Amerta Nutrition
e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
Farapti et al. | Amerta Nutrition Vol. 8 Issue 3 (September 2024). 416-423

RESEARCH STUDY
English Version
OPEN ACCESS

Food Waste Assessment to Evaluate Adequacy Intake among Elderly and to Apply Quality Control of Food Service Management in Nursing Home

Analisis Sisa Makanan untuk Mengevaluasi Kecukupan Asupan pada Lansia dan Menerapkan Pengendalian Mutu Manajemen Pelayanan Makanan di Panti Jompo Surabaya

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ARTICLE INFO

Received: *06-12-2023*
Accepted: *21-05-2024*
Published online: *30-09-2024*

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DOI:
10.20473/amnt.v8i3.2024.416-423

Available online at:
https://e-journal.unair.ac.id/AMNT

Keywords:
Food, Nutritional Needs, Quality of Live, Improved Nutrition, Food Waste

ABSTRACT

Background: Malnutrition is still common among the elderly, and meal provision has an important role in combating this issue. One of the meal provision programs is done by providing adequate quantity and quality of intake in nursing homes. Having less food waste can reflect to which extent intake and quality standards are applied in institutional food services.
Objectives: This study aims to examine food waste as a factor in evaluating the adequacy of food intake and quality control in the food service management of nursing institutions.
Methods: This study was conducted on 65 elderly at Surabaya Nursing Homes in 2023. Observations on the menu they had were carried out to determine the adequacy of their food intake. The Visual Comstock 7x hours method was used to assess the adequacy of food intake. Then, the food waste limit of 20% became a quality control in food service management.
Results: The adequacy of nutritional intakes in the studied Surabaya nursing homes in terms of energy, carbohydrates, fiber, sodium, and potassium were 77.26%, 66.24%, 37.14%, 165.36%, and 27.17% of recommended daily allowance, respectively. This means that both the adequacy of the intake and the type of menu the elderly consumed are still below the standards. Food waste of more than 20% was identified from menus made of papaya, *tongkol rica* (spicy mackerel tuna), *ote-ote* (vegetable fritter), rice, green bean compote, sour vegetable soup, skipjack tuna *balado* (chili pepper skipjack tuna), and melon.
Conclusions: The adequacy of food intake that the elderly consumed did not meet daily needs and recommendations. Apart from that, some menus still had >20% leftovers. The menu options need to be diversified to reach the recommended nutritional intake.

INTRODUCTION

Several developing countries, one of which is Indonesia, are starting to have a higher elderly population. A population can be called an "old population" if the proportion of the elderly population (aged ≥ 60 years) has reached a percentage of 10% or more[1]. The shift in population structure in which initially the number of young people is greater than the old population is called population aging. Based on the results of Susenas (National Socioeconomic Survey) in March 2021, eight provinces in Indonesia entered the aging phase. East Java was the second province with the highest number of elderly at 14.53% after the Special Region of Yogyakarta province at 15.52%. The percentage of the elderly population in East Java was 13.48% in 2020, and it was 9.16% in Surabaya[2]. From this data, it can be concluded that there has been an increase in the percentage of the elderly population in East Java, from 13.48% to 14.53% in 2021.

The aging process affects various aspects of life such as social, economic, and health. If it is seen from a health perspective, the elderly group will experience a

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decline in health status, both naturally and because of a disease. Hence, a special approach for the elderly group to continuously improve the quality of health is necessary. As an individual gets older, the body's physiological changes occur in almost all body systems. Nutritional problems are one of the health problems that are often encountered by the elderly. Unmet need for nutrient intake can cause nutritional problems such as undernutrition or overnutrition, resulting in an increased risk of infection due to a low immune system, and contracting degenerative diseases such as diabetes mellitus, hypertension, stroke, heart disease, and so on[3]. An individual's nutritional state plays an important role in the healing process; apart from that, illness can also have an impact on an individual's nutritional state. A health condition worsens due to insufficient nutrition required for recovery[4]. Seeing this problem, nursing homes should attend to improve the quality of the elderly's lives to avoid nutritional problems.

To improve the elderly's social welfare, the Surabaya City Government established a social institution, namely Griya Wreda. It is a technical implementation unit (*Unit Pelaksana Teknis Dinas*/UPTD) in the field of social welfare development for the elderly in the forms of providing shelter, life insurance such as food and clothing, health monitoring, free time including recreation, social, mental and religious guidance. This unit provides comfort and enjoyment for the elderly[5]. Griya Wreda Surabaya has 2 places, in Jambangan and Kalijudan.

