints, and the pressures of university life often discourage students from planning meals effectively or utilizing leftovers. As a result, food waste among university students in Pakistan emerges as a multidimensional issue shaped by the interaction of behavioral, economic, cultural, and institutional factors.

Overall, the evidence from developing countries, South Asia, and Pakistan highlights a gradual shift in the food waste discourse from a narrow focus on supply-chain inefficiencies toward a broader understanding that also encompasses consumption-stage waste. This transition underscores the importance of examining food waste within universities, where both individual behaviors and institutional practices can be targeted through evidence-based interventions to promote more sustainable food consumption patterns.

5. Food Waste in Institutional and University Settings

Institutional settings have emerged as important focal points in food waste research, particularly universities where large numbers of students consume meals daily. University campuses typically encompass multiple food service environments, including cafeterias, hostels, canteens, and event-based catering facilities, all of which generate substantial quantities of food waste. High food availability, standardized portion sizes, bulk meal preparation, and institutional serving practices often contribute to the accumulation of edible food waste (Whitehair *et al.*, 2013). Given the concentration of young consumers and structured food service systems, universities provide a unique context for understanding food waste behavior and for designing effective waste reduction strategies that can promote sustainable consumption practices.

5.1. Food Waste in Universities and Cafeterias

University cafeterias are among the primary sources of food waste within institutional settings. Research indicates that large portion sizes, buffet-style dining systems, and limited flexibility in meal selection frequently result in excessive plate waste (Parizeau *et al.*, 2015). Students often select or are served more food than they can consume, particularly when meals are provided in predetermined portions or through fixed meal plans that do not accommodate individual preferences and appetites.

Empirical evidence further suggests that institutional factors such as poor food quality, limited menu diversity, and time constraints significantly influence food waste generation in university dining facilities (Stancu *et al.*, 2016). Students may discard meals that fail to meet their expectations regarding taste, freshness, or variety, while busy academic schedules often prevent them from completing meals or returning for later consumption. Moreover, when food prices are subsidized, students may perceive food as less economically valuable, reducing the incentive to minimize waste and increasing the likelihood of food disposal.

5.2. Hostel, Canteen, and Event-Based Food Waste

Food waste is also prevalent in university hostels and canteens, where meals are commonly prepared in bulk to cater for large student populations. Standardized serving sizes and fixed meal schedules may generate significant amounts of uneaten food, particularly when students skip meals due to academic responsibilities, extracurricular activities, or personal preferences (Papargyropoulou *et al.*, 2014). In many cases, food prepared to ensure adequate supply remains unconsumed and is ultimately discarded.

Event-based food waste represents another important but often overlooked dimension of institutional food waste. Academic conferences, seminars, workshops, student gatherings, and other campus events frequently involve catering services that prepare food in excess to avoid shortages. Consequently, considerable quantities of edible food remain unused after these events and are disposed of rather than redistributed. Existing studies indicate that the absence of structured food recovery and redistribution systems within universities contributes significantly to the unnecessary disposal of surplus food (Thyberg & Tonjes, 2016). Establishing mechanisms for food donation and redistribution could therefore play an important role in reducing institutional food waste while simultaneously supporting local food security initiatives.

5.3. Comparative Evidence from Higher Education Institutions

Comparative research across higher education institutions demonstrates that food waste patterns vary according to institutional policies, dining systems, and socio-cultural contexts. Universities that have implemented targeted waste reduction initiatives, such as trayless dining programs, portion control measures, awareness campaigns, and sustainable food service practices, generally report lower levels of food waste than institutions without such interventions (Whitehair *et al.*, 2013).

Cross-country studies comparing universities in Europe, North America, and Asia further highlight the effectiveness of combining behavioral interventions with institutional management strategies to reduce food waste (Secondi *et al.*, 2015). Educational campaigns that enhance student awareness, coupled with operational reforms such as flexible portion sizing, improved menu planning, and efficient inventory management, have been shown to significantly reduce waste generation. These findings suggest that successful food waste management in higher education institutions requires an integrated approach that addresses both individual consumption behavior and the structural characteristics of campus food systems.

