

## Malnutrition during pandemic among home-nursed and community-dwelling elderly

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### ABSTRACT

**Background:** The current COVID-19 pandemic has led to serious changes in the daily routine of people including the elderly. One of the most feared impacts is the increasing malnutrition among the elderly, which contributes to exacerbating public health problems.

**Objective:** To evaluate the differences in nutritional status, the risk of malnutrition, and nutritional intake between the elderly receiving home nursing and community-dwelling elderly during the COVID 19 pandemic.

**Method:** Cross-sectional study with 60 home-nursed elderly residents and 52 community-dwelling elderly in South Jakarta. Nutritional status was determined through BMI, the risk for malnutrition was assessed by MNA, and nutritional intake was calculated using the interview method with a 24-hour food recall.

**Results:** The study found, based on MNA, that there is a high risk of malnutrition (63.5%) among community-dwelling elderly compared to the elderly receiving home nursing (71.7%). A good prevalence of nutrition status was found in community-dwelling elderly (36.5%) better than home-nursed elderly (28.3%). Based on MNA, the elderly at risk of malnutrition who live with a home nursing are mostly male (76.5%), at 60 – 65 years (44.1%), last education is high school (38.2%), do not have disease comorbidities (70.6%),

and had inadequate intake (55.9% energy, 41.2% protein, 61.8% fat, and 76.5% carbohydrate) while the elderly who live in the community are mostly female (69.4%), at 60 – 65 years (50%), the last education in elementary school (33.3%), have comorbidities (52.8%) and have inadequate intake (72.2% energy, 100% protein, 50% fat, 80.6% carbohydrate). There were significant differences in protein and fiber intake ( $p < 0.05$ ) between both groups.

**Implication:** In this COVID-19 pandemic, health care workers need to be more active in conducting malnutrition risk screening particularly for community-dwelling elderly. More effort is required to advocate and ensure improved nutritional intake in this vulnerable group.

### KEYWORDS

Nutritional status, malnutrition risk, nutritional intake, elderly.

### INTRODUCTION

The COVID-19 pandemic has caused a health crisis around the world, including Indonesia. The COVID-19 virus attacks all age groups, but the elderly group is the most fatal, experiencing the risk of death and hospitalization<sup>1</sup>. In Brazil, as of July 11, 2020, 50.4% of the elderly suffered from covid-19, with the proportion of aged 60 – 69 years being 20.1%, and aged 70-79 years being 24.8% and 71.8% died<sup>2</sup>. While, the report of CDC covid-19 on March 16 in Indonesia showed that 31% of the 4226 confirmed COVID-19 cases were people aged  $\geq 65$  years, 45% of the 508 patients who were hospitalized were elderly patients<sup>3</sup>.

The elderly according to Law No. 13 of 1998 is someone who has reached the age of 60 (sixty) years and over. The number

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of people aged over 60 years has now reached 28,7 million people or 10.6% of the total population of Indonesia<sup>4</sup>. In line with Law No. 6 of 1974 regarding Social Welfare for the Elderly, then a Social Service House for the elderly was established that was intended for neglected elderly to stay prosperous, known as home nursing. However, until now the number of elderly who live in a nursing home is still relatively small compared to living in the community, particularly under the same roof with 3 generations<sup>5</sup>.

In general, both the elderly who live with a home nursing and those who live in the community are at the same high risk of the COVID-19 pandemic effects. The elderly themselves are a vulnerable group that tends to have several comorbidities, changes in body composition, decrease in swallowing ability, and decrease in cognitive function<sup>6</sup>. Policies to break the chain of covid transmission include social distancing and limiting to meet with family, staying at home, it makes the elderly feel increasingly lonely and difficult to access basic service such as health service. Moreover, COVID-19 pandemic also created repetitive stress and eating behavior change<sup>7</sup>. Another thing that is perceived is the difficulty of obtaining income so that the elderly are more vulnerable to economic shocks. This is what causes the COVID-19 prognosis in elderly patients to be worse than in younger patients<sup>8</sup>. Decrease in the immune system and specific immunoregulation is the main cause of COVID-19 deaths in the elderly<sup>9</sup>.

The main strategy to optimize the health of the elderly in this pandemic time is maintaining or improving their nutritional status. Ironically, the incidence of malnutrition precisely increases after aged 65 years<sup>10</sup>. The groups which are vulnerable to malnutrition are low-income residents and the home-nursed elderly. Malnutrition itself is a condition where the body does not receive adequate nutritional intake, or it can also be said that there is an imbalance between intake and nutritional needs to maintain health. Several studies show that the percentage of the highest malnutrition in the elderly who live with a home nursing compared to the elderly who live with their families. The research of Mahnaz (2018) et al. 70% of the elderly who are home-nursed is at risk of malnutrition, 20% of malnutrition and only 10% of good nutritional status, and the elderly who experience the risk of malnutrition and malnutrition significantly low or moderate protein intake<sup>11</sup>. However, in the research of Rashmi et al. (2015), the elderly who live with their families with less nutritional status as much as 15% and who are at risk of malnutrition as much as 55% and a significant relationship between nutritional status and calorie intake, 52% of calorie intake is not fulfilled it is caused by difficulty chewing and swallowing as much as 59,5 % and loss of appetite as much as 54.2%<sup>12</sup>.

In other words, it appears that before the pandemic the prevalence of malnutrition in home-nursed elderly ranged between 50 – 60%, while malnourished elderly who live with their families were only around 5 – 10%<sup>13</sup>. This difference gives the elderly with home nursing experience a higher level of depression than the elderly who live in the family environment. The elderly who live with a home nursing think they are confined, isolated, and feel abandoned by their children. The impact of this can cause various things that cause physiological disorders, which in the end influence eating behavior and changes in nutritional status.

