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Food Waste Management in Private Hospitals in South Africa

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ABSTRACT

Background

Food waste in private hospitals is a significant issue, particularly in South Africa, where food insecurity affected 25.9% of the population. This study investigated food waste management in private hospitals, focusing on its extent, causes, and strategies to mitigate it.

Methods

A mixed-methods approach was employed, combining quantitative surveys (n=121) and qualitative interviews (n=10) with food service staff and management.

Results

Food waste in patient meals was prevalent, with 38% of respondents reporting a small extent and 37% a medium extent of waste. At least 62% noted that a quarter of the food served to patients was left uneaten, while 15% reported up to half of meals being wasted. The most common causes of food waste included patients' lack of appetite (27%) and overproduction (22%). Lunch and dinner were identified as the meals with the highest waste levels, with 44.6% and 38.8% of respondents reporting medium levels of waste, respectively. Food distribution systems also played a role, with 77.7% of hospitals using plated meals, which contributed to waste. The study found that varying portion sizes significantly reduced food waste, particularly at dinner ($p<0.05$). Interviews with hospital managers revealed that digital ordering systems could help reduce food waste, while patient satisfaction was identified as a key factor in minimizing waste. Challenges included staff non-compliance, inconsistent adherence to policies, and health regulations that prevented food redistribution.

Conclusion

There is a need for improved food management practices, enhanced staff training, and sustainable waste disposal methods to address food waste in private hospitals.

Keywords: Food waste, Private hospitals, South Africa, Patient meals, Sustainability.

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INTRODUCTION

Food waste is a widespread issue within the global food system, impacting various sectors, from agriculture to hospitality. One significant contributor to this problem is the healthcare industry, particularly hospitals, which—despite their primary role in patient care—generate significant amounts of food waste. In private hospitals in South Africa, food waste poses a serious challenge, with far-reaching implications for both sustainability and public health. Research has shown that food waste in hospitals can range as high as 60% [1], despite the global rise in food demand, which is expected to increase by up to 110% by 2050 [2]. Recent studies in Italy and Portugal, respectively, found that up to 41.6% and 72.6% of food intended for patient consumption was discarded [3, 4], illustrating the global scale of the problem. This is especially concerning in South Africa, where approximately 25.9% of the population faces food insecurity [5], while private hospitals continue to waste large quantities of food that could be repurposed to combat hunger and malnutrition.

Despite South Africa's status as one of the most industrialized countries in Africa, it faces high levels of poverty and food insecurity. Although the country produces significant amounts of food, much of it is lost or wasted. Oelofse et al. [6] estimate that South Africa wastes around nine million tonnes of food each year, contributing to the global problem of food waste, with approximately 1.3 billion tonnes of food being discarded annually worldwide [7, 8]. The issue of food waste in private hospitals adds a unique dimension to this problem, as these institutions are both major consumers of food and crucial players in the public health system. This makes it even more vital to address the sustainability of food management practices within the hospital sector.

This study focuses on private hospitals in South Africa due to the limited research on food waste within this context. While food waste in hospitals is a well-documented global issue, there is a significant lack of comprehensive data specific to South African healthcare settings, especially in private institutions. Unlike public hospitals, private hospitals cater to a wealthier and more diverse patient base, with distinct food management practices, resources, and patient expectations. They also face unique economic challenges, as the cost of delivering specialized care is often high. Despite these dynamics, detailed research on food waste in private hospitals is notably scarce. Their causes are complex and multifaceted, involving issues such as inadequate meal planning, the complex dietary needs of patients, and inefficiencies in food service operations. Furthermore, the high aesthetic and nutritional expectations associated with hospital food often led to significant plate waste [9]. In this context, it is critical to explore the specific causes of food waste within South African private hospitals and examine the strategies currently in place to reduce waste.

