External Factors Associated With Food Waste In Patients With Diabetes Mellitus At RSUD Undata Palu Central Sulawesi Province

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Article Info	ABSTRACT
	The successful implementation of food delivery in hospitals is closely related to the presence of food waste which indicates less than optimal food delivery so that the nutritional needs of patients are not met. Obtained data on food waste in diabetes mellitus patients at RSUD Undata is high as much as 50.9%. The purpose of this study was to analyze external factors associated with the occurrence of food waste in patients with diabetes mellitus at RSUD Undata Palu Central Sulawesi Province. This type of research is quantitative with an analytic observation approach using a cross-sectional design. The sample in this study were all patients with a diagnosis of diabetes mellitus who were treated in the Inpatient Room of RSUD Undata totaling 30 people, who were taken by purposive sampling, with primary and secondary data collection techniques. Data analysis using univariate and bivariate techniques. Food acceptability (aroma, taste, texture, color combination) of patients with diabetes mellitus on food waste obtained P> 0.05, as well as waiter's attitude towards food obtained P> 0.05 and standard portion of food on food waste obtained P> 0.05. there is no significant relationship between external factors and the occurrence of food waste in patients with diabetes mellitus at RSUD Undata Palu Central Sulawesi Province. it is necessary to be careful with diabetes mellitus patients who bring food from outside the hospital, because this affects the remaining food of diabetes mellitus patients.
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INTRODUCTION

Diabetes mellitus, also known as diabetes mellitus, is a health condition in which a person experiences a number of symptoms due to high levels of sugar in the blood. This is caused by a lack of insulin or insulin resistance as well as metabolic disorders in the human body (Perkeni, 2021). Diabetes mellitus is a degenerative disease that each year has an increasing prevalence in both developed and developing countries (Purwaningsih *et al.*, 2023)

Data from *the International Diabetes Federation* is known that the prevalence of diabetes mellitus reached 537 million people worldwide in 2021 with an age range starting from 20 to 79 years. Diabetes mellitus Data according to the 2018 Indonesian Health Survey found that as many as 2% of the Indonesian population aged over 15 years had this disease and this result decreased in 2023 where the prevalence of DM became as much as 1.7%

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(Ministry of Health, 2023). Central Sulawesi province has DM data in 2023 of 91,312 people and an increase of 19,059 people in 2023 (Central Sulawesi provincial Health Office, 2023).

The increase in diabetes mellitus cases that occur in Central Sulawesi is very sought to be handled and many districts have been successful in dealing with this problem, but Palu City still occupies the area with the highest prevalence of DM in Central Sulawesi in 2023. Based on data from 2023, Palu City has a recorded number of DM cases of 21,884 people (Palu City Health Office, 2023). DM Data at Undata Regional General Hospital (RSUD) Proovinsi Central Sulawesi recorded throughout 2023 as many as 715 patients and the results increased compared to 2022 as many as 424 patients. This is a challenge, especially for health workers in providing proper health services for DM patients so that they can have normal blood sugar levels (Sofie and Sefrina, 2022).

Health services in hospitals consist of various parts and one of them is nutrition services (Adhyka and Machmud, 2020).The program of Nutrition Services aims to improve the quality of hospital services through the provision of nutritional therapy and food to support the success of patients to recover quickly. Kegiatan pelayanan gizi di rumah sakit terdiri dari asuhan gizi rawat inap, asuhan gizi rawat jalan, penyelenggaraan makanan, serta penelitian dan pengembangan (Kemenkes RI, 2014).

Food delivery is the main activity in hospital Nutrition Services (PGRS) with the aim of ensuring the availability of good quality food in accordance with the nutritional needs, cost, safety, and patient acceptability of patients to achieve optimal nutritional status. The success of the implementation of food in the hospital is closely related to the presence of food waste that shows less than optimal feeding so that the nutritional needs of patients are not met. Food waste is the main indicator used to evaluate and benchmark the acceptability and perception of a person towards food delivery activities (Ministry of Health, 2013).

