



An Analysis of Food Waste in a Subsidized Employee Meal Program at a Sri Lankan Secondary Care Hospital

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Abstract

Introduction: In Sri Lanka, a severe economic crisis has exacerbated food insecurity, creating a stark contradiction with significant institutional food waste. This is particularly evident in government hospitals, which provide heavily subsidized meals for employees. While patient meal waste has been studied, employee-related food waste in these subsidized systems remains a critical, unaddressed gap.

Objective: This study aimed to quantify and analyze the patterns of food waste generated by employees in the subsidized meal service of a secondary care government hospital in Sri Lanka.

Methods: A descriptive cross-sectional study was conducted over four weeks (28 days) by analyzing routine dietary service records. Data on the quantity of meals ordered (prepared) and actually delivered (collected) were compared to identify discrepancies. Descriptive statistics were used to analyze daily waste patterns, variations by day of the week and menu type, and the subsequent financial impact.

Results: The analysis revealed a consistent pattern of waste, with 85.7% of days showing under-delivery (meals prepared but not collected). The average daily waste was 18.7 meals, representing 12.3% of total preparation. Waste peaked on Fridays (17.5% waste) and for less preferred vegetable-based dishes (15.8% waste). The calculated loss from raw materials alone totaled LKR 135,716 over 28 days, translating to an estimated annual loss of roughly LKR 1.77 million per hospital. This figure excludes other potential cost components.

Conclusion: The subsidized employee meal system generates significant and avoidable waste, driven by a misalignment between preparation and collection patterns, employee menu preferences, and a rigid ordering system. These findings, contextualized by the Theory of Planned Behavior, highlight an urgent need for operational reforms. Implementing flexible ordering, preference-based menu planning, and behavioral interventions is essential to align this vital welfare benefit with fiscal responsibility and ethical resource use amidst Sri Lanka's ongoing economic crisis.

Introduction

Food waste represents a critical global challenge with profound economic, environmental, and social implications. Approximately one-third of all food produced for human consumption is lost or wasted annually, accounting for nearly 1.3 billion tons worldwide [1]. This wastage exacerbates global hunger, intensifies greenhouse gas emissions, and creates significant financial burdens across food systems [2]. The paradox is particularly striking in low- and middle-income countries such as Sri Lanka, where rising levels of malnutrition and food insecurity coexist with substantial institutional food waste [3].

In Sri Lanka, this contradiction is especially evident within healthcare institutions. Government

hospitals provide a highly subsidized meal service for employees (SKS), presumably a category of minor staff or specific service personnel, at a nominal cost of Rs. 10 per month a valuable welfare benefit that nonetheless may inadvertently decouple consumption from economic reality. This system, operating within a context of severe economic crisis characterized by hyperinflation and deepened poverty [4], creates a complex environment where well-intentioned subsidies might inadvertently foster complacency and waste. Despite known high levels of food waste in hospital settings with studies indicating waste levels of 55-62% of prepared food at some Sri Lankan hospitals [5] employee-related food waste remains significantly understudied. This research addresses this critical gap by investigating food

order and delivery patterns and quantifying plate waste among hospital staff in a government hospital setting, with the aim of identifying sustainable solutions that align welfare benefits with resource efficiency.

Background

Sri Lanka's food waste crisis occurs within a context of broader waste management challenges. The country generates approximately 7,000 tons of solid waste daily, with biodegradable organic matter including food waste comprising about 65% of this total. Within institutional settings, particularly hospitals, food waste arises from complex interactions between dietary prescriptions, procurement systems, preparation methods, and consumption patterns. Previous research has documented substantial waste in patient meal services, with the National Hospital of Sri Lanka reporting food waste levels of 55% for breakfast, 62% for lunch, and 57% for dinner. The Colombo South Teaching Hospital similarly documented 500-600 kg of daily food waste before implementing intervention strategies [5].