This study aimed to evaluate the extent of food waste in private hospitals in South Africa, identify the primary causes of food wastage, and assess the effectiveness of existing waste reduction strategies. By investigating these factors, the research contributed to the broader conversation on food waste, offering valuable insights into how private hospitals could optimize their food management practices to promote sustainability and address food insecurity

1. METHODOLOGY

This study, carried out in 2021, employed a mixed-methods design to explore food waste management in private hospitals in South Africa. The design combined both quantitative and qualitative approaches to enhance the depth and breadth of the findings [10, 11], and therefore have a holistic view of food waste in private hospitals. A sequential explanatory design was adopted, where quantitative data were collected first, followed by qualitative data to further explain and expand on the initial findings [12].

A non-probability sampling method, specifically convenience sampling, was used to select participants based on their accessibility and relevance to the study [13]. Participants were hospital employees knowledgeable about food waste management, including kitchen staff, food

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service employees, and managers in private hospitals. The study focused on individuals working in hospitals located in South Africa, aged 18 or older, and employed in the food service or catering departments. The target sample size for the quantitative analysis was 100–150 respondents, while the sample size for the qualitative analysis was fixed at 10 respondents. Primary data were collected through surveys and semi-structured interviews.

The survey, conducted online due to COVID-19 restrictions, used a closed- and open-ended English-language questionnaire divided into two sections: demographics (Section A) and food waste management practices (Section B). In Section A, participants were asked to provide information about their gender, age, educational level, job title, and work experience. In Section B, participants were asked to express their perception of the extent of food waste (No, Small, Medium, Large, Very Large), based on factors such as the consumers, mealtimes, and the ward. They were also asked to report the frequency of food waste (Almost never, Sometimes, Almost every time, or Every time), the food distribution system used (Plated, Bulk, or Both), the types of menus offered to patients (A la carte, Cycle Menu, or Other), whether they apply different portion sizes for patients (Yes or No), and the extent of patient plate waste (None, A quarter, A third, or Half). An open-ended question was included to allow participants to identify the main cause of food waste in their hospitals.

On the other hand, ten telephonic interviews were conducted with hospital managers to explore food waste management in more depth. The use of telephonic interviews was a pragmatic solution to adhere to COVID-19 pandemic restrictions, which included limited hospital access, lockdown protocols, and the immense pressure on healthcare facilities. All interviews were recorded with the participants' consent. The interviews lasted an average of 5 to 10 minutes and were recorded using a recording device. The interview questions aimed to collect demographic data (similar to the survey) and data regarding the food service system and food waste management practices in the hospitals.

A pilot study was conducted prior to the main survey to test the survey instrument. The pilot study was implemented in hospitals that did not participate in the main study, allowing the researcher to identify any issues with question clarity, relevance, and comprehension. Feedback from the pilot study led to revisions in the survey to improve its reliability and validity.

Ethical approval was obtained from the Institutional Research Ethics Committee (IREC) of the University of Johannesburg (Ethics number: STH053). Ethical practices included obtaining informed consent from all participants, ensuring confidentiality, and protecting participants from harm. Participants were informed about the study's purpose and their right to withdraw from the study at any time.

Descriptive statistics were used to summarize the characteristics of the respondents and the main trends in food waste. Inferential statistics were used to test relationships between independent variables (such as mealtimes) and the dependent variable (extent of food waste). The data were analyzed using the Statistical Package for the Social Sciences (SPSS, Version 25). Thematic analysis was employed to analyze interview data, identifying key themes related to food waste management in hospitals. Indeed, the interviews were transcribed to facilitate in-depth analysis. The transcriptions were reviewed multiple times to identify patterns, similarities, and differences. Individual responses were analysed, coded, and grouped into overarching themes and sub-themes.