Regulation of the Minister of health of the Republic of Indonesia No. 129 of 2008 on minimum Hospital Service Standards states that there is a lot of food leftovers if the result value reaches ≥ 20% and little food leftovers if <20%. Food waste Data based on the results of research conducted in various Indonesian hospitals show that the average food waste varies from 17% to 67% (Nafi'a, 2021). Research conducted at Gambiran hospital in Kediri City found an average of 23% of INPA Class III inpatient food waste (Dewi and Ruhana, 2023). Then, food waste research conducted at Teluk Kuantan Hospital found that soft food waste for inpatients averaged 52% (Oktaviani *et al.*, 2023). Furthermore, in Bangli Regional General Hospital found food waste an average of 65% (Septidiantari *et al.*, 2022).

The results of the initial data collection conducted at the Undatta Hospital of Central Sulawesi province in April 2024, found the amount of food waste in 20 patients with a diagnosis of diabetes mellitus as much as 50.9%. These Data indicate that food waste in patients with diabetes mellitus is relatively high because it is more than the limit value of food waste of 20%. The distribution of food waste is divided into basic food groups (rice and porridge) by 46.2%, animal side dishes (grilled fish, woku fish, grilled chicken) by 45%, vegetable side dishes (cah tempe, rolade tahu kuku, cah tahu) by 46.25%, vegetables (clear vegetables) by 76.25%, and fruit (papaya, banana) by 0%.

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Based on these problems, researchers are interested in conducting research on factors that affect food waste in patients with diabetes mellitus at Undata hospital because this related research has never been done before. This study aims to determine the factors that affect food waste in patients with diabetes mellitus in Undata Hospital of Central Sulawesi province.

METHODS

This study uses *cross-sectional* research that describes the independent variable on the dependent variable at the same time with an analytical observation approach. The population of the following study is all patients with a diagnosis of diabetes mellitus who were treated for 3 days in the inpatient room of Undata hospital from July to August 2024. The Total sample in this study as many as 30 subjects with sampling techniques using *purposive sampling* is a sampling technique with certain considerations.

This study uses a research instrument in the form of respondent identity sheet, *comstock* sheet and questionnaire repsonden identity sheet is a tool that contains information about the respondents include name, age, gender, education and employment. Then, on this sheet also contains data on food waste respondents in Undata Hospital of Central Sulawesi province. The questionnaire in this study contains data on external factors that cause food waste.

RESULTS AND DISCUSSION

Univariate Analysis Results

Table 4.1 distribution of characteristics overview of the characteristics of respondents in Undata Hospital Central Sulawesi province

Variable	f	%
Gender		
Male	11	36.7
female	19	63.3
age		
38-47 years	8	26.7
48-57 years	22	73.3
occupation		
civil servant/TNI / Polri	9	30.0
self-employed	8	26.7
other (IRT)	13	43.3
Education Level		
SMP / MTs	7	23.3
SMA/MA/SMK	13	43.3
S1	9	30.0
S2	1	3.3

Based on Table 4.1, there are the most female gender (63.3%), male (36.7%). The most respondents at the age of 48-57 (73.26%). Those who came to undata hospital were

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employed as civil servants (30.0%), self-employed (26.7%), and IRT (43.3%). The last Most High School Education Level (43.3%).

Hasil Bivariate Analysis Results

Table 4.2 overview of factors associated with the incidence of food waste in Patients With Diabetes Mellitus

Variable	f	%
food		
acceptability less	5	16.7
good	25	83.3
standard food portion		
less	22	73.3
good	8	26.7
schedule / timeliness of eating morning schedule		
not on time	3	10.0
on time	27	90.0
waiter attitude		
less friendly food	2	6.7
friendly	28	93.3
Leftovers		
less staple food		
Less	12	40.0
good	18	60.0
animal side dishes		
less	19	63.3
Good	11	36.7
Vegetable Side Dishes		
Less	23	76.7
Good	7	23.3
Vegetables		
Less	21	70.0
Good	9	30.0
Fruits		
Less	3	10.0
Good	27	90.0