However, in the pandemic time, it is not known for sure whether this condition is still the same. Considering that living with a home nursing is more secure, everything has been prepared by the nursing home, while the elderly who live in the community feel how the pandemic affects the family economy, and a sense of loneliness arises because of social distancing, etc. It is necessary to measure the nutritional status so that the right program can be formulated by policymakers, so as the elderly can fulfill their rights and can press the incidence of covid.

Measurement of the elderly nutritional status can be conducted by two methods, namely anthropometry and Mini-Nutritional Assessment (MNA). Anthropometry can identify good, moderate, less, and poor nutritional status as well as a history of past nutritional intake. While the MNA is a well-validated tool to assess malnutrition in the elderly. This tool is proven to have 92% accuracy when compared to clinical evaluation by two nutritionist doctors, and 98% when compared to a comprehensive nutritional assessment, including biochemical test, anthropometric measurement, and dietary assessment<sup>12</sup>.

Dietary assessment is very necessary, considering that the key to the body's defense is in nutrition, namely balanced nutrition<sup>14</sup>. Adequate nutrition can prevent and slow down and improve chronic disease problems, which are often suffered by the elderly<sup>15</sup>. The Japanese Ministry of Health, Labor, and Welfare in 2020 suggested that daily protein intake should be given around 1.2 – 1.5 g/kg of body weight. Protein quality should be selected protein that contains branched-chain amino acids (BCAAs). Moreover, the intake of vitamins and minerals such as vitamin D, vitamin A, vitamin E, B6, B12, selenium, and zinc need to be considered to increase the body's protection from viral infections<sup>15</sup>.

Therefore, this study aims to explore nutritional status, risk factors for malnutrition, energy, and nutrient intake for the elderly who live with their families and the elderly who live in a nursing home in the COVID-19 pandemic time. The results of the study are expected to be able to improve health policies for the elderly, both those who live in the community and nursing homes.

## RESEARCH METHODS

### Research Studies

This study used a cross-sectional study which was conducted in two places, namely the elderly who were in the Government Social Institution of South Jakarta and the elderly who were in the area of South Jakarta. This study was conducted in March-April 2021, starting from the licensing process, data collection, and data analysis. This study already obtained permission from the Ethics Commission of the Health Polytechnic of the Ministry of Health Jakarta II with the number of LB.02.01/I/KE/31/224/2021 and has received an administrative permit from the DKI Jakarta Provincial Social Service with the number of 1205/-1.851.8.

### Population and Sampling

The study was divided into two groups, namely the elderly who live in a nursing home and the elderly who are in the community environment. From 250 elderly who are in the institution, only 60 people can be interviewed and the elderly who are outside of the nursing home are 52 people. Samples were taken based on the purposive sampling technique according to the inclusion and exclusion criteria that have been set. The inclusion criteria are the respondent enter into the category of elderly aged  $\geq 60$  years, can be invited to talk, willing to be a respondent, can do anthropometric measurements, and sign a research approval sheet. The exclusion criteria are, the patient had dementia and the patient had a mental disorder.

### Data Collection

Data collected in this study were characteristic data, anthropometric data (weight, height, and Mid Upper Arm Circumference (MUAC)), malnutrition risk screening, physical activity, and food intake of the elderly. Data collection was conducted by trained enumerators with the health protocol of the COVID-19 level 2, namely the use of gloves, masks, face shields, and PPE clothes. The elderly who became respondents also used masks and face shields that had been prepared by the researchers. Before the study was conducted, the enumerators had done a rapid antigen test with negative results, and the elderly had been vaccinated.

Measurement of height used microtoise (GEA brand, 0,1 cm accuracy) was conducted with the way of the respondents standing upright without footwear with their back to the wall by sticking 5 points to the back of the respondents' body. The respondent's weight was obtained by using a digital scale (GEA brand, 0,1 cm accuracy) with light clothes without footwear. Measurements of MUAC were obtained by measurements using MUAC tape (GEA brand, 0,1 cm accuracy) with direct measurements without clothing obstructions. Measurements of weight and height were then used to calculate BMI (in  $\text{kg}/\text{m}^2$ ) as a measure of

the respondent's nutritional status. Cut-off standards by the Asian Pacific were used. A BMI of less than 18.5 was classified as underweight, BMI of 18.5 to 22.9 as normal weight, BMI of 23.0 to 24.9 as overweight, and up to 25 was classified as obese<sup>16</sup>. Then the nutritional status was grouped into normal nutritional status and malnutrition status (less nutritional status, overweight, and obesity).

Malnutrition risk screening used the Mini Nutritional Assessment form (MNA). This questionnaire was composed of 18 different questions and anthropometric measures for ranking participants in three levels (malnutrition with scores less than 17, at risk of malnutrition with 17 to 23.5 scores, and normal status with 24 to 30 scores)<sup>17</sup>. The collection process of intake data used the interview method with a 24-hour food recall form. Food weight estimation using a food photography book survey of individual food consumption (SKMI-2014) issued by the National Institute of Health Research and Development, Indonesian Ministry of Health. Analysis of nutrients from those foodstuffs was processed by using the Nutrisurvey application.

### Statistical Analysis

Statistical analysis was conducted by using SPSS version 17.0. The test between the characteristics of the respondents used a Chi-Square test, it was significant if  $p < 0.05$ . The difference test between groups who were in a nursing home and the elderly outside of a nursing home used the independent sample T-test, which was significant if  $p < 0.05$ .

## THE RESULTS OF RESEARCH

In Table 1, concerning the characteristics of respondents who are in a nursing home, mostly 63.3% are male, 38.3% are aged 60-65 years, 31.7% have last education of high school, 63.3% have comorbidities, 71.7% have malnutrition status based on BMI and 56.7% are at risk of malnutrition based on screening and assessment by using the MNA form. While in the elderly group outside of the nursing home, most of them consist of 75% female, 51.9% are aged 60-65 years, 38.5% have last education of elementary school, 53.8% have comorbidities, 63.5% have malnutrition status based on BMI and 69.2% have a risk of malnutrition based on the MNA form.