2. RESULTS

2.1 Sociodemographic characteristics of the study participants

The demographic characteristics of participants involved in the study are presented in Table 1. A total of 121 respondents participated to the study, among which the majority was female (65.3%, n=79) and 34.7% (n=42) of participants were male. Their age mostly ranged between 26-55 years old (90.9%). The sample was mainly composed of white participants, 42.2% (n=51), followed by black participants, 41.3% (n=50), coloured participants, 13.2% (n=16) and lastly, a minor group of Indian participants, 3.3% (n=4). Almost half, 43% (n=52), of the participants

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had completed a post-matric diploma or certificate and 38% (n=46) a Grade 12. A further 8.3% (n=10) of participants had completed a baccalaureate degree and 4.1% (n=5) a postgraduate degree. A minor percentage of the participants, 6.6% (n=8), had completed Grade 11 or lower. The majority of the participants had completed a Grade 12 certificate or higher. Many of the participants were in management positions with 38.8% (n=47) of participants holding kitchen manager positions and 7.4% (n=9) of participants holding kitchen supervisor positions. A further 13.2% (n=16) of participants were kitchen staff and 16.5% (n=20) of participants were food service staff. The remaining 24% (n=29) of participants held various other positions such as assistant catering manager, catering manager, ward hostess, regional manager and menu coordinator. The majority (90.1%) had more than 02 years of experience in the food and beverage sector, and 86% were working 02 years at their workplace since at least 02 years.

TABLE 1. Socio-demographic characteristics of participants (N=121)

Demographic variables		Frequency (N)	Percentage (%)
Gender	Male	42	34.7
	Female	79	65.3
	Total	121	100.0
Age	25 or younger	3	2.5
	26–35	33	27.3
	36–45	45	37.2
	46–55	32	26.4
	56 and older	8	6.6
	Total	121	100.0
Race	Black	50	41.3
	White	51	42.2
	Coloured	16	13.2
	Indian	4	3.3
	Total	121	100.0
Highest Educational Qualification	Grade 11 or lower (Std 9 or lower)	8	6.6
	Grade 12 (Matric)	46	38.0
	Post-matric diploma or certificate	52	43.0
	Baccalaureate degree(s)	10	8.3
	Postgraduate degree(s)	5	4.1
	Total	121	100.0
Job Title	Kitchen manager	47	38.8
	Kitchen supervisor	9	7.4
	Kitchen staff	16	13.2
	Food service staff	20	16.5
	Other	29	24.0
	Total	121	100.0
Work Experience in Food and Beverage Sector	Less than 1 year	4	3.3
	1–2 years	8	6.6
	2–5 years	23	19.0
	5–10 years	26	21.5
	10–15 years	30	24.8
	More than 20 years	30	24.8

	Total	121	100.0
Work Experience at Current Workplace	Less than 1 year	4	3.3
	1–2 years	13	10.7
	2–5 years	40	33.1
	5–10 years	26	21.5
	10–15 years	23	19.0
	More than 20 years	15	12.4
	Total	121	100.0

2.2 Overview of food waste generated in the private hospitals and causes

Table 2 presents the extent of food waste in hospitals according to various criteria. Many participants reported a small extent of patient food waste, with 38.0% (n=48) indicating this level. This is followed by 37.2% (n=45) reporting a medium extent, and 15.7% (n=19) experiencing a large extent of food waste. A smaller percentage, 5.8%, noted a very large extent of patient food waste, while 3.3% (n=4) reported no food waste from patients. With a mean value of 2.83 and a standard deviation of 0.937, the data suggest that most food waste from patients falls between a small and medium extent. As for staff food waste, 52.1% (n=62) of participants reported no food waste from staff, indicating that the majority of hospital food waste comes from patients. A further 36.4% (n=44) indicated a small extent of staff food waste, followed by 9.9% (n=12) reporting a medium extent. Only 1.7% (n=2) observed a large extent, and no participants reported a very large extent of staff food waste. Patients are therefore the primary contributors of hospital food waste.