In Table 4.2 shows that the acceptability of food in good respondents as many as 25 people (83.3%) and the acceptability of respondents to food is less good as many as 5 people (16.7%). Most respondents stated that the standard portion given was less good as many as 22 people (73.3%) and good as many as 8 people (26.7%). Then, the schedule / timeliness of meals showed that most respondents answered on time by 27 people (90%) and the attitude of food waiters who had been assessed by respondents showed that most gave friendly answers by 28 people (93.3%). In addition, the variable food waste found the most types of food that provide food waste is the type of vegetable side dishes (76.7%) followed by vegetables (70%), animal side dishes (63.3%), staple foods (40%), and finally fruit (10%).

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Receptivity relationship with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

Table 4.3 the relationship of acceptability with the rest of the staple food of patients with Diabetes mellitus

Receiving Power	Acceptability of staple food waste				Total		P Value
	less		good				
	f	%	f	%	f	%	
less	4	33.3	1	5.6	5	16.7	0.128
good	8	66.7	17	94.4	25	83.3	

Table 4.4 relationship of acceptability with food waste of animal side dishes patients with Diabetes mellitus

Acceptability of	animal side dishes				Total		P Value
	less		good				
	f	%	F	%	f	%	
less	5	26.3	0	0	5	16.7	0.129
good	14	73.7	11	100	25	83.3	

Table 4.5 the relationship of acceptability with vegetable side dishes of patients with Diabetes mellitus

Receiving Power	Vegetable side dishes				total		p Value
	less		good				
	f	%	F	%	f	%	
less	3	13	2	28.6	5	16.7	0.565
good	20	87	5	71.4	25	83.3	

Table 4.6 relationship of acceptability with vegetable food residues of patients with Diabetes mellitus

Receptivity of	vegetable leftovers				Total		P Value
	less		good				
	f	%	f	%	f	%	
less	3	14.3	2	22.2	5	16.7	0.622
good	18	85.7	7	77.8	25	83.3	

Table 4.7 the relationship of acceptability with fruit residues in Patients With Diabetes Mellitus

Receptivity of	fruit Leftovers				Total		P Value
	less		good				
	f	%	f	%	f	%	
less	1	33.3	4	14.8	5	16.7	0.433
Good	2	66.7	23	85.2	25	83.3	

Based on tables 4.3 to 4.7 above, it was found that respondents ' food acceptability did not have a significant relationship with the incidence of food waste (staple food, animal side

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dishes, vegetable side dishes, vegetables, and fruits) in patients with diabetes mellitus at Undata hospital in Central Sulawesi province with a significance value of >0.05.

Relationship of portion standards with food waste in Patients With Diabetes Mellitus in Undata Hospital of Central Sulawesi province

Table 4.8 relationship of portion standards to the rest of the staple food

| Standard portion | of staple food waste | | | | Total | | P Value |
| | less | | good | | | | |
	f	%	f	%	f	%	
less	8	66.7	14	77.8	22	73.3	0.678
Good	4	33.3	4	22.2	8	26.7	

Table 4.9 relationship of portion standards with animal side dishes

| Standard portion | Leftovers animal side dishes | | | | Total | | P Value |
| | Bad (n) | | Good (n) | | | | |
	f	%	f	%	f	%	
Bad	14	73.7	8	72.7	22	73.3	1,000
good	5	26.3	3	27.3	8	26.7	

Table 4.10 relationship of portion standards with vegetable side dish Leftovers

| Standard portion | Leftovers vegetable side dishes | | | | Total | | P Value |
| | less | | good | | | | |
	f	%	F	%	f	%	
less	18	78.3	4	57.1	22	73.3	0.345
good	5	21.7	3	42.9	8	26.7	