The results of research in 2017 show elderly people who live in social institutions have a lower BMI, experience malnutrition, and tend to experience malnutrition when compared to the elderly who live in a typical community environment[6]. The elderly in Griya Wreda experienced some nutritional issues that depended on their previous nutritional status before living at the nursing home, eating habits, or food consumption at Griya Wreda. Providing meal services in nursing homes aims to meet the physiological needs of the elderly, therefore the adequacy of food intake should be achieved, one of which is by serving menus that increase their appetite[7].

One way to determine nutritional intake by patients and evaluate institutional meal provision is by analyzing food waste from the food they consume. Food waste is the amount of food that is not consumed. Food waste is considered a lot if the patient has food waste of > 20%. Patients who have food waste of > 20% for a long period can result in nutritional deficiencies[4]. The consumption of a balanced menu relies on how the various menus are prepared starting from the composition, color, taste, appearance, and harmonious combination of dishes[8].

Meal provision is a series of processes starting from menu planning, food needs analysis, budget planning for food procurement, ingredient delivery, storing, cooking, distribution, and documentation to monitoring and evaluation[9]. Food management is one of the nutritional services available in nursing homes that significantly contributes to meeting the elderly's nutritional needs. Management of the food service system needs to be well-performed to meet the elderly's optimal health and nutritional status. Routine and continuous evaluation of the meal serving process among the elderly is essential to implement in assessing quality standards and quality control and ensuring nutritional quality. This study aims to analyze food waste that the elderly in Griya Wreda left to evaluate the nutritional adequacy level and the quality of nutritional services in the food management of a nursing home.

METHODS

This was a descriptive observational study. The studied population was all elderly at Griya Wreda Jambangan and Kalijudan who were not on bedrest from May to June 2023. The sample in this study was 65 people who were selected through simple random sampling. The minimum sample size was calculated using the *Lemeshow* formula. They met several inclusion criteria: being ≥ 60 years old, having a good memory, being able to communicate well, being able to carry out eating activities independently, and being in good health.

The menus served at the nursing home were analyzed, observed directly, and then converted from household measurement units to gram units. Then, data on the nutritional content of the menu would be calculated using Nutrisurvey. Food waste data were obtained using a visual Comstock for 7 consecutive days. Then, each component of the menu served was observed, and categorized into a little if the food waste was ≤20% and a lot of the food waste was >20%, then analyzed descriptively. Data on nutritional adequacy levels were obtained by assessing the daily intake of elderly people as measured by measuring food waste using a visual Comstock for 7 consecutive days. After knowing the elderly's food intake for seven consecutive days, the data were then averaged and compared with the recommended dietary allowance (RDA) 2019 to measure nutritional adequacy. Approval for this study has been obtained from the Ethics Commission of the Faculty of Medicine and Nutrition of Universitas Airlangga with number 673/HRECC.FODM/IV/2023.

RESULTS AND DISCUSSIONS

Griya Wreda's menu data was obtained based on direct observation. Then the data is processed using Nutrisurvey. The nutrients analyzed include energy, carbohydrates, fiber, sodium and potassium. The Griya Wreda Surabaya menu cycle can be seen in Table 1.

Table 1. Menus in Griya Wreda Nursing Homes in 2023

Day's Menu	Menu Components	Morning	Day	Evening
1	The Main Food	Rice *Rawon* (beef and vegetables soup)	Rice Spicy mackerel tuna	Rice Omelette