Overall, the existing literature identifies universities as critical settings for addressing food waste due to their large student populations, organized food service operations, and potential to influence long-term consumption habits. Investigating food waste within institutional environments therefore provides valuable insights for developing evidence-based interventions aimed at promoting sustainable food consumption and reducing unnecessary food loss among young consumers.

6. Determinants of Food Waste

Food waste is a multifaceted phenomenon influenced by a complex interaction of socio-demographic, behavioral, institutional, and economic factors. Empirical studies suggest that food waste behavior is not uniform across populations but varies according to differences in age, income, education, dietary habits, awareness levels, social norms, and the broader institutional environment (Thyberg & Tonjes, 2016). In university settings, where food is often readily available through subsidized cafeterias and hostels, these factors interact to shape students' food consumption and disposal practices. Understanding the determinants of food waste is therefore essential for designing targeted interventions and effective institutional policies aimed at promoting sustainable consumption.

6.1. Socio-Demographic Determinants

Socio-demographic characteristics are among the most fundamental drivers of food waste behavior because they influence individuals' consumption habits, awareness, preferences, and decision-making processes. Variables such as age, income, education, and dietary patterns have been widely recognized in the literature as significant predictors of food waste generation.

Age, Income, Education, and Dietary Habits

Age plays an important role in shaping food waste behavior. Younger individuals, particularly university students, tend to generate more waste than older populations, largely because of limited experience in meal planning, irregular eating schedules, and a stronger preference for convenience foods (Secondi *et al.*, 2015). Student lifestyles, often characterized by changing routines and limited attention to food management, further contribute to higher levels of waste.

Income level also affects food waste patterns. Individuals with higher incomes are generally less sensitive to food costs and may waste larger quantities of food because the perceived economic loss associated with disposal is relatively low. Conversely, those with limited financial resources tend to manage food more carefully and generate less waste (Aschemann-Witzel *et al.*, 2015). Within university environments, subsidized meal systems can similarly reduce students' perception of the economic value of food, increasing the likelihood of wasteful behavior.

Education represents another important determinant. Higher levels of education are often associated with greater awareness of the environmental, social, and economic implications of food waste. However, empirical evidence consistently suggests that increased awareness does not necessarily translate into reduced food waste, highlighting a persistent gap between knowledge and actual behavior (Stancu *et al.*, 2016).

Dietary habits and food preferences further shape waste generation. Students who seek greater variety in their meals or frequently change their food choices may be more likely to discard leftovers. Likewise, irregular eating patterns, meal skipping, and dependence on ready-made or cafeteria meals increase the probability of food waste (Parizeau *et al.*, 2015). Overall, the literature demonstrates that socio-demographic factors exert a substantial influence on food waste behavior, particularly among university students, while interacting closely with behavioral and institutional determinants.

6.2. Behavioral and Attitudinal Determinants

Behavioral and attitudinal factors are among the most widely studied determinants of food waste, especially in educational institutions. These factors influence how individuals perceive food, make consumption decisions, and manage leftovers. Existing evidence highlights that awareness, attitudes, social norms, food preferences, portion sizes, and daily consumption practices collectively shape food waste patterns (Stancu *et al.*, 2016).

Awareness, Attitudes, Social Norms, and Food Preferences

Awareness of the environmental, economic, and social consequences of food waste is often considered a prerequisite for responsible consumption behavior. Students who possess greater knowledge about the impacts of food waste are generally more inclined to adopt waste-reducing practices. Nevertheless, research

indicates that awareness alone is insufficient to ensure behavioral change, revealing a significant gap between knowledge and actual practice (Visschers *et al.*, 2016).

Attitudes toward food conservation and sustainability also play a critical role. Positive attitudes are generally associated with lower levels of food waste, whereas indifferent or careless attitudes contribute to higher levels of disposal (Stancu *et al.*, 2016). In addition, social norms significantly influence food consumption patterns. Students are often affected by peer behavior and shared dining practices, and in group settings they may overserve or waste food to conform to social expectations.