Table 4.11 relationship of portion standards with vegetable food residues

| Standard portion | Leftovers vegetables | | | | Total | | P Value |
| | less | | good | | | | |
	f	%	F	%	f	%	
less	17	81	5	55.6	22	73.3	0.195
Good	4	19	4	44.4	8	26.7	

Table 4.12 the relationship of portion standards with the rest of the fruit diet

| Standard portion | fruit Leftovers | | | | Total | | P Value |
| | less | | good | | | | |
	f	%	F	%	f	%	
less	2	66.7	20	74.1	22	73.3	1,000
good	1	33.3	7	25.9	8	26.7	

In tables 4.8 to 4.12 above, it was found that the standard portion of food respondents did not have a significant relationship to the incidence of food waste (staple food, animal side dishes, vegetable side dishes, vegetables, and fruit) in patients with diabetes mellitus in Undata Hospital Central Sulawesi province with a significance value >0.05.

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Relationship schedule / timeliness of meals with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

Table 4.13 relationship of schedule / timeliness of meals with food waste of patients with Diabetes mellitus

Schedule / timeliness	of meals Leftovers				Total		P Value
	not		good				
	f	%	f	%	f	%	
Not On Time	3	13	0	0	3	10	1,000
on time	20	87	7	100	27	90	

Table 4.13 above shows that the schedule / timeliness of eating respondents did not have a significant relationship to the incidence of food waste (staple food, animal side dishes, vegetable side dishes, vegetables, and fruit) in patients with diabetes mellitus in Undata Hospital of Central Sulawesi province with a significance value >0.05.

Relationship of food waitress attitude with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

Table 4.14 relationship of food waitress attitude with food waste

Waiter attitude food	leftovers				Total		P Value
	not		good				
	f	%	f	%	F	%	
not Friendly	1	4.3	1	14.3	2	6.7	0.418
friendly	22	95.7	6	85.7	28	93.3	

The results that have been presented in Table 4.14 above, it was found that the attitude of food waitresses did not have a significant relationship to the incidence of food waste (staple foods, animal dishes, vegetable dishes, vegetables, and fruit) in patients with diabetes mellitus in Undata Hospital Central Sulawesi province with a significance value of >0.05.

Receptivity relationship with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

The results *of chi square test analysis* in this study showed that there was no significant relationship between the acceptability of staple food menu, animal side dishes, vegetable side dishes, vegetables and fruit with the rest of the food. In the study the acceptability of patients on the staple food menu presented can affect the frequency of food waste in the hospital. The lower the acceptability of the menu in patients, the more the frequency of food waste will increase. This can be caused by the compatibility between the hospital Meal menu with the patient's eating habits at home.From direct interviews patients argue that the menu presented is not in accordance with the tastes and eating habits at home and the patient's perception of the wrong food-related patients with DM, so megakibilkan a lot of leftovers in patients.

Overall and based on the type of foodstuffs showed the acceptability or intake of food in the respondents was still lacking, at least respondents had to consume food and leave the rest of the food <20% of that served by the hospital, because the food that has been provided by the installation of Nutrition has been taken into account the quality and amount of nutrition.It can be caused due to different appetite of the patient and lack of appetite of the

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patient.Receptivity is the ability of a person to be able to spend the food served in accordance with their needs and the food is eaten without leaving any leftovers. Previous research by Septidiantari *et al.* (2022) mentioned that the patient's food waste factor can come from internal factors, one of which is eating habits

Relationship of standard portion with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

Based on the results of research related to the standard portion of food and food waste shows that there is no relationship between the standard portion of each type of food to food waste.In the results of the analysis of data obtained an average of food waste >20% (bad) as much as 50% on each type of food and the results of analysis related to penialain respondents obtained most of the respondents gave good responses to the perception of the standard portion on each type of food.