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Day's Menu	Menu Components	Morning	Day	Evening
		Fried tempe	Corn omelette	
			Clear vegetable soup	Chinese cabbage, carrots, tofu sauté
		Tea	Mineral water	Mineral water
	Fruit		Papaya	
	Snack		Iced *Dawet* (green vermicelli coconut milk and Javanese sugar)	Scottel
2		Rice	Rice	Rice
	The Main Food	Fried milkfish	Fried eggs *krengsengan* (onion-sauteed beef)	Shredded fried chicken
		Red spiced tofu	Fried tempe	Egg and mustard noodle soup
		Pecel (vegetables with peanut sauce)	*Lodeh* (spicy coconut milk with vegetables)	
		Tea	Coffee	Mineral water
	Fruit		Banana	
	Snack		Sweet *Martabak*	Steamed Banana
3		Rice	Rice	Rice
	The Main Food	Chicken *rica* (spicy chicken)	Spicy mackerel tuna	Egg *balado* (chili egg)
		Fried tofu		Fried *tempe*
		Kale sauté	Sour vegetables	White mustard greens sauté
			Chili shrimp paste	
		Tea	Mineral water	Mineral water
	Fruit		Watermelon	
	Snack		Tomato Juice	Walik tofu (tofu with meat mixture)
4		Rice	Rice	Rice
	The Main Food	Soy sauce chicken	Mackerel *Tongkol rica* (spicy mackerel tuna)	Fried egg stew
		Fried *mendoan tempe*	Crispy fried tofu	
		Carrot and cabbage sauté	Sour vegetable soup	Long beans with tempe sauté
		Tea	Mineral water	Mineral water
	Fruit		Banana	
	Snack		Ice *Cao* (milk, syrup with black grass jelly)	Fried bananas
5		Rice	Rice	Rice
	The Main Food	Meat soup	Fried *tempe*	Omelette
		Fried tofu		
			Lodeh (spicy coconut milk with vegetables)	Mustard greens and tofu sauté
		Crackers		
		Tea	Mineral water	Mineral water
	Fruit		Pineapple	
	Snack		*Ote-ote* (vegetable fritter)	Cassava cheese
6		Rice	Rice	Rice
	The Main Food	Fried *patin* (fried shark catfish)	Tofu chicken curry	Egg *fuyunghai* (egg with tomato sauce)
		Fried Tempe		
		Sour Vegetables	Carrots chickenpeas sauté	*Capcay* (stir vegetables)
		Tea	Mineral Water	Mineral water
	Fruit		Papaya	
	Snack		Green bean compote	*Mutiara* porridge (pearl sago with coconut milk)
7		Rice	Rice	Rice
	The Main Food	Fried egg	Skipjack tuna *balado*	Seasoned shredded chicken *rica*
			Fried tofu	

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Day's Menu	Menu Components	Morning	Day	Evening
		Pecel (vegetables with peanut sauce) *Pecel* sambal (spicy peanut sauce) Crackers	Sour carrots and peas soup	*Lodeh*
		Tea	Mineral water	Mineral water
	Fruit		Melon	
	Snack		*Nagasari*	Pudding

As the studied nursing homes are government institutions, all food intake for the elderly is obtained from the state budget. These institutions also employ cooks to cook and serve food with the assistance of nurses. The menu must be planned to balance the daily nutritional value, and it is best not to give food more than 15 hours between the last meal and the first meal the following day. Then, the menu pattern must be planned by considering the needs and desires of consumers, leading to effective and optimal food service[10]. Griya Wreda Surabaya itself has implemented a 15-day menu cycle which will be changed once a year. Feeding for the elderly at the nursing home was scheduled at four times, namely 07.00 a.m. for breakfast, noon for lunch and fruit snacks, 04.30 p.m. for dinner, and 08.00 p.m. for evening snacks. Apart from providing routine food services, elderly people who fasted, such as Monday-Thursday fasting, were also facilitated for *sahur* (predawn meal) menu, while for the *iftar* (breaking the fast) menu, they received a rice box given by donors other than from Griya Wreda. The elderly were allowed to receive food from outside but were not allowed to buy food outside. The portions of rice for men and women were differentiated. For women, the rice portion was 100 g, and for men was 150 g. The data obtained were then processed using Nutrisurvey 2007. The nutrients analyzed included energy, carbohydrates, protein, and fat.

Table 2. The nutrients of daily menus and adequacy based on RDA (Recommended Dietary Allowances) in Griya Wreda Surabaya in 2023

Menu	Average						
	Energi (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Sodium (mg)	Potassium (mg)
1	1,497.1	63.1	52.9	193.8	7.5	2,811.6	1,311.5
2	1,111.9	38.5	38.3	153.9	5.7	1,325.4	774.6
3	1,405.7	56.3	54.6	173.9	14.8	1,524.4	1,414.8
4	1,111.7	44	34.9	155.5	7	2,111.1	1,039.4
5	1,263.9	47.9	43.1	172.4	7.9	1,753.9	1,200.7
6	1,540.9	58.7	57.7	203.4	12.3	2,289.1	2,117.2
7	1,354	52.2	61	152.8	7.2	1,689.6	1,083.7
Mean of daily nutrition intake	1,326.45 ± 172.34	51.52 ± 8.64	48.92 ± 10.11	172.24 ± 20.13	8.91 ± 3.31	1,929.30 ± 509.54	1,277.41 ± 423.90
RDA for elderly	1,716.66 ± 239.21	61.50 ± 2.92	48.33 ± 6.23	260.00 ± 45.00	24.00 ± 3.21	1,166.67 ± 149.07	4,700.00 ± 000
The adequacy of nutritional intake	77.26	83.78	101.23	66.24	37.14	165.36	27.17