In terms of meal times, most participants noted a small extent of food waste at breakfast (56.2%, n=68) and dinner (41.3%, n=50), with lunch generating a medium extent of food waste for 44.6% (n=54) of participants. Snack time also saw a small extent of food waste (40.5%, n=49). Additionally, 38.8% (n=47) of participants reported a medium extent of food waste at dinner, similar to the findings for lunch. Lunch and dinner are the meals that generate the most food waste.

Food waste also varied by ward type. In general, most participants noted a small extent of food waste in general wards (63.6%, n=77), while ICU (Intensive Care Unit) wards were reported to have a medium extent of food waste at 31.4% (n=38). In maternity wards, 50.4% of participants observed a small extent, and 40.5% of those in paediatric wards reported a small extent as well. Although less common, 29.8% (n=36) of participants noted a large extent of food waste in ICU wards, and 35.5% (n=43) observed a medium extent of food waste in paediatric wards. The waste tended to be more prominent among critically ill patients and minors.

TABLE 2. Extent of food waste in the hospitals according to different criteria

sFood waste per category			No extent	Small extent	Medium extent	Large extent	Very large extent	Total
Food consumers	Patient food waste	N	4	46	45	19	7	121
		%	3.3	38.0	37.2	15.7	5.8	100
	Staff food waste	N	63	44	12	2	0	121
		%	52.1	36.4	9.9	1.7	0.0	100
Meal times	Breakfast	N	8	68	37	7	1	121
		%	6.6	56.2	30.6	5.8	0.8	100
	Lunch	N	8	50	54	6	3	121
		%	6.6	41.3	44.6	5.0	2.5	100
	Dinner	N	6	50	47	16	2	121
		%	5.0	41.3	38.8	13.2	1.7	100

	Snacks	N	43	49	21	2	6	121
		%	35.5	40.5	17.4	1.7	5.0	100
Ward	General ward	N	1	77	32	8	3	121
		%	0.8	63.6	26.4	6.6	2.5	100
	ICU ward	N	6	36	38	36	5	121
		%	5.0	29.8	31.4	29.8	4.1	100
	Maternity ward	N	28	61	24	5	3	121
		%	23.1	50.4	19.8	4.1	2.5	100
	Paediatric ward	N	16	49	43	12	1	121
		%	13.2	40.5	35.5	9.9	0.8	100

Food waste occurrence in hospitals, the food distribution systems used, and estimates of food waste quantities are presented in Table 3. According to the results, 34.7% (n=42) of participants report that food waste occurs every time, while 33.1% (n=40) say it happens sometimes. Only 1.7% (n=2) noted that food waste happens rarely (almost never), which is a small proportion compared to the 30.6% who reported that food waste occurs consistently. Regarding food distribution systems, the majority of participants, 77.7% (n=94), indicated that their hospitals use the plated food distribution system. This is followed by 21.5% (n=26) who said both plated and bulk systems are used, and 0.8% (n=1) who reported that only the bulk system is utilized.

When asked about menu types, 71.1% (n=86) of participants reported the use of an à la carte menu, 24.8% (n=30) said a cycle menu is used, and 4.1% (n=5) noted the use of other menu formats, including a combination of à la carte and cycle menus along with a "chef's special". In terms of portion sizes, 70.2% (n=85) of participants indicated that portion sizes vary between patients, while 29.8% (n=36) disagreed, stating that portion sizes are consistent across patients. Focusing on food waste per patient plate, 62% (n=75) of participants reported that about a quarter of the food served is left uneaten. Additionally, 13.2% (n=16) said there is no food left on the plate, while 12.4% (n=15) stated that half of the food is wasted, and another 12.4% (n=15) indicated that a third of the food produced is wasted. These results highlight that a significant portion of food is left uneaten on patients' plates. While a quarter of the food left may not seem excessive on an individual plate, when considering that most participants report this level of waste, the overall amount of food waste generated is substantial.