This study includes portions of staple foods, namely rice,animal side dishes, vegetable, vegetable and fruit portions. All aspects studied in this study known value *of p-value* yangdiperoleh >0.05 which shows no relationship between the standard portionof rice, animal side dishes and vegetables with the rest of the food. The results obtained are in line with the results of previous studies which showed that there was no significant relationship between the large portions of staple foods.This is supported by statements from some respondents who said that the portion of staple food is too much, full, and lazy to eat. Respondents who said they were full were also consuming other foods other than those provided by the hospital (Izzah*et al.*, 2022).

From the observation of large portions of dishes in the hospital is in accordance with the hospital set.However, large portions have not anticipated the patient's ability to spend the dishes served, so the food served a lot of wasted.This study is in line with (Astuti *et al.*, 2022).that there is a significant relationship between the incompatibility of food portions with the rest of the patient's food. Likewise, large portion menus can affect the appearance, consumer characteristics of food so that if the portion is too large or too small it can affect acceptability.

According to *Mangalik et al.*(2020) that patients should finish all the food served, this is because the food served by the nutrition installation has taken into account the amount and quality of nutrition so that healing can run optimally.One of the successes of a nutrition service in the inpatient room was evaluated by observing the leftovers that were not consumed after the food was served.

Relationship schedule / timeliness of meals with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

The results of chi square test analysis in this study showed that there was no significant relationship between the schedule/timeliness of meals to the incidence of food waste.Based on the results of observations and interviews when taking data respondents anticipate that there is food in between in accordance with the meal schedule and there are some patients who also megatakan not on time. The distribution of food by the time of serving the food affects each other. Dishes that will be given to consumers must be provided with conditions

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according to time because it will have an impact on consumers ' desire to eat (Rimporok *et al.*, 2019).

Based on (Rina, 2017) the distribution of food to individuals/clients who are being hospitalized is more complex than healthy individuals. The dishes given must adjust to the patient's condition and comorbidities experienced by the patient while conducting food distribution activities related to the timeliness of feeding to patients. Such food should be distributed and served to patients in a timely manner as it affects various things such as the appetite of consumers. Timeliness of food distribution is an activity that uses a meal schedule based on existing regulations. Delivery on time if in accordance with the meal time that has occurred while the delivery does not match the time is the food does not match the applicable time so the food comes before the schedule or vice versa. Another factor that can affect is the possibility of processed food served is not in accordance with the patient's taste that causes the patient does not finish the food given so that if the food is given on time but the patient experiences nausea and vomiting, it causes food waste. This is in accordance with research (Triyanto, 2022) which shows that there is no relationship between the timeliness of distribution and food waste at the RAA Soewondo hospital in Pati Regency. The food left on the patient's plate is caused by several internal, external and environmental factors such as schedules or meal times, food from outside the hospital, dishes and the hospitality of the waiters.

Relationship of food waitress attitude with food waste in Patients With Diabetes Mellitus in Undata Hospital Central Sulawesi province

The results *of chi square test analysis* in this study showed that there was no significant relationship between the attitude of the stewardess to the occurrence of food waste. This is because the food waitress at the time of delivering food provides motivation for patients to consume food to meet their nutritional needs.This statement is supported by research by Dewi and Ruhana (2023) where motivation to patients is able to increase patient food consumption so that it reduces the incidence of food waste in hospitals.

In other analysis results, it does not have a significant relationship with the acquisition of values >0.05. This is due to the level of knowledge and attitude of patients in choosing foods that do not know about their diet, causing the occurrence of food waste is still common.A previous study by Triyanto (2022)which showed no significant relationship between the attitude of waitresses and the incidence of food waste.

CONCLUSION

There are several conclusions in this study which can be seen as follows. Respondents in this study were 30 people with a diagnosis of diabetes mellitus and had an elderly age range and the largest gender, namely women. The highest percentage of leftovers on the vegetable side dish menu (76.7%) was followed by vegetables (70%), animal side dishes (63.3%), staple foods (40%), and finally fruit (10%). There was no significant relationship between acceptability, portion standards, meal schedule/timeliness, and the attitude of food waiters towards leftovers, animal side dishes, vegetable side dishes, vegetables and fruits with a significance value of >0.05.

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