Food preferences and taste are equally important determinants. Students may discard meals that do not satisfy their taste preferences or may choose a variety of menu items while leaving some portions uneaten. Such preference-driven decisions are particularly common in buffet-style and cafeteria dining environments where multiple food options are available.

Portion Size, Plate Waste, and Consumption Behavior

Portion size is consistently identified as a major determinant of food waste in institutional settings. Empirical studies show that larger serving sizes are directly associated with increased plate waste because individuals are often unable to consume all the food provided (Whitehair *et al.*, 2013). Fixed portion systems and limited flexibility in meal customization further exacerbate this problem.

Consumption behavior, including impulsive food selection, overeating tendencies, and poor meal planning, also contributes significantly to food waste. Students frequently overestimate their appetite and select more food than required, resulting in leftovers that are eventually discarded (Parizeau *et al.*, 2015). Plate waste is particularly common in university cafeterias where convenience, time constraints, and social dining habits shape consumption patterns. Furthermore, irregular meal schedules and meal skipping often lead to food remaining unused or becoming spoiled before consumption. These findings suggest that improvements in portion control, increased awareness, and the promotion of responsible eating practices can substantially reduce food waste within university settings.

6.3. Economic Determinants

Economic factors play a pivotal role in shaping food consumption and disposal behavior, particularly in institutional environments where food pricing structures and subsidy mechanisms influence consumer decisions. The literature suggests that when the perceived economic cost of food is low, the likelihood of food waste increases (Thyberg & Tonjes, 2016).

Food Pricing and Subsidies

Food pricing is a key determinant of food waste behavior. Lower food prices reduce the perceived value of food, encouraging individuals to purchase or serve larger quantities than necessary. In university settings, subsidized meals and fixed-price dining systems often motivate students to select larger portions, contributing to higher levels of plate waste (Aschemann-Witzel *et al.*, 2015).

Although subsidy-based food systems improve affordability and accessibility, they may unintentionally encourage waste by reducing the financial incentive to conserve food. Students may not fully internalize the economic cost of discarded food when meals are subsidized or incorporated into prepaid meal plans. Consequently, the economic disincentive for wasting food remains weak, leading to inefficient consumption patterns (Parizeau *et al.*, 2015).

Budget allocation and Resource Efficiency

Budget allocation and resource management influence food waste at both the individual and institutional levels. Students operating under limited personal budgets generally adopt more cautious food management practices, whereas those with greater financial flexibility often exhibit higher levels of waste (Secondi *et al.*, 2015). Financial constraints can therefore act as a natural mechanism for reducing unnecessary consumption and improving resource utilization.

At the institutional level, inefficient budget allocation and food service management practices may contribute to overproduction and excess food supply. Universities frequently prepare food in large quantities to avoid shortages, but this practice often results in significant amounts of surplus food being discarded. Such inefficiencies reflect shortcomings in demand forecasting, inventory management, and portion planning, highlighting the need for more effective resource allocation strategies (Papargyropoulou *et al.*, 2014; Bittner *et al.*, 2025).

Overall, the literature demonstrates that economic determinants influence food waste through both individual consumption decisions and institutional management practices. Addressing issues related to food pricing, subsidy structures, demand forecasting, and resource efficiency can therefore play a significant role in reducing food waste within university environments and promoting more sustainable food systems.

7. Measurement Approaches to Food Waste

The accurate measurement of food waste is essential for understanding its magnitude, identifying its primary sources, and designing effective interventions to reduce waste generation. Reliable measurement not only provides evidence on the scale of the problem but also enables researchers and policymakers to evaluate the effectiveness of food waste reduction initiatives over time. In institutional settings such as universities, a combination of quantitative and qualitative approaches is commonly employed to assess food waste behavior and disposal patterns. Each method offers distinct advantages while also presenting certain limitations that must be considered in empirical research (Xue *et al.*, 2017).