Based on the results of the Chi-Square test, it is known that there is a significant gender relationship ( $p = 0.000$ ) with the residence of the elderly, with a  $p$ -value  $< 0.05$ . While the characteristics of age ( $p=0.149$ ), last education ( $p= 0.093$ ), comorbidities ( $p=0.216$ ), nutritional status based on BMI ( $p=0.146$ ), and MNA Score ( $p=0.091$ ) do not have a significant relationship with the residence of the elderly, with  $p$ -value  $> 0.05$ .

Based on the results from the table 2 above, it is known that the elderly group who live in nursing homes are most

**Table 1.** The Characteristics of Respondents

Variable	Nursing Home (n=60)		Non-Nursing Home (n=32)		p-value
	N	%	n	%	
<b>Gender</b>					
Male	38	63.3	13	25.0	0.000
Female	22	36.7	39	75.0	
<b>Age Group</b>					
Aged 60-65	23	38.3	21	51.9	0.149
Aged 66-70	14	23.3	18	34.6	
Aged 71-75	10	16.7	1	1.9	
Aged >75	13	21.7	6	11.5	
<b>Last Education</b>					
None	9	15.0	10	19.2	0.093
Elementary School	18	30.0	20	38.5	
Middle School	10	16.7	14	26.9	
High School	19	31.7	4	7.7	
University	4	6.7	4	7.7	
<b>Comorbidities</b>					
Yes	22	36.7	28	53.8	0.216
No	38	63.3	24	46.2	
<b>Nutritional Status (BMI)</b>					
Malnutrition	43	71.7	33	63.5	0.146
Normal	17	28.3	19	36.5	
<b>Risk of Malnutrition</b>					
Malnutrition	10	16.7	1	1.9	0.091
Risk of Malnutrition	34	56.7	36	69.2	
Normal	16	26.7	15	28.8	

\*Information: Significant if  $p < 0.05$ , Chi-Square test.

at risk of malnutrition with most of them being male (76.5%), with the age group of 60-65 years (44.1%), have last education of high school (38.2 %) and have no comorbidities (70.6%). Meanwhile, the elderly group who live in the community mostly have a risk of malnutrition with most of them being female (69.4%), with the age group of

66-70 years, have last education of elementary school (33.3%), and have comorbidities (52.8%). From the results of the chi-square statistic calculation, it is known that there is a significant relationship between gender and risk of malnutrition in the elderly who live in a nursing home and the elderly who live in the community with a p-value  $< 0.005$

**Table 2.** Distribution of Malnutrition Risk (MNA) Frequency Based on Characteristics

Variable	Nursing Home			Community			p-value
	No Malnutrition Risk n (%) (n=16)	Malnutrition Risk n (%) (n=34)	Malnutrition n (%) (n=10)	No Malnutrition Risk n (%) (n=15)	Malnutrition Risk n (%) (n=36)	Malnutrition n (%) (n=10)	
<b>Gender</b>							
Male	6 (37.5)	26 (76.5)	6 (60.0)	2 (13.3)	11 (30.9)	0 (0.0)	0.028
Female	10 (62.5)	8 (23.5)	4 (40.0)	13 (86.7)	25 (69.4)	1 (100.0)	
<b>Age Group</b>							
Aged 60-65	4(25.0)	15 (44.1)	4 (40.0)	9 (60.0)	18 (50.0)	0 (0.0)	0.461
Aged 66-70	5 (31.3)	7 (20.6)	2 (20.0)	6 (40.0)	12 (33.3)	0 (0.0)	
Aged 71-75	4 (25.0)	3 (8.8)	3 (30.0)	0 (0.0)	0 (0.0)	1 (100.0)	
Aged >75	3 (18.8)	9 (26.5)	1 (10/0)	0 (0.0)	6 (16.7)	0 (0.0)	
<b>Last Education</b>							
None	3 (18.8)	4 (11.8)	2 (20.0)	0 (0.0)	10 (27.8)	0 (0.0)	0.383
ElementarySchool	6 (37.5)	10 (29.4)	2 (20.0)	7 (46.7)	12 (33.3)	1 (100.0)	
Middle School	2 (12.5)	4 (11.8)	4 (40.0)	4 (26.7)	10 (27.8)	0 (0.0)	
HighSchool	5 (31.3)	13 (38.2)	1 (10.0)	2 (13.3)	2 (5.6)	0 (0.0)	
University	0 (0.0)	3 (8.8)	1 (10.0)	2 (13.3)	2 (5.6)	0 (0.0)	
<b>Comorbidities</b>							
Yes	7 (43.8)	10 (29.4)	5 (50.0)	9 (60.0)	19 (52.8)	0 (0.0)	0.390
No	9 (56.3)	24 (70.6)	5 (50.0)	6 (40.0)	17 (47.2)	1 (100.0)	

while for the other characteristics such as age group, last education, and comorbidities there is no significant relationship with p-value > 0.005.

Based on the results from the table 3 above, it is known that the elderly group who live in a nursing home mostly have malnutrition status with most of them being male (55.6%), with the age group of 60 – 65 years (41.9%), have last education of elementary school (29.5%) and have no comorbidities (58.3%). Meanwhile, the elderly group who live in the community, mostly have malnutrition status with most of them being female (69.3%), with the age group of 66-70 years (66.7%), have last education of elementary school (42.4%), and have comorbidities (63.2%). From the results of the chi-square statistic calculation, it is known that there is a significant relationship between gender and the elderly nutritional status who live in a nursing home and the

elderly who live in the community with p-value <0.005 while for the other characteristics such as age group, last education, and comorbidities there is no significant relationship with p-value > 0.005.