Table 2 shows that based on the results of observations on menus served at Griya Wreda, the average value of energy intake from menus 1 to 7 was 1,326.45 ± 172.34 kcal; protein intake was 51.52 ± 8.64 g on average; the average fat and carbohydrate intake was 48.92 ± 10.11 g and 172.24 ± 20.13 g, respectively; the mean fiber and sodium intake was 8.91 ± 3.31 g and 1,929.30 ± 509.54 mg, respectively; potassium intake was 1,277.41 ± 423.90 mg on average. When compared to the nutritional adequacy rate 2019, it is known that the respondents' energy intake met 77.26%; protein intake met 83.78%; fat and carbohydrate intake met 101.23% and 66.24%, respectively; fiber intake met 37.14%; sodium and potassium intake respectively met 165.36% and 27.17% of the recommended needs. Based on the 2012 WNPG (National Widyakarya for Food and Nutrition), macronutrient adequacy levels are said to be a deficit if an individual meets a food intake by ≤ 89% of the RDA; they are normal if an individual meets a food intake by 90-110% of the RDA; and they are excessive if an individual meets a food intake by >110% of the RDA[11].

Previous studies in nursing homes showed that the energy content of the food served only met 69.03%, and the protein content only met 65.62% of the recommendations. The maximum allocated budget (Rp. 15,000 per day) can result in low nutritional content, especially essential micronutrients for the elderly. In almost all menus served, fiber, potassium, and calcium are lower than the recommended daily requirements[12,13]. From the data above it can be seen that there has been an increase in the percentage of nutritional content provided by nursing homes even though they are still classified as deficit. This increase can occur because there is a change in the master menu every year, where the

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master menu will be consulted with nutrition experts in order to increase the nutritional needs of the elderly with a minimum budget.

Insufficient nutritional intake will affect muscle protein synthesis, resulting in a decrease in fat-free mass (lean body mass) which then results in a decrease in strength and muscle mass[14]. Apart from that, low protein intake can also result in insufficient intake of essential amino acids needed for neurotransmitter synthesis. This can have an impact on the occurrence of dementia because dementia is associated with low levels of amino acids which function as neurotransmitters[15].

Then, insufficient carbohydrate intake will result in low energy supplies. Without enough glucose, the central nervous system cannot work properly, causing dizziness and mental and physical weakness[16]. This is because low carbohydrate intake will result in a decrease in glucose in the blood so that the body will metabolize fat into ketones (ketosis) which can then cause dizziness, fatigue and weakness[17]. Individuals who lack carbohydrate intake can also experience fiber insufficiency, which can then lead to digestive problems and constipation[16].

Furthermore, one of the needs that plays an important role in the body is potassium. Potassium functions to maintain fluid and electrolyte balance, acid base, muscle relaxation and nerve transmission[18]. Potassium intake can affect blood pressure, so when there is a deficit in potassium intake, eating will result in an increase in blood pressure[18]. Therefore, lack of potassium intake is a factor that increases the risk of hypertension[19]. Based on research in 2020, there is a relationship between potassium intake and the incidence of hypertension in the elderly[19].

An increase in sodium intake will result in an increase in extracellular fluid volume. This will cause the body to retain fluid which then results in an increase in blood volume[19]. The elderly are an age group that is vulnerable to hypertension. This is because increasing age is also accompanied by an increase in blood pressure[19]. Therefore, it is important to regulate sodium intake that does not exceed the recommended recommendations.