7.1. Quantitative Measurement Approaches

Quantitative methods are widely used to estimate the volume and composition of food waste generated within institutional settings. Among these, waste audits and direct weighing techniques are generally regarded as the most reliable methods because they provide objective and accurate information on the amount and type of food discarded (Gustavsson *et al.*, 2011). In university cafeterias, plate waste is frequently measured by collecting and weighing leftover food after meals, allowing researchers to quantify waste levels and identify the food items most discarded.

Surveys and structured questionnaires represent another important quantitative approach to measuring food waste behavior. These tools are used to gather information on students' food consumption habits, portion selection, meal planning practices, and self-reported waste behavior. Survey-based methods are particularly useful for collecting data from large populations at relatively low cost. However, they are subject to certain limitations, including reporting bias and recall errors, as respondents may underestimate or inaccurately report the amount of food they waste (Xue *et al.*, 2017). Despite these shortcomings, surveys remain a valuable complement to direct measurement techniques because they provide insights into the factors underlying waste generation.

7.2. Qualitative Measurement Approaches

Qualitative methods are primarily employed to explore the underlying reasons and motivations behind food waste behavior. Unlike quantitative techniques, which focus on measuring the amount of waste generated, qualitative approaches seek to understand why individuals waste food and how social, cultural, and institutional factors shape their decisions.

Interviews provide researchers with the opportunity to examine students' attitudes, perceptions, and beliefs regarding food consumption and waste. Through in-depth discussions, participants can explain the factors influencing their meal choices, leftover management practices, and awareness of the environmental and economic consequences of food waste. Similarly, observational methods, such as monitoring cafeteria or canteen behavior, allow researchers to record real-time food selection, serving, and disposal practices without relying solely on self-reported information (Papargyropoulou *et al.*, 2014).

These qualitative approaches are particularly valuable for identifying behavioral and institutional determinants that may not be adequately captured through quantitative data alone. They provide contextual

understanding of food waste practices and help explain the social and organizational dynamics that contribute to waste generation in university settings.

7.3. Limitations of Food Waste Measurement in Institutional Settings

Despite the availability of various measurement techniques, assessing food waste in institutional environments presents several methodological challenges. Direct measurement methods, including waste audits and plate-weighing exercises, are often labor-intensive, time-consuming, and require substantial logistical and financial resources. Implementing these methods on a large scale can therefore be difficult, particularly in universities with multiple dining facilities and large student populations.

Survey-based approaches also have limitations. Self-reported data may suffer from recall bias and social desirability bias, as respondents often underreport behaviors perceived as socially undesirable, including food waste (Xue *et al.*, 2017). As a result, survey estimates may not accurately reflect actual waste levels.

In addition, variations across university dining systems, serving practices, portion sizes, and student lifestyles create further challenges for obtaining standardized and comparable measurements. The absence of universally accepted measurement protocols also limits the comparability of findings across different studies and institutional contexts. Consequently, many scholars recommend the use of mixed method approaches that combine quantitative techniques, such as waste audits and surveys, with qualitative methods, including interviews and observations, to produce more comprehensive and reliable assessments of food waste (Papargyropoulou *et al.*, 2014; Aydin & Yildirim, 2020).

Overall, the literature suggests that no single method can fully capture the complexity of food waste behavior. Integrating multiple measurement approaches provides a more robust understanding of both the scale of food waste and the underlying factors that drive it, thereby supporting the development of more effective and evidence-based waste reduction strategies in university settings.

8. Research Gaps Identified from Literature

The preceding review of the literature demonstrates that food waste has emerged as an important area of research because of its implications for food security, environmental sustainability, and resource efficiency. Although a substantial body of work has examined the causes and consequences of food waste, several important gaps remain, particularly within the context of developing countries such as Pakistan. Existing studies have primarily focused on household-level food waste and supply chain losses, while relatively limited attention has been devoted to food waste occurring within institutional environments, especially universities (Thyberg & Tonjes, 2016). The literature review identifies three major gaps that provide the rationale for the present study.