Recent initiatives demonstrate the potential for improvement through systematic intervention. The Minimum Food Waste Toolkit piloted by the Dietitians Association of Sri Lanka achieved a 33% reduction in waste within 12 months through improved meal planning and staff training [6]. However, these efforts have primarily focused on patient meal services, leaving employee-related food waste largely unexplored. This gap is particularly significant given the unique dynamics of subsidized employee meal programs, where the minimal personal cost (Rs. 10/month) may reduce the perceived value of food and disincentivize waste reduction behaviors.

The current economic crisis in Sri Lanka has added urgency to addressing institutional food waste. With soaring food inflation and increased vulnerability to food insecurity [4], efficient use of resources in public institutions has become both an economic imperative and ethical obligation. Understanding the drivers and dynamics of employee plate waste in hospital settings is therefore essential for developing targeted interventions that can reduce waste while maintaining important staff welfare benefits. This study seeks to contribute to this understanding by examining the patterns and predictors of food waste in a government hospital canteen, with the ultimate goal of informing policies that promote both sustainability and equity in food service management.

Objective

The objective of this study is to quantify and analyze food waste generated by employees (SKS) in a secondary care hospital in Sri Lanka.

Justification

This research is rigorously justified by a confluence of critical factors specific to Sri Lanka's current socio-economic crisis and the identified gaps in public institutional management. The country's profound economic downturn has placed unprecedented strain on public health funding, rendering any operational inefficiency especially the unquantified financial drain of food waste from a heavily subsidized employee meal system a severe fiscal liability that demands immediate evidence-based intervention. Ethically, this wastage presents an untenable paradox, occurring within a state-funded institution while national surveys indicate a significant portion of the population faces food insecurity and compromised nutrition, thereby creating a moral imperative for resource equity and conscientious consumption. Environmentally, diverting organic waste from landfills is crucial for reducing methane emissions and aligning with broader national waste management goals, mitigating the public health hazards associated with disposal. Operationally, while initiatives like the Minimum Food Waste Toolkit exist for patient services, a definitive policy gap remains regarding employee-related waste in subsidized canteens. This study directly addresses this void, aiming to generate the essential empirical data needed by hospital administrators and the Ministry of Health to formulate targeted interventions, optimize supply chains, and establish sustainable national guidelines, thereby transforming a critical welfare benefit into a model of fiscal responsibility and ethical practice.

Literature Review

Food waste represents one of the most critical global challenges of the 21st century, with profound implications for food security, environmental sustainability, and economic stability. According to the United Nations Environment Programme (2021), an estimated 931 million tons of food waste were generated in 2019, with the food service sector—including institutions like hospitals—being a significant contributor. This wastage occurs amidst a backdrop of global hunger and resource depletion, where nearly 828 million people suffer from chronic undernourishment [3], making its reduction a key target of the United Nations Sustainable Development Goals (SDG 12.3). The environmental impact is particularly severe, as food waste in landfills generates methane, a potent greenhouse gas that contributes 8–10% of global emissions, while also representing a massive waste of land, water, and energy resources used in production [2].

Within institutional food services, including schools, universities, and hospitals, research has identified several consistent drivers of plate waste. These include oversized portions, lack of menu

variety and palatability, inflexible meal schedules, and low consumer awareness regarding the consequences of waste [7], [8]. The hospital setting introduces additional complexities through therapeutic diets for patients and structural separations between those who order food and those who consume it [9]. Studies across developed and developing nations reveal that hospital food waste ranges from 30% to 67% of meals served, with portion sizes, patient preferences, and limited menu flexibility being major determinants of waste [10], [11]. Research in Asian contexts, including Malaysia and India, further confirms that mismatches between consumer preferences and standardized menus significantly contribute to waste generation.

The Theory of Planned Behavior (TPB) [1] provides a robust psychological framework for understanding the determinants of wasteful practices. The model posits that behavior is driven by intention, which is influenced by three key factors: (1) attitudes, the individual's positive or negative evaluation of performing the behavior; (2) subjective norms, the perceived social pressure to perform or not perform the behavior; and (3) perceived behavioral control, the perceived ease or difficulty of performing the behavior. Studies applying the TPB to food waste have found that attitudes and perceived behavioral control are significant predictors of waste reduction intention [12]. A highly subsidized system, where the consumer bears minimal financial cost, can critically undermine all three constructs by diminishing the perceived value of food (negative attitude), removing financial disincentives (low perceived control), and potentially normalizing waste among peers (subjective norm).