Based on the results from the table 4 above, it is known that the elderly group is at risk of malnutrition who live in a nursing home only have 44.1% energy, 58.8% protein, 38.2% fat, and 23.5% carbohydrates. Meanwhile, the elderly group is at risk of malnutrition who live in the community only have 27.8% energy, 0% protein, 50% fat, and 8.3% carbohydrates. From the results of the Chi-square statistic calculation, it is known that there is a significant relationship between the adequacy of RDA percent of energy and protein intake with the risk of malnutrition in the elderly who live in a nursing home and the elderly who live in the community with p-value <0.005 while the adequacy category of RDA



**Table 3.** Frequency Distribution of Nutritional Status (BMI) Based on Characteristics

Variable	Nursing Home		Community		p-value
	Malnutrition n (%) n=43	Normal n (%) n=17	Malnutrition n (%) n=33	Normal n (%) n=19	
<b>Gender</b>					
Male	25 (55.6)	15 (88.2)	12 (30.7)	10 (52.6)	0.000
Female	20(44.6)	2(11.8)	27 (69.3)	9 (47.4)	
<b>Age Group</b>					
Aged 60-65	18 (41.9)	5 (29.4)	22 (66.7)	5 (26.3)	0.196
Aged 66-70	9 (20.9)	5 (29.4)	7 (21.1)	11 (57.9)	
Aged 71-75	6 (13.9)	4 (23.5)	0 (0.0)	1 (5.3)	
Aged >75	10 (23.3)	3 (17.6)	4 (12.2)	2 (10.5)	
<b>Last Education</b>					
None	8 (18.2)	1 (5.9)	5 (15.1)	5 (26.3)	0.433
Primary	13 (29.5)	5 (29.4)	14 (42.4)	6 (31.6)	
Secondary	8 (18.2)	2 (11.8)	10 (30.3)	4 (21.1)	
Higher Secondary	11 (25.0)	8 (47.1)	4 (12.2)	0 (0.0)	
PT	4 (9.1)	1 (5.9)	0 (0.0)	2 (21.1)	
<b>Comorbidities</b>					
Yes	18 (41.8)	4 (23.5)	16 (48.8)	12 (63.2)	0.187
No	25 (58.3)	13 (76.5)	17 (51.2)	7 (36.8)	

percent of fat and carbohydrate intake there is no significant relationship with p-value > 0.005.

Based on the results from the table 5 above, it is known that the malnourished elderly group in nursing homes only have 41.8% energy, 46.5% protein, 51.5% fat, and 30.2% carbohydrates. Meanwhile, the malnourished elderly group in the community only have 15.2% energy, 12.2% protein, 39.4% fat, and 9.1% adequate carbohydrates. From the results of the chi-square statistic calculation, it is known that there is a significant relationship between the adequacy of RDA percent of protein and fat intake with the elderly nutritional status who live in a nursing home and the elderly who live in the community with a p-value < 0.005 while the adequacy category of RDA percent of energy and carbohydrate intake there is no significant relationship with p-value > 0.005.

From Table 6, it is known that the anthropometry and the elderly nutritional status who live in the nursing home have a

mean weight of  $51.84 \pm 9.38$  kg, mean height of  $154.66 \pm 8.99$  cm, mean MUAC of  $23.91 \pm 3.72$  cm, mean BMI of  $22.24 \pm 4.20$  kg/m<sup>2</sup> and mean MNA score was  $10.25 \pm 1.78$ . From the aspect of nutritional intake, the elderly who live in the social nursing home have a mean energy intake of  $1257.05 \pm 282.53$  kcal, protein intake of  $47.07 \pm 10.16$  g, the fat intake of  $42.71 \pm 11.76$  g, carbohydrate intake of  $171.97 \pm 51.12$  g, fiber intake of  $7.05 \pm 4.08$  g, vitamin A intake of  $1230.25 \pm 448.87$  RE, vitamin B2 intake of  $0.54 \pm 0.24$  mg, vitamin C intake of  $22.62 \pm 9.55$  mg, vitamin D intake of  $2.89 \pm 2.69$  mcg, vitamin E intake of  $2.40 \pm 0.70$  mcg, sodium intake of  $179.52 \pm 39.23$  mg, magnesium of intake  $179.52 \pm 39.23$  mg and zinc intake of  $5.17 \pm 1.49$  mg.

Meanwhile, the elderly who live in the community have a mean weight of  $55.01 \pm 9.83$  kg, mean height of  $151.29 \pm 6.14$  cm, mean MUAC of  $25.18 \pm 4.06$  cm, mean BMI of  $25.35 \pm 3.56$  kg/m<sup>2</sup> and mean MNA score was  $10.25 \pm 1.78$ . From the aspect of nutritional intake, the elderly who live in a

**Table 4.** Distribution of Malnutrition Risk Frequency Based on Percentage of RDA Adequacy

Variable	Nursin			Community			p-value
	No Malnutrition Risk n (%) (n=16)	Malnutrition Riskn (%) (n=34)	Malnutrition n (%) (n=10)	No Malnutrition Risk n (%) (n=15)	Malnutrition Risk n (%) (n=36)	Malnutrition n (%) (n=10)	
<b>Energy</b>							
Inadequate	12 (75.0)	18 (55.9)	3 (30.0)	11 (73.3)	26 (72.2)	1 (100.0)	0.003
Adequate	4 (25.0)	15(44.1)	7 (70.0)	4 (26.7)	10 (27.8)	0 (0.0)	
<b>Protein</b>							
Inadequate	10 (62.5)	14 (41.2)	6 (60.0)	11 (73.3)	36 (100.0)	1 (100.0)	0.000
Adequate	6 (37.5)	20 (58.8)	4 (40.0)	4 (26.7)	0 (0.0)	0 (0.0)	
<b>Fat</b>							
Inadequate	4 (25.0)	21 (61.8)	3 (30.0)	9 (60.0)	18 (50.0)	1 (100.0)	0.346
Adequate	12 (75.0)	13 (38.2)	7 (70.0)	6 (40.0)	18 (50.0)	0 (0.0)	
<b>Carbohydrates</b>							
Inadequate	13 (81.3)	26 (76.5)	6 (60.0)	15 (100.0)	29 (80.6)	1 (100.0)	0.146
Adequate	3(18.8)	8 (23.5)	4 (40.0)	0 (0.0)	3 (8.3)	0 (0.0)	