TABLE 3. Occurrence of Food Waste, Food Distribution System, and Loss Quantification

Category		N	Percentage (%)
Frequency of food waste	Almost never	2	1.7
	Sometimes	40	33.1
	Almost every	42	34.7
	Every time	37	30.6
Food distribution system utilised	Plated	94	77.7
	Bulk	1	0.8
	Both	26	21.5
Types of menus offered to patients	A la carte (Menu items can be separately ordered)	86	71.1
	Cycle menu	30	24.8

	Other	5	4.1
Difference of portion size between patients	Yes	85	70.2
	No	36	29.8
Extent of patient plate waste	None	16	13.2
	A quarter	75	62
	A third	15	12.4
	Half	15	12.4

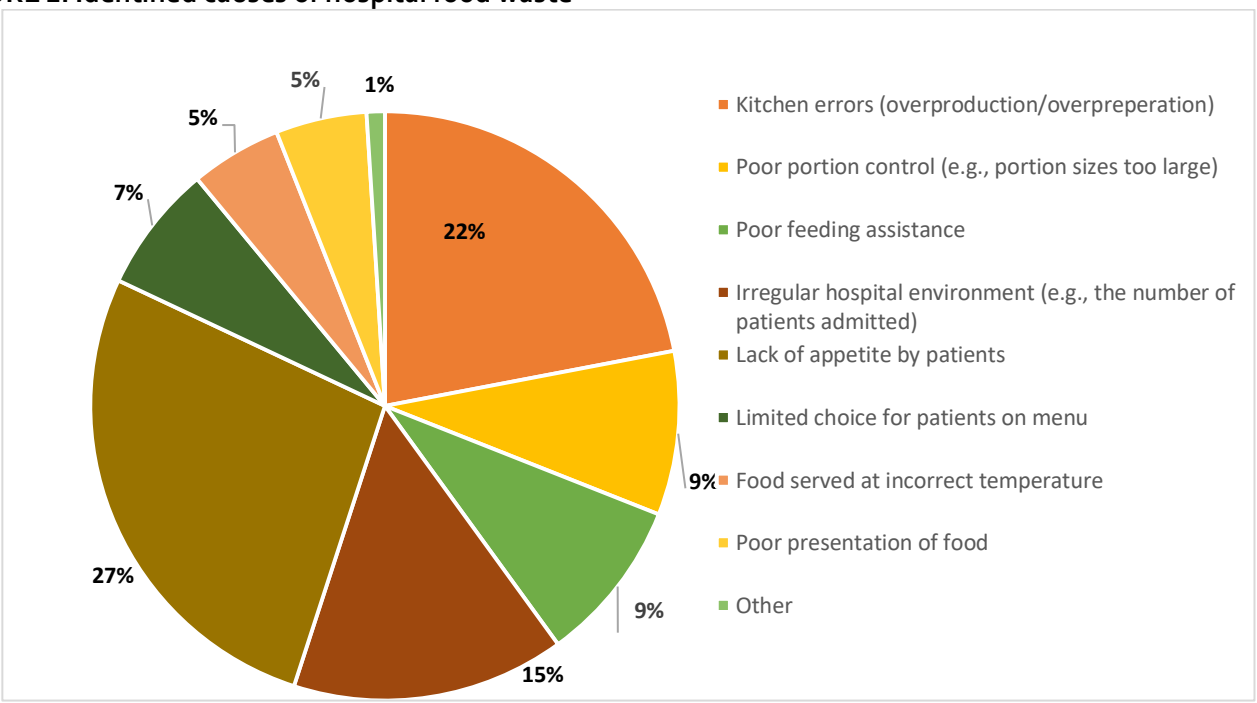
The analysis of the collected data showed no significant correlation between portion sizes served to patients and the frequency of food waste at breakfast and lunch (Table 4). However, a noticeable effect was observed at dinner ($p<0.05$). Specifically, in private hospitals where portion sizes vary between patients, the amount of food waste was lower compared to hospitals where portion sizes were uniform.