The literature must be contextualized within Sri Lanka's severe socio-economic crisis, where the country faces a dual burden of high household food insecurity and significant institutional waste. Reports indicate that a substantial portion of the population has been forced to reduce meal frequency and quality due to rampant food inflation and poverty [4]. Concurrently, studies have documented alarming levels of food waste within Sri Lankan institutions. The country generates approximately 7,000 tons of solid waste daily, with food waste constituting 65-66% of this total [13]. Specific studies at the National Hospital of Sri Lanka found plate waste exceeding 55% across meal services, while Colombo South Teaching Hospital generated 500-600 kg of daily food waste before implementing mitigation strategies [5].

The government's response has included initiatives like the Minimum Food Waste Toolkit piloted by the Dietitians Association of Sri Lanka, which demonstrated that focused interventions could achieve a 33% reduction in waste within a year

through improved meal planning and staff training [6]. However, a critical research gap persists. While existing efforts have focused predominantly on patient meal services and municipal solid waste management, the specific domain of employee-related food waste in subsidized canteens remains almost entirely unexplored. This gap is particularly salient given that the employee meal system costing a nominal LKR 10 per month represents both a significant financial undertaking for the state and a potential hotspot for waste generation. The economic crisis has placed public health funding under extreme strain, making the efficient use of every resource an operational and ethical imperative that demands immediate research attention.

Most existing Sri Lankan studies are quantification-focused, offering limited insight into the behavioral, cultural, and operational drivers of waste in employee meal programs. Furthermore, despite Sri Lanka's commitment to the National Roadmap for Food Waste Reduction and its alignment with SDG 12.3, research linking hospital food waste reduction strategies to these policy objectives remains scarce. This study, therefore, addresses a critical knowledge gap by examining employee plate waste through both quantitative measurement and behavioral analysis, providing essential evidence for policy development and sustainable institutional food management in a resource-constrained setting.

Methodology

A descriptive cross-sectional study design was adopted to assess discrepancies between ordered and delivered food quantities in the dietary services of a government hospital in Sri Lanka. This design was chosen because it allows for the systematic evaluation of food service efficiency and potential sources of food waste within a defined four-week period.

The study was conducted in a secondary care hospital in Sri Lanka, providing both inpatient and staff dietary services. The hospital dietary unit prepares meals for both patients and employees, with employees (SKS) eligible to receive subsidized meals at a monthly cost of Rs. 10.

The study focused on dietary service records relating to the preparation of meals for hospital staff. Since the diet chart represents routine weekly food ordering and delivery records, consecutive sampling of all available days within the selected study period (Sunday to Saturday) was used.

Data were extracted from the weekly diet chart records prepared for this purpose. Information collected included:

- Food item (e.g., pumpkin, cucumber, chicken, fish, eggs, dhal, kankun, ash plantain, fried rice)
- Day of the week (Sunday–Saturday)
- Quantity ordered
- Quantity delivered

The study compared ordered versus delivered quantities for each food item, with discrepancies documented as either short supply, over supply, or exact match. This research analyzed supply chain efficiency by examining how the day of the week and type of food item (vegetables, proteins, cereals, pulses, leafy greens) influenced discrepancies between ordered and delivered quantities. The dependent variable was measured as the difference between ordered and delivered amounts.

Data were tabulated in Microsoft Excel 2019 and analyzed using descriptive statistics.

The study was conducted using routine dietary records without patient identifiers. Formal ethics committee approval was not required; however, administrative clearance was obtained from the hospital director. Confidentiality of institutional records was maintained.

Results

This chapter presents the findings from the analysis of meal preparation and collection data in the government hospital employee canteen. The results focus on the discrepancy between the number of meals ordered (prepared) by the kitchen based on expected attendance and the number actually collected by employees. Data were collected over a four-week period, covering 28 service days.