**Table 5.** Frequency Distribution of Nutritional Status (BMI) Based on Percentage of RDA Adequacy

Variable	Nursing Home		Community		p-value
	Malnutrition n (%) n=43	Normal n (%) n=17	Malnutrition n (%) n=33	Normal n (%) n=19	
<b>Energy</b>					
Inadequate	25 (58.2)	9 (52.9)	28 (84.8)	14 (73.3)	0.275
Adequate	18 (41.8)	8 (47.1)	5 (15.2)	5 (26.3)	
<b>Protein</b>					
Inadequate	23 (53.5)	7 (41.2)	29 (87.8)	15 (88.2)	0.000
Adequate	20 (46.5)	10 (58.8)	4 (12.2)	2 (11.8)	
<b>Fat</b>					
Inadequate	21 (48.9)	7 (41.2)	20 (60.6)	7 (36.5)	0.000
Adequate	22 (51.1)	10 (58.8)	13 (39.4)	12 (63.5)	
<b>Carbohydrates</b>					
Inadequate	30 (69.8)	15 (88.2)	30 (90.9)	19 (100.0)	0.220
Adequate	13 (30.2)	2 (11.8)	3 (9.1)	0 (0.0)	

**Table 6.** Differences in anthropometry, nutritional status, MNA score, PASE score, and intake between the elderly group who are in a nursing home and non-nursing home

Variable	Nursing Home		Non-Nursing Home		p-value*
	Mean $\pm$ SD	Min/Max	Mean $\pm$ SD	Min/Max	
Weight (Kg)	51.84 $\pm$ 9.38	26.80/73.20	55.01 $\pm$ 9.83	38.00/80.00	0.101
Height (cm)	154.66 $\pm$ 8.99	133.30/173.50	151.29 $\pm$ 6.14	142.00/165.00	0.047
MUAC (cm)	23.91 $\pm$ 3.72	13.00/31.00	25.18 $\pm$ 4.06	17.50/31.50	0.457
BMI (Kg/cm <sup>2</sup> )	22.24 $\pm$ 4.20	12.17/30.50	25.35 $\pm$ 3.56	16.80/33.30	0.037
MNA Score	20.37 $\pm$ 3.75	12/26	20.30 $\pm$ 3.17	14/24	0.96 9
Energy (kcal)	1257.05 $\pm$ 282.53	633.20/2038.60	1109.22 $\pm$ 276.94	642.60/1604.10	0.044
Protein (gr)	47.07 $\pm$ 10.16	10.00/71.00	33.65 $\pm$ 11.40	17.20/52.30	0.000
Fat (gr)	42.71 $\pm$ 11.76	19.90/63.90	37.10 $\pm$ 13.20	7.80/70.20	0.070
Carbohydrates (gr)	171.97 $\pm$ 51.12	98.30/298.20	162.17 $\pm$ 54.11	88.00/281.60	0.599
Fiber (gr)	7.05 $\pm$ 4.08	2.60/33.40	4.98 $\pm$ 2.47	1.60/9.90	0.010
Vitamin A (RE)	1230.25 $\pm$ 448.87	106.50/2056.70	1194.77 $\pm$ 608.37	303.10/2435.80	0.717
Vitamin B2 (mg)	0.54 $\pm$ 0.24	0.10/1.10	0.32 $\pm$ 0.23	0.00/1.00	0.000
Vitamin C (mg)	22.62 $\pm$ 9.55	5.40/40.10	19.73 $\pm$ 19.81	0.00/73.50	0.400
Vitamin D (mcg)	2.89 $\pm$ 2.69	0.00/7.00	2.92 $\pm$ 3.03	0.00/8.80	0.900
Vitamin E (mcg)	2.40 $\pm$ 0.70	0.80/3.80	2.41 $\pm$ 1.48	0.60/5.50	0.565
Sodium (mg)	215.12 $\pm$ 288.96	51.50/1793.10	452.31 $\pm$ 510.51	28.00/1566.00	0.004
Magnesium (mg)	179.52 $\pm$ 39.23	70.60/278.90	138.13 $\pm$ 59.28	52.60/225.60	0.000
Zinc (mg)	5.17 $\pm$ 1.49	1.70/8.80	3.35 $\pm$ 1.22	1.60/5.20	0.000

\* p<0,05, significant independent sample T-test.

nursing home have a mean energy intake of 1109.22  $\pm$  276.94 kcal, protein intake of 33.65  $\pm$  11.40 g, the fat intake of 37.10  $\pm$  13.20 g, carbohydrate intake of 162.17  $\pm$  54.11 g, fiber intake of 4.98  $\pm$  2.47 g, vitamin A intake of 1194.77  $\pm$  608.37 RE, vitamin B2 intake of 0.32  $\pm$  0.23 mg, vitamin C intake of 19.73  $\pm$  19.81 mg, vitamin D intake of 2.92  $\pm$  3.03 mcg, vitamin E intake of 2.41  $\pm$  1.48 mcg, sodium intake of 452.31  $\pm$  510.51 mg, magnesium intake of 138.13  $\pm$  59.28 mg, and zinc intake of 3.35  $\pm$  1.22 mg.