8.1. Lack of Micro-Level Evidence from Pakistani Universities

One of the most significant limitations in the existing literature is the scarcity of micro-level empirical evidence from higher education institutions in Pakistan. Most available studies present broad or generalized findings regarding food waste and do not comprehensively investigate student-specific behaviors, consumption patterns, and waste management practices. Consequently, there is limited understanding of how individual characteristics, dietary habits, and daily campus routines influence food waste generation among university students.

Moreover, most previous studies have relied on national or household-level data, which may not adequately capture the unique dynamics of institutional food environments. Universities represent a distinct setting where subsidized meals, cafeteria services, hostel dining systems, and changing student lifestyles collectively shape food consumption behavior. The absence of detailed campus-level evidence restricts the development of targeted interventions and limits the ability of policymakers and university administrators to formulate evidence-based strategies for reducing food waste.

8.2. Limited Focus on Institutional Determinants

A second major gap concerns the relatively limited attention given to institutional and organizational determinants of food waste. Existing research has predominantly emphasized individual-level behavioral factors such as awareness, attitudes, environmental concern, and personal responsibility. While these factors are undoubtedly important, they do not fully explain the variation in food waste observed across different institutional settings.

The literature provides comparatively little analysis of how cafeteria systems, portion sizes, food quality, menu flexibility, serving practices, and dining schedules influence food waste generation (Papargyropoulou *et al.*, 2014; Alattar *et al.*, 2020). Similarly, the role of institutional policies, food service management, and operational inefficiencies remains underexplored, particularly in developing-country universities. Since food waste is shaped by the interaction between individual choices and the institutional environment, a more integrated analytical approach is required to understand the relative contribution of these factors.

8.3. Absence of Campus-Level Policy Evaluations

Another notable gap in the literature is the limited evaluation of food waste reduction initiatives implemented within university settings. Although various interventions such as awareness campaigns, portion control measures, trayless dining systems, and food redistribution programs have been proposed or introduced in different countries, few studies have systematically assessed their effectiveness in reducing food waste.

The absence of rigorous evaluations makes it difficult to identify which policy instruments and institutional practices are most effective in promoting sustainable food consumption among university students. This limitation is particularly evident in Pakistan, where empirical evidence on the implementation and outcomes of campus-level food waste management strategies remains extremely limited. As a result, universities often lack practical guidance for designing and implementing evidence-based food waste reduction programs.

8.4. Research Contribution and Study Rationale

Addressing these gaps is essential for advancing both the academic understanding and practical management of food waste in higher education institutions. The present study contributes to the literature by providing micro-level empirical evidence from Government College Women University Sialkot (GCWUS), with a particular focus on the interaction between behavioral and institutional determinants of food waste. Unlike many previous studies that emphasize either individual attitudes or generalized national trends, this research adopts an integrated perspective that examines how socio-demographic characteristics, behavioral factors, economic considerations, and institutional arrangements collectively shape food waste behavior among university students.

By generating context-specific evidence from a developing-country setting, the study seeks to fill an important gap in the existing literature and provide a foundation for the development of targeted policies and sustainable food waste management practices within Pakistani universities.

9. Conclusion

This chapter has critically reviewed the existing body of knowledge on food waste with a particular focus on young consumers and university students in developing countries. The literature demonstrates that food waste is a multidimensional and systemic issue that extends beyond individual carelessness and is shaped by the interaction of economic incentives, behavioral intentions, social norms, institutional practices, and broader food system characteristics. Theoretical perspectives, including the economic theory of consumer behavior, the Theory of Planned Behavior, institutional theory, and behavioral economics, collectively provide a robust framework for understanding why food waste persists even among individuals who are aware of its adverse consequences. These perspectives highlight that food waste behavior is influenced not only by personal attitudes and preferences but also by contextual factors such as pricing structures, portion sizes, social expectations, convenience, and the design of institutional food service systems.