Overall Discrepancy Patterns

The analysis revealed a consistent pattern of under-delivery across the study period. Of the 28 days analyzed, 24 days (85.7%) showed instances of under-delivery (meals prepared but not collected), resulting in food waste. The average daily waste was 18.7 meals, representing 12.3% of total meals prepared.

Table 1: Overall Discrepancy Patterns

Occupation	Frequency (n)	Percentage (%)	Average Meals Affected
Under-Delivery (Waste)	24	85.7%	18.7
Over-Delivery (Shortage)	2	7.1%	8.5
Exact Delivery	2	7.1%	0

Day-Wise Analysis of Collection Patterns

Significant variations in collection patterns were observed across different days of the week (Figure 1). Fridays showed the highest rate of under-delivery (25.4 kg wasted), followed by Mondays (19.2kg wasted). Weekends (Saturdays and Sundays) demonstrated the most accurate collection patterns, with an average of only 6.3 kg wasted.

Table 2: Day-Wise Analysis of Meal Collection

Day	Avg. Ordered (kg)	Avg. Delivered (kg)	Avg. Waste (kg)	Waste Percentage
Monday	152	132.8	19.2	12.6%
Tuesday	148	133.5	14.5	9.8%
Wednesday	155	140.2	14.8	9.5%
Thursday	150	132.1	17.9	11.9%
Friday	145	119.6	25.4	17.5%
Saturday	98	91.7	6.3	6.4%
Sunday	85	79.2	5.8	6.8%

Food-Type Specific Wastage

The wastage patterns varied significantly based on the menu items served. Days featuring less preferred items (typically vegetable-based dishes) showed 23.4% higher wastage compared to days with preferred protein items (chicken or fish).

Table 3: Wastage by Menu Type

Menu Type	Avg. Daily Waste (Kg)	Waste Percentage	Most Affected Items
Vegetable-Based	22.3	15.8%	Pumpkin, Beetroot
Protein-Based	14.1	9.2%	Chicken, Fish
Pulses/Cereals	8.9	6.1%	Dhal, Rice

Financial Impact

The financial analysis revealed significant losses due to uneaten meals. Based on the calculated cost of LKR 259 per meal, the total financial waste over the 28-day period was LKR 135,716, projecting to an annual loss of approximately LKR 1,769,155 (approximately 1.77million).

Table 4: Financial Impact of Meal Waste

Metric	Value
Total Meals Wasted (28 days)	524
Average Daily Waste	18.7 Kg
Cost per Meal	LKR 259
Total Financial Waste for 28 days	LKR 135,716
Projected Annual Waste	LKR 1,769,155

Peak Waste Periods

Analysis of temporal patterns identified consistent peak waste periods:

- Highest waste occurs on Fridays before weekends
- Elevated waste on Mondays following weekends
- Lowest waste mid-week (Tuesday-Thursday)

These patterns suggest that employee attendance patterns and weekend plans significantly influence meal collection behavior, leading to predictable wastage trends.

The results demonstrate substantial inefficiency in the current meal preparation system, with significant financial losses due to inconsistent employee meal collection patterns, particularly around weekends and with less preferred menu items.

Discussion

This study provides the first empirical analysis of employee food waste within Sri Lanka's subsidized hospital meal system, revealing critical inefficiencies with substantial economic, ethical, and operational implications. The findings demonstrate that, although the system is well-intentioned, it generates significant avoidable waste due to a misalignment between meal preparation and employee collection patterns. This discussion interprets the key results, contextualizes them within theoretical frameworks and the national crisis, and highlights practical and policy implications.

A striking finding is the high frequency and volume of uncollected meals. On 85.7% of study days, prepared meals were discarded, with an average waste rate of 12.3%. This translates to a projected annual financial loss of over LKR 1.77 million per hospital a considerable burden amid Sri Lanka's ongoing economic crisis. Beyond financial losses, such waste represents a profound ethical issue, especially in a context where food insecurity is widespread.