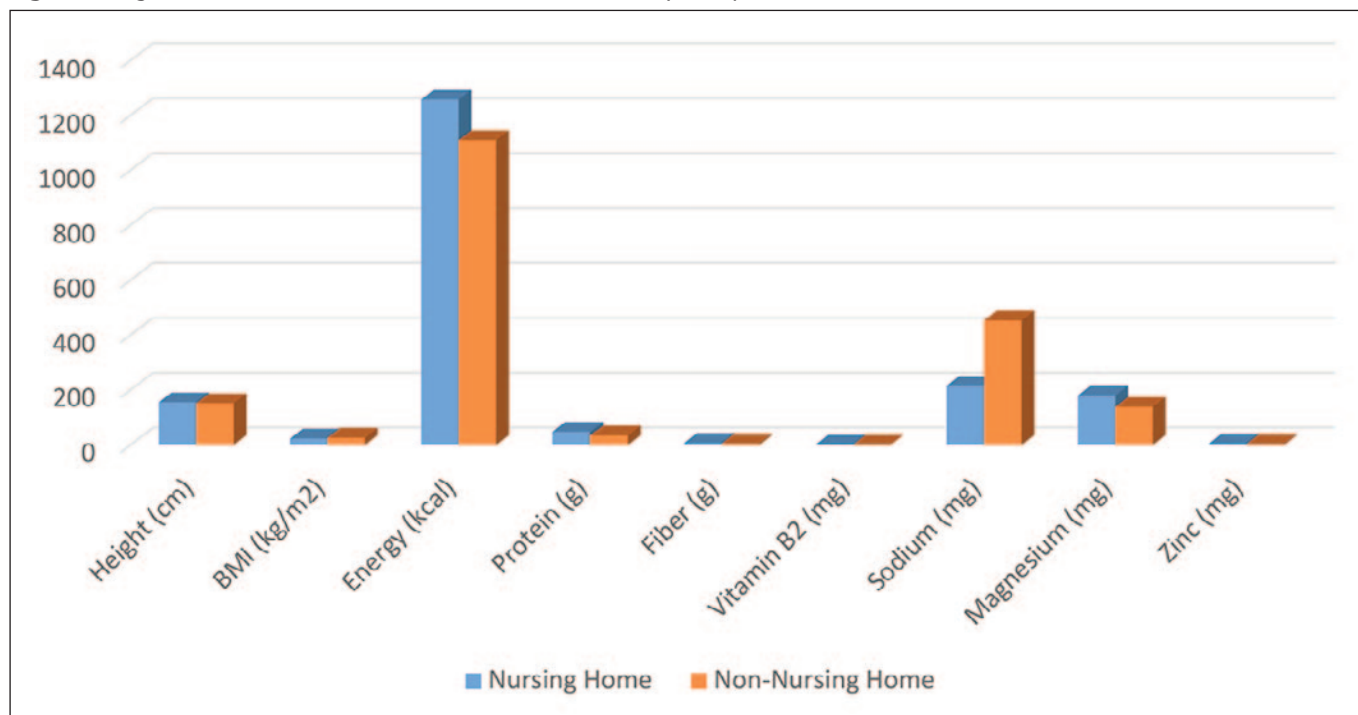
Table 6 shows that there are significant differences between height, BMI, energy intake, protein intake, fiber, vitamin B2, sodium, magnesium, and zinc between the elderly group who live in a nursing home and the elderly who live in the community with a p-value <0.05. While, age of (p =0.083), length of sunbathing (p=0.297), weight (p =

0.101), MUAC (p=0.457), MNA score (p=0.969), PASE score (p= 0.050), energy intake (p=0.054), fat (p=0.070), carbohydrates (p=0.599), vitamin A (p=0.717), vitamin C (p=0.400), vitamin D (p=0.900) and vitamin E (p=0.565) there are no significant differences between the two groups.

## DISCUSSION

Assessing the elderly nutritional status in a time of the pandemic is very important so that nutritional intervention steps can be determined from early on. Malnutrition in the elderly is very susceptible to infectious and chronic diseases such as osteoporosis, circulatory disorders, fractures, respiratory and cardiac problems, and also mortality which is correlated with the severity of nutritional deficiencies<sup>18</sup>. Determination of nutritional status in this study is conducted by BMI and MNA.



**Figure 1.** Significant Difference in Variables Between Both Elderly Groups

Determination of nutritional status based on BMI is focused on normal nutritional status and malnutrition status (a combination of undernutrition and overnutrition) considering that the elderly with undernutrition and overnutrition are both at risk of increased morbidity and mortality.

From the results of measurement of nutritional status based on BMI in the two groups of elderly, it appears that there is a significant difference between the elderly who live in a nursing home compared to those who live in the community. The mean BMI value in the nursing home was  $22.24 \pm 4.20$  kg/m<sup>2</sup>, while the elderly group who live in the community was  $25.35 \pm 3.56$  kg/m<sup>2</sup>. Cut-off standards by the Asian Pacific were used. A BMI of less than 18.5 was classified as underweight, BMI of 18.5 to 22.9 as normal weight, BMI of 23.0 to 24.9 as overweight, and up to 25 was classified as obese<sup>16</sup>. From these results, it appears that most of the elderly who live in a nursing home and the elderly who live in the community have a malnutrition status. These results when associated with nutritional status based on BMI before COVID-19, it appears that there is a decrease in the elderly who have normal nutritional status, both the elderly who live in a nursing home and who live in the community<sup>17</sup>. Normal nutritional status based on BMI in the community and a nursing home before the COVID-19 pandemic appeared was 70% of the elderly who live in a nursing home and 45% of the elderly who live in the community, while in this time of the pandemic normal nutritional status in the nursing home and the community dropped drastically to 28.3 % of the elderly who live in the

nursing home and 36.5% of the elderly who live in the community. Although the samples are different, these results can provide predictions that in a time of the pandemic there will be a decrease in normal nutritional status and an increase in malnutrition status<sup>18-21</sup>. One of the boosters for this decrease is social isolation which causes socioeconomic vulnerability which indirectly affects the quality and fulfillment of daily food<sup>22</sup>. On the other hand, the aging process in the elderly continues so this condition will affect the nutritional status and eating behavior of the elderly<sup>23</sup>.