Table 3. The food waste assessment and quality control at Griya Wreda in 2023

Daily Menu		Food Waste (%)				
		Staple Foods	Side Dishes	Vegetables	Fruits	Snacks (drinks, etc)
1	Morning	4,62	3.85	0.00	-	-
	Day	5,38	9.62	6.15	22.31*	1.15
	Evening	8,46	11.15	6.92	-	0.00
2	Morning	15.00	17.31	16.15	-	-
	Day	7.69	12.69	10.00	15.38	16.54
	Evening	3.85	3.46	0.00	-	1.54
3	Morning	3.08	6.92	0.38	-	-
	Day	5.00	10.38	9.23	6.15	1.54
	Evening	5.38	6.54	3.46	-	4.23
4	Morning	6.54	4.23	10.77	-	-
	Day	15.77	24.23*	19.62	20.00	18.46
	Evening	9.62	4.62	5.77	-	9.23
5	Morning	0.00	3.85	0.00	-	-
	Day	10.77	7.69	11.15	14.23	22.22*
	Evening	3.46	8.08	5.38	-	0.00
6	Morning	23.46*	17.31	24.23*	-	-
	Day	16.92	14.62	15.00	19.62	30.00*
	Evening	7.69	4.62	6.15	-	15.00
7	Morning	7.31	4.62	2.69	-	-
	Day	8.85	20.38*	18.08	42.31*	13.08
	Evening	6.92	5.77	0.77	-	0.00
Average%		8.37	9.62	8.19	20.00	9.50
SD		5.48	6.05	7.10	11.18	9.81

*food waste > 20%

Based on Table 3, the average food waste in fruit is greater than the food waste in other menu components at 20.00%. Lower waste was collected from snacks, side dishes, staple foods, and vegetables with an average of 9.72%, 9.62%, 8.37%, and 8.19% respectively. Food waste in each menu component was small at ≤ 20%. However, even though the thorough average food waste was relatively small, many leftovers came from menus made of papaya fruit on day 1, tuna *rica* on day 4, *ote-ote* on day 5, rice, green bean compote, and sour vegetable soup on day 6, skipjack tuna *balado* and melon on day 7 (>20%). If food waste still reaches more than 20%, it means that there are still obstacles to achieving food service quality indicators[20]. From the results of the interview with the elderly, they left out their food because they had difficulty eating due to the hard texture of the food. Some of them also believed that avoiding certain types of food ingredients could prevent the diseases they suffered. The other reason was the taste of food which made them not finish their food.

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The results of food waste in this study are in line with research in 2023, which said that high levels of food waste can occur because the elderly have lost their appetite, have problems with their mouth, or have different meal preferences[21]. Several factors that have an impact on food waste are divided into three, namely internal factors consisting of psychological conditions, physical conditions, and eating habits; external factors consisting of the appearance and taste of food; and environmental factors consisting of the schedule/time of food serving, already eating food from outside of the hospital, eating utensils and friendliness of kitchen staff/food servers[22].

One of the success indicators of hospital nutrition services is that the food waste of the patient is less than 20%. In the current study, it was found that 26.65% or 327 of the 1,230 plates observed had more than 20% food waste. One of the reasons is the smell of food that is less attractive to patients and is the priority problem that must be solved[23]. Another study conducted at the Regional General Hospital (RSUD) Prof Dr W.Z Yohanes stated that on average patients did not finish the food they were given because the majority of patients did not like the aroma of the food served[24].

The way to overcome exorbitant food waste (>20%) is by applying food management policies related to menu planning, processing, and serving, all of which should be outlined in SOPs (Standard Operating Procedures). With such policies, the quality of institutional food services can be controlled well[25]. Griya Wreda Surabaya has not implemented SOPs for the food preparation process, which regulate the amount of spice used, cooking duration, food quality standards, and guidelines for using food serving equipment. SOPs have an important role in ensuring that the quality of food preparation can be guaranteed. Thus, it is necessary to create SOPs for unstandardized procedures[26]. Institutional food service standards relate to the quality of nutrition service standards. There are three standard parameters, namely the timeliness of giving food according to schedule, food waste, and the absence of errors in giving the diet[27].

Table 4. The Nutrient Intake and Adequacy Intake Among Elderly in Nursing Homes Residents in Surabaya 2023