Day-wise patterns further illuminate employee behavior. Waste peaked on Fridays (17.5%) and Mondays, suggesting that weekend-related scheduling, early departures, and irregular attendance influence collection rates. This aligns with global research indicating that institutional food waste is highly sensitive to temporal and weekly rhythms [8]. In contrast, weekend collections were higher, likely due to the presence of essential resident staff with limited dining alternatives.

Menu type also influenced collection behavior. Vegetable-based meals had higher waste (15.8%) compared to protein-based meals (9.2%), reflecting employee preferences. This supports findings from other institutional settings, where palatability is a primary determinant of plate waste [7]. Employees, exercising their limited choice, effectively "vote with their feet," avoiding meals they find less desirable.

The Theory of Planned Behavior provides a useful framework for understanding these results.

- **Attitude:** The nominal LKR 10 token payment reduces perceived value, lowering the psychological cost of waste.
- **Perceived Behavioral Control:** Employees face no consequence for non-collection, making it an easy decision to forgo meals.

- **Subjective Norms:** High frequency of non-collection normalizes the behavior, reinforcing waste within the employee community.

This analysis demonstrates how a subsidized system can unintentionally encourage waste by negatively influencing all three TPB constructs.

The issue extends beyond operational inefficiency. Amid national economic hardship, the annual loss of LKR 1.77 million per hospital could otherwise support critical healthcare needs, such as medicines or supplies. Ethically, routine disposal of nutritious food within government institutions is indefensible in a context where food insecurity persists. On average, 7.1% of meals went uncollected, and no day achieved 100% collection, revealing systemic inefficiencies consistent with global evidence that institutional food services are vulnerable to behavioral and operational drivers of waste.

Hospital food waste is well-documented among patient populations, with European and Asian studies reporting 30–67% of meals uneaten. Although employee meal waste in this study (7.1%) is lower, it represents a substantial daily loss of food, money, and resources in a low-resource public hospital. This aligns with evidence suggesting that staff meal programs, like patient meals, are vulnerable to wastage driven by menu acceptability, attendance, and rigid ordering systems.

The primary contributors to meal non-collection in the hospital setting include a combination of behavioral and operational factors. Employee absenteeism, irregular shift patterns, and early departures resulted in mismatches between meal preparation and actual attendance, directly reducing collection rates. Menu acceptability also played a significant role, as certain items, such as pumpkin, leaks, and kankun were consistently less preferred, highlighting the influence of palatability on plate waste. Additionally, the rigid pre-ordering system managed by the overseer limited the ability to adjust meals in response to last-minute absences, reflecting broader critiques of centralized food ordering in Sri Lanka. Collectively, these factors created a system where prepared meals frequently went uncollected, contributing to avoidable food waste.

Conclusion

This study provides the first empirical evidence of employee meal waste within Sri Lanka's subsidized hospital meal system, revealing significant operational inefficiencies with ethical, financial, and resource implications. On average, 7.1% of prepared meals went uncollected, with peak waste occurring on certain days and for specific menu items. Key drivers included attendance mismatches, menu acceptability, and rigid pre-ordering systems. The findings are

consistent with global evidence that institutional food services are vulnerable to behavioral and operational factors, and they underscore how subsidized systems can unintentionally promote waste through psychological and social mechanisms, as explained by the Theory of Planned Behavior. In the context of Sri Lanka's ongoing economic crisis, such avoidable waste represents not only a financial burden but also a moral concern, given the prevalence of food insecurity.

Recommendations

Hospitals should implement more flexible meal ordering systems that allow adjustments for absenteeism, shift changes, or last-minute cancellations, ensuring that preparation better matches actual demand. Menu planning should be optimized to reflect employee preferences, focusing on popular and nutritionally balanced options to minimize refusal rates. Behavioral interventions, including awareness campaigns and social incentives, can encourage meal collection and foster a culture of minimizing waste. Regular monitoring and feedback mechanisms should be established to track meal collection and waste patterns, allowing kitchen staff and management to refine operations continuously. Finally, employee meal schemes should be aligned with broader institutional and national food waste reduction policies, contributing to sustainability goals, efficient resource utilization, and ethical standards in public healthcare.

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