The purpose of determining nutritional status based on MNA is to find out whether a person is at risk of malnutrition or not so that intervention can be conducted as early as possible<sup>24</sup>. The Mini Nutritional Assessment (MNA) was categorized as a well-validated screening tool, noninvasive, and simple for early malnutrition detection in the elderly<sup>25</sup>. The results of nutritional status based on MNA are presented in normal form, at risk of malnutrition and malnutrition. The results of this study showed that the mean MNA score of the elderly who live in a nursing home and the community was  $20.37 \pm 3.75$  and  $20.30 \pm 3.17$  respectively. If the MNA score is categorized based on nutritional status, then the prevalence for the elderly in nursing homes was 26.7% were well-nourished; 56.7% were at risk of malnutrition, and 16.7% suffered malnutrition. While the prevalence for the elderly who live in the community was 28.8% were well-nourished, 69.2% were at risk of malnutrition and 1.9% suffered malnutrition. The results of a multicenter study of the elderly in Indonesia that was conducted by Setiati et al in 2011

reported that the prevalence of the elderly nutritional status who live in a nursing home and the community was 53.8% respectively and those were well-nourished, 42.3% were at risk of malnutrition, 3.8% suffered malnutrition while the elderly in the community was 41.17% were well-nourished, 56.07% were at risk of malnutrition, and 2.14% suffered from malnutrition<sup>26</sup>.

The research of Setiati et al (2011) was conducted before the pandemic, while the results of this study were conducted in a time of the pandemic. From the two results, it appears that during the pandemic tends to decrease normal nutritional status and increase nutritional status at risk of malnutrition and malnutrition in both locations<sup>25</sup>. Li et al (2020) reported that the prevalence of malnutrition based on MNA score in the elderly who were treated for Covid showed 52.7% suffered malnutrition, 27.5% were at risk of malnutrition and 15% were classified as well nourished<sup>8</sup>. From these results, it appears that Nutrition is an important determinant of health status in elderly people because it affects the aging process<sup>27</sup>.

The results of this study also reported that gender is the only variable that is significantly different in the nutritional status of the two groups. The problem of malnutrition and the risk of malnutrition is dominated by the male gender in the nursing home group, while the community group with malnutrition problems and the risk of malnutrition has the largest proportion in the female gender<sup>28</sup>. This difference may be caused by the initial characteristic that respondents from nursing homes are dominated by men, whereas in reality, the proportion of women and men in the elderly is the women proportion is greater than the men proportion. If this difference is related to the characteristics of the occupants in the two residences, it appears that the occupants in the nursing home are dominated by the male gender, while in the community are dominated by the female gender. This result appears to be an exception, because the occupants of this nursing home care from the streets, and most of the street elderly are male. Therefore, the prevention and management of malnutrition are more focused on elderly women. Women are more likely to have depression than men because of many roles which they must carry, namely as household managers, workers, wives, and mothers the same time; all of these are stressors that play a role in increasing the incidence of depression, as well as a pandemic where there are family economic instability<sup>24,29</sup>.

Other factors that are thought to have a direct role in nutritional status are energy intake and nutrients. These results showed that almost all energy intakes, macronutrients (protein, fat, carbohydrates), and micronutrients (vitamins A, B, C, D, E, sodium, magnesium, zinc) are inadequate. However, what is significantly different ( $p < 0.05$ ) is energy intake, protein, vitamin B1, and minerals. The average fulfillment of energy and protein intake for the elderly group in

nursing homes is 1257 kcal and 47 grams of protein, while the elderly group in the community is 1109 kcal of energy intake and 33 grams of protein. If this condition is not overcome quickly, particularly for those who live in the community, then the incidence of malnutrition will increase. Malnutrition is usually associated with decreased muscle and immune function, impaired quality of life, impaired wound healing, and even with increased length of hospital stay, mortality as well as costs well of health care<sup>20</sup>. Therefore, monitoring the elderly nutritional status in a nursing home and the community needs to be conducted regularly so that the incidence of malnutrition can be prevented<sup>21</sup>. Nutritional intervention in a time of the pandemic seems to need to be differentiated for the elderly in nursing homes and the community, probably the food supply in a nursing home is relatively good and they get food (well-balanced diet) 3 times a day regularly, while the elderly in the community on the average only 2 times a day. The intervention program needs to be differentiated, it may be necessary to develop a PMT program for the elderly whose amount is at least 1/3 of the needs, particularly for those who live in the community, which may be able to delay the occurrence of malnutrition problems or the risk of malnutrition. Nutrients needed in a time of the pandemic can be met if the promotion of a balanced diet is practiced in daily life, followed by physical activity, sunbathing (vitamin D plays a high role in a time of the pandemic), and social relationship<sup>30</sup>. In addition, the emphasis on the use of diverse foods such as colorful vegetables and fruits, food sources of prebiotics/probiotics, omega-3 fatty acids, and nuts in daily food needs to be encouraged to ensure body endurance<sup>31</sup>.

There are some limitations to this study.

1. The study is conducted in a time of the pandemic so there are limitations in collecting information and data concerning body composition and nutritional status based on biochemical values which can not be conducted.
2. The results of the study cannot answer the causes and effects because the design is a cross-sectional study.
3. The data collection is conducted at one time and the location selection is chosen purposively.
4. All form V variables are obtained by the interview because in a nursing home and the community there is no record of the history of illness, weight loss, types of food consumed so the data still relied on the respondent's cognitive and memory.

## IMPLICATION

The problems of nutritional status in the elderly who are in a nursing home, either in undernutrition, the risk of malnutrition, malnutrition, and overnutrition need more attention from all health workers in a nursing home or the

community (Public Health Center). This is important so that the elderly in a nursing home can maintain their normal nutritional status and in the elderly who have problems with poor nutritional status, they are at risk of malnutrition and their conditions of malnutrition do not get worse. Assessment of nutritional status can use the MNA Form because it is relatively short, easy and the information is sufficiently accurate to prepare a program for improving nutrition services for the elderly.

## CONCLUSIONS

When compared to the elderly who get home care, community-dwelling old have a higher risk of malnutrition. The majority of elderly women with comorbidities and low nutrition intake who live in a community at high risk of malnutrition are female. Furthermore, a difference in protein and fiber consumption was noted between the two groups.