The empirical evidence reviewed in this chapter reveals that food waste among university students is associated with a wide range of determinants, including socio-demographic characteristics, dietary habits,

environmental awareness, attitudes toward sustainability, peer influence, and economic considerations. Institutional factors such as cafeteria management practices, food quality, menu flexibility, serving systems, and standardized portion sizes also play a critical role in shaping food waste outcomes. The literature further shows that while developed countries have long recognized consumption-stage food waste as a major challenge, developing countries are increasingly facing similar problems due to rapid urbanization, changing lifestyles, expanding food service sectors, and evolving consumption patterns among younger populations. In countries such as Pakistan, where concerns regarding food insecurity and resource scarcity remain acute, the growing incidence of food waste within educational institutions presents both a sustainability challenge and a missed opportunity for improving resource efficiency.

The chapter also highlights the importance of reliable food waste measurement and the need for combining quantitative and qualitative approaches to capture both the magnitude of waste and the underlying behavioral and institutional drivers. Existing measurement methods provide useful insights but often face limitations related to data availability, self-reporting biases, and the absence of standardized methodologies, particularly in institutional settings. This reinforces the need for context-specific empirical investigations that employ comprehensive and methodologically sound approaches.

A major contribution of this literature review is the identification of significant research gaps. Existing studies have largely focused on household food waste or supply chain losses, with comparatively little attention devoted to university environments in developing countries. Micro-level evidence from Pakistani higher education institutions remains scarce, and limited research has examined the influence of institutional arrangements such as cafeteria operations, portion control, and campus food policies. Likewise, there is a notable lack of empirical evaluation of food waste reduction initiatives, including awareness campaigns, food redistribution mechanisms, and behavioral interventions. Addressing these gaps is essential for developing evidence-based strategies capable of reducing food waste while promoting sustainable consumption practices among young consumers.

Drawing together the theoretical perspectives, empirical findings, and identified research gaps, this chapter provides the conceptual and analytical foundation for the present study. The proposed conceptual framework recognizes that food waste among university students is the outcome of the interaction between socio-demographic, behavioral, economic, and institutional factors, all of which jointly influence food consumption and disposal practices. By focusing on the context of GC Women University Sialkot, the study seeks to contribute original empirical evidence from a developing country perspective and to generate practical insights for policymakers, university administrators, and other stakeholders seeking to reduce food waste and advance sustainability within higher education institutions. Ultimately, tackling food waste among young consumers is not only a matter of improving resource efficiency but also an essential step toward achieving broader goals of food security, environmental sustainability, and responsible consumption.

References

- Bittner, B., Vida, V., Szakos, D., Kasza, G., Kovács, S., & Nagy, A. (2025). A study of the behavioral and environmental factors influencing food waste in higher education. *Cleaner Waste Systems*, vol. 11, Art. no. 100256. <https://doi.org/10.1016/j.clwas.2025.100256>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Alattar, M. A., DeLaney, J., Morse, J. L., & Nielsen-Pincus, M. (2020). Food waste knowledge, attitudes, and behavioral intentions among university students. *Journal of Agriculture, Food Systems, and Community Development*, 9(3), 1–18. <https://doi.org/10.5304/jafscd.2020.093.014>
- Aschemann-Witzel, J., de Hooge, I., Amani, P., Bech-Larsen, T., & Oostindjer, M. (2015). Consumer-related food waste: Causes and potential for action. *Sustainability*, 7(6), 6457–6477. <https://doi.org/10.3390/su7066457>
- Aydin, H., & Yildirim, P. (2020). Understanding food waste behavior: The role of morals, habits and knowledge. *Journal of Cleaner Production*, 280, Article 124250. <https://doi.org/10.1016/j.jclepro.2020.124250>
- Becker, G. S. (1965). A theory of the allocation of time. *The Economic Journal*, 75(299), 493–517. <https://doi.org/10.2307/2228949>