Menu	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Sodium (mg)	Potassium (mg)
1	1,442.06 ± 149.53	61.53 ± 13.83	50.58 ± 5.79	188.31 ± 23.53	7.24 ± 1.40	2,811.82 ± 385.68	1,285.30 ± 148.05
2	1,137.20 ± 121.09	39.11 ± 4.19	38.83 ± 4.51	158.57 ± 19.9	5.70 ± 0.66	1,452.30 ± 302.91	821.67 ± 361.24
3	1,329.97 ± 144.78	49.29 ± 7.34	52.6 ± 7.19	166.43 ± 22.49	10.19 ± 4.07	1,654.51 ± 273.62	1,274.53 ± 329.47
4	1,097.60 ± 164.25	44.38 ± 7.02	36.82 ± 7.96	149.57 ± 23.95	7.38 ± 1.42	1,993.76 ± 409.60	987.05 ± 190.79
5	1,245.46 ± 140.47	46.30 ± 6.12	42.34 ± 5.76	172.06 ± 20.53	7.60 ± 1.24	1,809.90 ± 338	1,189.59 ± 152.61
6	1,510.30 ± 178.87	57.41 ± 8.19	55.95 ± 8.36	200.96 ± 27.00	11.70 ± 1.92	2,107.32 ± 389.80	1,845.62 ± 470.84
7	1,344.82 ± 170.50	51.01 ± 7.71	59.05 ± 8.24	155.89 ± 24.18	7.42 ± 1.16	1,660.19 ± 270.92	1,030.79 ± 180.74
Mean of daily nutrition intake in elderly	1,301.05 ± 151.52	49.86 ± 7.67	48.02 ± 8.7	170.25 ± 18.51	8.17 ± 2.04	1,,927.11 ± 448.02	1,204.93 ± 328.30
RDA for elderly	1,716.66 ± 239.21	61.50 ± 2.92	48.33 ± 6.23	260.00 ± 45.00	24.00 ± 3.21	1,166.67 ± 149.07	4,700.00 ± 0.00
The adequacy of intake	75.79%	81.07%	99.36%	65.48%	34.06%	165.18%	25.63%

Table 4 shows the average value of respondents' energy intake is 1,301.05 ± 151.52 kcal, higher than other nutrient intakes. The protein intake was 49.86 ± 7.67g; the fat intake was 48.02 ± 8.7; the carbohydrates intake was 170.25 ± 18.51 g; fiber intake was 8.17 ± 2.04 g; sodium intake was 1,927.11 ± 448.02 mg; and potassium intake was 1,204.93 ± 328.30 mg. When compared with the 2019 Nutritional Adequacy Rate, it is known that the respondent's energy intake meets 75.79%; protein meets 81.07%; fat fulfills 99.36%, carbohydrates fulfill 65.48%; fiber meets 34.06%, sodium meets 165.18% and potassium meets 25.63% of recommended needs. Based on the 2012 WNPG, the macronutrient adequacy levels are said to be a deficit if the nutrient intake meets ≤89% of the RDA; they are normal if the nutrient intake meets 90-110% of the RDA; and they are excessive if the nutrient intake meets >110% of the RDA[11]. Table 4 describes that energy, protein, carbohydrate, and fiber intakes are classified as a deficit. Meanwhile, fat intake meets recommendations. Sodium intake exceeds the recommended intake (165.18%), while potassium intake does not meet the recommendation (25.63%). This is in line with a study in 2020 which found that the majority of respondents, (79 out of 147 elderly, 53.7%)2 at the

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Nursing Home did not suffice energy needs, potentially leading to malnutrition[28]. Nutrient deficiency is a problem that is often encountered in the elderly[29]. Furthermore, a study in 2017 showed sodium/potassium ratio among elderly in Indonesia were high enough that can induce hypertension[13].

Inadequate food intake among the elderly can be ascribed to several factors, namely congenital disease, stress, oral disorders, visits, medication use, food taste, and number of teeth[30]. The research in 2018 states that there is a significant difference in stress levels between the elderly who live in nursing homes and the elderly who live with their families. They asserted that the elderly who live in nursing homes tend to experience severe stress, while the elderly who live with their families tend to experience mild stress[31]. Stressful elderly may face abundant sadness which may impact their appetite[32].

CONCLUSIONS

The nutritional content of the menus served to the elderly at Griya Wreda Surabaya did not meet the elderly's daily needs, possibly leading to suboptimal nutritional status. The fat content, however, met their daily needs, while the sodium content exceeded the recommendations. Food waste in the elderly was relatively small (≤20%), but some food components resulted in a lot of food waste (>20%). The elderly had a deficit in energy, protein, carbohydrate, and fiber intake, but their fat intake was considered sufficient, and their sodium intake was considered excessive. It is necessary to evaluate food services periodically by observing nutritional satisfaction and food waste to provide a sufficient intake within the allocated budget.

ACKNOWLEDGEMENT

The researchers would like to thank the Head of Griya Wreda Surabaya who has given the research permit, the nurses, elderly participants, and all parties who have helped with this research process.

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

All authors have no conflict of interest regarding this article. This research was funded by Airlangga University.

AUTHOR CONTRIBUTIONS

FF: conceptualization, investigation, methodology, supervision, writing–review and editing; AFR: methodology, writing–original draft; SRK: methodology, formal analysis, writing–original draft; YSD: formal analysis, resources; NH: writing–original draft, writing–review and editing; DDW: methodology, supervision, resources.

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