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## REFERENCES

- Desti Dwi Rahmah. Covid-19 pada Lanjut Usia. *J Wellness*. 2020;2(February):309–13.
- Ceolin G, Moreira JD, Mendes BC, Schroeder J, Pietro PF Di, Rieger DK. Nutritional challenges in older adults during the COVID-19 pandemic TT - Desafios nutricionais na saúde de idosos em tempos de pandemia da COVID-19. *Rev Nutr*. 2020;33:e200174–e200174.
- US Department of Health and Human Services/Centers for Disease Control and Prevention. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(12):343–6.
- Statistik BP. Statistik Penduduk Lanjut Usia. 2020;
- Statistik BP. Statistik Penduduk Lanjut Usia. 2014;
- Nakayama N. Nutrition for elderly individuals during the COVID-19 pandemic. *World Nutr J*. 2020;4(1).
- Tazeoglu A, Bozdogan FBK, Idiz C. Evaluation of osmaniye korkut ata university students' eating behaviors during the quarantine period during the covid-19 pandemic period. *Nutr Clin y Diet Hosp*. 2021;41(2):86–93.
- Li T, Zhang Y, Gong C, Wang J, Liu B, Shi L, et al. Prevalence of malnutrition and analysis of related factors in elderly patients with COVID-19 in Wuhan, China. *Eur J Clin Nutr*. 2020;74(6): 871–5.
- Azwar MK, Setiati S, Rizka A, Fitriana I, Saldi SRF, Safitri ED. Clinical Profile of Elderly Patients with COVID-19 hospitalized in Indonesia's National General Hospital. *Acta Med Indones*. 2020;52(3):199–205.
- Pavlovic J, Racic M, Ivkovic N, Jatic Z. Comparison of Nutritional Status Between Nursing Home Residents and Community-Dwelling Older Adults: a Cross-Sectional Study from Bosnia and Herzegovina. *Mater Socio Medica*. 2019;31(1):19.
- Mardani M, Abbasnezhad A, Rezapour M, Rostami S, Bonyadi M, Ebrahimzadeh F, et al. Mini nutritional assessment and its correlation with elderly nursing home residents in Khorramabad, Iran. *Iran Rehabil J*. 2018;16(2):177–84.
- Agarwalla R, Saikia A, Baruah R. Assessment of the nutritional status of the elderly and its correlates. *J Fam Community Med*. 2015;22(1):39.
- Piğłowska M, Guligowska A, Kostka T. Nutritional status plays a more important role in determining the functional state in older people living in the community than in nursing home residents. *Nutrients*. 2020;12(7):1–15.
- Calder PC. Nutrition, immunity, and COVID-19. *BMJ Nutr Prev Heal*. 2020;3(1):74–92.
- Mentella MC, Scaldaferrri F, Gasbarrini A, Miggiano GAD. The role of nutrition in the covid-19 pandemic. *Nutrients*. 2021;13(4): 1–13.
- Kalish VB. Obesity in Older Adults. *Prim Care - Clin Off Pract*. 2016;43(1):137–44.
- Khalesi ZB, Bokaie M. Nutritional Status and Related Factors in Elderly Nursing Home Residents. *Shahid Sadoughi Univ Med Sci*. 2015;1(1):16–21.
- Norman K, Hab U, Pirlich M. Malnutrition in Older Adults - Recent Advance and Remaining Challenges. *Nutrients*. 2021;13:1–20.
- Reber E, Gomes F, Vasiloglou MF, Schuetz P. Nutritional Risk Screening and Assessment. *J Clin Med*. 2019;8(7):1–19.
- Poggiano MR, Ciarla S, Gnerre P, Roberts A, Magni L, Morbidoni L, et al. The management of the patient with malnutrition: From evidence to clinical practice. *Ital J Med*. 2017;11(2):134–50.
- Truijen SPM, Hayhoe RPG, Hooper L, Schoenmakers I, Forbes A, Welch AA. Predicting malnutrition risk with data from routinely measured clinical biochemical diagnostic tests in free-living older populations. *Nutrients*. 2021;13(6).
- Surni, Nendissa DR, Wahib MA, Astuti MH, Arimbawa P, Miar, et al. Socio-economic impact of the Covid-19 pandemic: Empirical study on the supply of chicken meat in Indonesia. *AIMS Agric Food*. 2020;6(1):65–81.
- Ceolin G, Moreira JD, Mendes BC, Schroeder J, Pietro PF Di, Rieger DK. Nutritional challenges in older adults during the COVID-19 pandemic TT - Desafios nutricionais na saúde de idosos em tempos de pandemia da COVID-19. *Rev Nutr*. 2020;33:e200174–e200174.
- Albert PR. Why is depression more prevalent in women? *J Psychiatry Neurosci*. 2015;40(4):219–21.

25. Abadía Otero J, Briongos Figuero LS, Gabella Martín M, Usategui Martín I, Cubero Morais P, Cuellar Olmedo L, et al. The nutritional status of the elderly patient infected with COVID-19: the forgotten risk factor? *Curr Med Res Opin.* 2021;37(4):549–54.
26. Lee CJ, Hsu Y. Promoting the quality of life of elderly during the COVID-19 pandemic. *Int J Environ Res Public Health.* 2021; 18(13).
27. Amarya S, Singh K, Sabharwal M. Changes during aging and their association with malnutrition. *J Clin Gerontol Geriatr.* 2015;6(3): 78–84.
28. Hagg S, Jylhava J. Sex differences in biological aging with a focus on human studies. *Epidemiol Glob Heal.* 2021;10:1–27.
29. Ballo IR, Kaunang TMD. Profil Lansia Depresi Di Manado. *J Biomedik.* 2012;4(1):59–67.
30. Fernandes MR, Dos Reis Barreto W. Association between physical activity and Vitamin D: A narrative literature review. *Rev Assoc Med Bras.* 2017;63(6):550–6.
31. Gutiérrez S, Svahn SL, Johansson ME. Effects of omega-3 fatty acids on immune cells. *Int J Mol Sci.* 2019;20(20).