- Graham-Rowe, E., Jessop, D. C., & Sparks, P. (2015). Predicting household food waste reduction using an extended theory of planned behaviour. *Resources, Conservation and Recycling*, 101, 194–202. <https://doi.org/10.1016/j.resconrec.2015.05.020>
- Gustavsson, J., Cederberg, C., Sonesson, U., Van Otterdijk, R., & Meybeck, A. (2011). *Global food losses and food waste: Extent, causes and prevention*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/4/mb060e/mb060e.pdf>
- Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux. <https://link.springer.com/article/10.1007/s00362-013-0533-y>
- Kaur, P., Dhir, A., Talwar, S., & Ghuman, K. (2021). Systematic literature review of food waste in educational institutions. *International Journal of Contemporary Hospitality Management*, 33(4), 1161–1184. <http://dx.doi.org/10.1108/IJCHM-07-2020-0672>
- Knezevic, B., Kurnoga, N., & Anic, I. D. (2019). Typology of university students regarding attitudes toward food waste. *British Food Journal*, 121(11), 2578–2591. <https://doi.org/10.1108/BFJ-05-2018-0316>
- Long, Q., Feng, Li., Baoming, C., Lingen, W., & Shaosheng J. (2021). Determinants of food waste generation in Chinese university canteens. *Resources, Conservation and Recycling*, 167, Article 105410. <https://doi.org/10.1016/j.resconrec.2021.105410>
- Ozanne, L. K., Ballantine, P. W., & McMaster, A. (2022). Understanding food waste produced by university students: A social practice approach. *Sustainability*, 14(17), Article 10653. <https://doi.org/10.3390/su141710653>
- Papargyropoulou, E., Lozano, R., Steinberger, J. K., Wright, N., & Ujang, Z. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Cleaner Production*, 76, 106–115. <https://doi.org/10.1016/j.jclepro.2014.04.020>
- Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: Quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3065–3081. <https://doi.org/10.1098/rstb.2010.0126>
- Parizeau, K., von Massow, M., & Martin, R. (2015). Household-level dynamics of food waste production and related beliefs, attitudes, and behaviours in Guelph, Ontario. *Waste Management*, 35, 207–217. <https://doi.org/10.1016/j.wasman.2014.09.019>
- Scott, W. R. (2008). *Institutions and organizations: Ideas and interests* (3rd ed.). Sage Publications. https://digitalcommons.usu.edu/unf_research/55/
- Secondi, L., Principato, L., & Laureti, T. (2015). Household food waste behaviour in EU-27 countries: A multilevel analysis. *Food Policy*, 56, 25–40. <https://doi.org/10.1016/j.foodpol.2015.07.007>
- Stancu, V., Haugaard, P., & Lahtenmaki, L. (2016). Determinants of consumer food waste behaviour: Two routes to food waste. *Appetite*, 96, 7–17. <https://doi.org/10.1016/j.appet.2015.08.025>
- Thi, N. B. D., Kumar, G., & Lin, C. Y. (2015). An overview of food waste management in developing countries: Current status and future perspective. *Journal of Environmental Management*, 157, 220–229. <https://doi.org/10.1016/j.jenvman.2015.04.022>
- Thyberg, K. L., & Tonjes, D. J. (2016). Drivers of food waste and their implications for sustainable policy development. *Resources, Conservation and Recycling*, 106, 110–123. <https://doi.org/10.1016/j.resconrec.2015.11.016>
- Visschers, V. H. M., Wickli, N., & Siegrist, M. (2016). Sorting out food waste behaviour: A survey on the motivators and barriers of self-reported amounts of food waste in households. *Journal of Environmental Psychology*, 45, 66–78. <https://doi.org/10.1016/j.jenvp.2015.11.007>
- Whitehair, K. J., Shanklin, C. W., & Brannon, L. A. (2013). Written messages improve edible food waste behaviors in a university dining facility. *Journal of the Academy of Nutrition and Dietetics*, 113(1), 63–69. <https://doi.org/10.1016/j.jand.2012.09.015>
- Xue, L., Liu, G., Parfitt, J., Liu, X., Van Herpen, E., Stenmarck, Å., O'Connor, C., Östergren, K., & Cheng, S. (2017). Missing food, missing data? A critical review of global food losses and food waste data. *Environmental Science & Technology*, 51(12), 6618–6633. <https://doi.org/10.1021/acs.est.7b00401>

Declaration: AI-assisted tools (LLMs) were used to improve the language and grammar of this chapter. The authors reviewed and approved all content and assume full responsibility for its accuracy.