TABLE 4. Extend of food waste with mealtimes and portion size

Category			Extend of food waste after Breakfast			Value	df	Asymptotic Significance (2-sided)
			None to a small extent	Medium extent	Large to a very large extent			
Do portion sizes differ between patients?	Yes	N	52	26	7	1.36	2	0.51
		Percentage (%)	61.2%	30.6%	8.2%			
	No	N	24	11	1			
		Percentage (%)	66.7%	30.6%	2.8%			
Extend of food waste after Lunch								
Do portion sizes differ between patients?	Yes	N	36	42	7	3.82	2	0.15
		Percentage (%)	42.4%	49.4%	8.2%			
	No	N	22	12	2			
		Percentage (%)	61.1%	33.3%	5.6%			
Extend of food waste after Diner								
Do portion sizes differ between patients?	Yes	N	39	38	8	8.24	2	0.02
		Percentage (%)	45.9%	44.7%	9.4%			
	No	N	17	9	10			
		Percentage (%)	47.2%	25.0%	27.8%			

Figure 1 illustrates the main reported causes of food waste in private hospitals. According to the data, 27% of participants identified patients' lack of appetite as a key factor contributing to food waste. Other causes include kitchen errors such as overproduction (22%), an irregular hospital environment (e.g., fluctuating patient numbers) at 15%, poor portion control and inadequate feeding assistance (both 9%), limited menu options (7%), food served at the wrong temperature and poor food presentation (both 5%), and finally, 1% of participants attributed waste to factors such as medication and extremely ill patients.

FIGURE 1. Identified causes of hospital food waste



2.3 Managers opinion on the food services system and the food waste management in their hospitals

The 10 respondents interviewed were diverse in terms of gender, age, ethnicity, and educational background. Seven were female and three males, with ages ranging from 26 to 55 years. Ethnically, three respondents identified as black, and seven as white. In terms of education, most had completed post-high school education: one had high school, one a certificate, seven a diploma, and one a degree. All respondents held management positions, including catering, kitchen, and unit, project, and hospitality managers, indicating that a tertiary education is typically required for such roles. Their tenure in their current positions varied from 1 to 21 years, and their time at their current workplaces ranged from 2 to 27 years.

From these interviews, three main themes were identified and are hereby described. Theme 1 was the impact of food service systems, ordering styles, and patient satisfaction on food waste management in private hospitals in South Africa. While some managers supported shifting from protected mealtimes to a room service system as a way to reduce food waste, one manager raised concerns that such a change could negatively affect food production, quality, and increase waste due to issues like defrosting inefficiencies. The use of electronic or combined menu systems was found to significantly reduce food waste compared to traditional paper menus, with hospitals using digital systems reporting only 5% annual waste compared to 25% in those using paper menus. Additionally, patient satisfaction was identified as a key factor in food waste, with managers noting that dissatisfied patients are more likely to waste food, and regular

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customer satisfaction surveys were crucial for managing food waste by ensuring meals meet patients' expectations.

Factors driving food waste was Theme 2. One of the biggest challenges identified was the lack of awareness around the scale of food waste. While most managers acknowledged the problem, only a few had precise data on waste levels. For instance, one manager estimated that 25% of their annual food production—about 87,600 kilograms—ended up as waste. Without accurate data, it's difficult to measure the effectiveness of waste reduction efforts or pinpoint areas for improvement. Key drivers of food waste reported included overproduction, patients being too ill to eat, and poor food handling practices, such as unregulated access to storerooms. In one case, unrestricted storeroom access led to unaccounted-for food usage and increased waste, prompting tighter controls. Another significant factor was the unpredictable nature of hospital operations—such as patients being discharged after meals had been prepared—which created unavoidable waste.

The last theme (Theme 3) was the strategies for reducing and preventing waste. Hospitals approached food waste management with varying levels of commitment. Some had established systems, such as Trim Trax, which measures and monitors waste, and offered regular training for staff to improve food handling and portioning practices. However, others admitted that waste management was not a top priority, citing challenges like staff not adhering to policies or lacking awareness of portion control guidelines. Redistributing leftover food was not an option for any of the hospitals due to strict health and safety regulations, concerns over contamination risks, and legal restrictions. Once food had been served but not consumed, it had to be discarded. When it came to disposal methods, most hospitals relied on macerators to break down waste sustainably, while others simply used municipal collection services. One hospital explored anaerobic digestion, which not only reduces waste but also generates energy—a promising option for more sustainable waste management.

3. DISCUSSION

Food waste in private hospitals is a significant issue, often exceeding levels seen in other sectors like schools and restaurants [14, 15]. This study identifies key drivers of food waste, including patient-related factors such as reduced appetite and illness. These findings are consistent with research by Malefors [16] and Eriksson et al. [17], which highlighted that patients undergoing treatment for chronic illnesses often leave meals uneaten. Overproduction also contributes significantly to waste, as hospitals prepare excess food to accommodate varying patient demand, aligning with studies by Saber et al. [18] and Cuglin et al. [19]. Additionally, unpredictable hospital environments, such as early discharges and incorrect meal orders, further exacerbate food waste [20], making food production and consumption in these settings particularly difficult to manage.

The type of food service system used in hospitals plays a critical role in minimizing waste. This study found that plated meal service systems resulted in less waste, as they allowed for better portion control [21]. Electronic or bedside meal ordering systems also helped reduce waste by giving patients more control over their meal choices, as shown by Schiavone et al. [3] and Shuhaimi et al. [22]. However, room service systems, while effective at minimizing waste, incur higher operational costs [23]. A mixed system that combines traditional and electronic ordering methods may offer a balanced solution, addressing both waste reduction and cost concerns.

Portion control was another key factor in reducing food waste, particularly for dinner. Customizing portion sizes to meet individual patient needs—especially for those with reduced appetites or specific medical conditions—proved effective in minimizing waste. This aligns with the work of Do Rosario & Walton [24] and Rochmah et al. [25], who found that offering smaller, tailored portions reduces plate waste. Allowing patients to choose portions based on their appetite helps hospitals better manage food consumption and reduce leftovers.

Effective strategies for reducing food waste in private hospitals include staff training in waste management, improved meal forecasting, and the implementation of waste tracking systems [26, 27]. This study found that providing staff with proper training and tools for tracking food waste improved waste management practices. However, the unpredictable nature of hospital environments, such as fluctuating patient conditions and early discharges, remains a challenge. Flexible meal production strategies that can quickly adjust to real-time patient needs might offer a solution [28, 29].

The environmental and social impacts of food waste are significant. Hospital food waste contributes to CO_2 emissions, resource depletion, and increased waste disposal costs [30, 31]. The financial burden of wasted food and its disposal weighs heavily on hospitals, while food waste in healthcare settings is also a social concern, particularly in the context of global food insecurity [4]. Reducing food waste in hospitals, therefore, aligns with sustainability and ethical objectives, benefiting both the institution and the wider community. Further research into more sustainable waste disposal methods, such as anaerobic digestion, could offer long-term environmental benefits [32]. Ultimately, improving food waste management in hospitals can lead to cost savings, enhanced patient satisfaction, and support broader sustainability efforts.

4. STUDY LIMITATIONS

The primary limitation of this study was the impact of COVID-19, which led to reduced participation and required adjustments in data collection methods. While the study's sample size was smaller than initially planned, the mixed-methods approach provided a robust analysis of the research question despite these challenges.

5. CONCLUSION

Reducing food waste in private hospitals requires a multifaceted approach. The findings suggest that hospitals can significantly reduce waste by adopting more efficient food service systems, offering portion control, and training staff on waste reduction practices. Moreover, hospitals should consider more flexible meal planning to account for patient variability.

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