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# **Assessment of Malnutrition Among Albanian Elderly Participating in Home Meal Delivery Using the Mini Nutritional Assessment**

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## **Abstract**

Malnutrition is of increasing concern among the elderly. Home meal delivery programs target individuals with decreased access to food and increased risk of malnutrition. The purpose of this study was to assess the nutritional status of elderly Albanian meal recipients using the Mini Nutritional Assessment (MNA). Elderly meal recipients (n=31) were assessed using the MNA during July and August, 2011. Fisher's exact test was used to compare the frequency of the malnutrition indicator score (MIS) categories to the frequency of individual responses to the MNA. The MIS revealed 65% of the elderly were at risk for malnutrition, 6% malnourished, and 29% with normal nutritional status. The malnourished and at risk MIS categories were significantly associated with MNA responses for food intake decrease, meat/fish/poultry consumption, and negative self-views of nutritional status and health status ( $p < 0.05$ ). A trend was observed in association of MIS categories with responses to number of meals per day and overall protein intake ( $p \leq 0.1$ ). Malnutrition was not prevalent among meal recipients although nearly two-thirds of the subjects were at risk of malnutrition. Future meal recipients who report a decrease in food intake or negative self-views of nutritional status or health status should be monitored for nutritional risk. The meal delivery program should work to provide meals containing adequate protein sources.

## **Introduction**

As life expectancies continue to lengthen, the number of independent living elderly is increasing and more elderly individuals are malnourished or at risk of malnutrition. Morbidity is predicted by the severity of malnutrition even when the severity of illness is controlled for (1), and there is an increase in mortality among malnourished elderly (2). As a person ages, many

sensory changes occur including loss of appetite, smell and taste which lead to inadequate food intake. Interactions between diet and medications, in addition to sociological and biochemical changes, can also result in undernutrition, which is commonly undiagnosed (3).

Since many early signs of malnutrition in the elderly are not overtly noticeable, it is necessary to use a standardized assessment tool in situations where socioeconomic factors might perpetuate malnutrition. Early identification of poor nutritional status and subsequent intervention may stop or correct its negative outcomes (4). The Mini Nutritional Assessment (MNA) was validated among persons age 65 and older and is most widely used in community geriatrics (5-7). The MNA has been supported for its sensitivity (8), specificity, and reliability (9) in different settings and countries as an effective screening and assessment tool (10).

Numerous studies show the high sensitivity, specificity, and reliability of the MNA in elderly subjects where malnutrition is determined using the MNA and compared to serum albumin measures as the gold standard (5). The MNA identifies those who are at risk of malnutrition before they lose weight and their serum protein level declines (5,11).

The full MNA is formatted with 18 items, A through R. The first six items, A through F, comprise a screening portion that quickly evaluates subjects' risk of malnutrition. Items in the full MNA consist of four evaluation fields: anthropometric, global, dietary, and self-assessment (Appendix A). The anthropometric assessment considers body mass index (BMI), weight loss, and arm and calf circumferences. The global assessment examines lifestyle, prescription medication, pressure ulcers, mobility, psychological stress, and depression/dementia. The dietary assessment gauges the number of meals, food and fluid intake which includes questions specific to protein and fruit/vegetable consumption, and the subject's autonomy in eating. The subject's

self-assessment considers their self-view of nutritional status and personal opinion of their overall health in comparison with others of the same age. Answers are valued from 0-2 points with a cumulative total assessment score of 30 being the best possible score (12). A subject's total assessment score is evaluated using the Malnutrition Indicator Score (MIS) categories to assign a malnourished, at risk of malnourishment, or normal nutritional status label. The purpose of this study was to assess the nutritional status of elderly Albanian meal recipients using the Mini Nutritional Assessment and determine if the MNA is an appropriate tool to improve recipients' nutritional status.

### **Subjects and Methods**

Elderly Works is a segment of a social outreach organization, The Kenedi Foundation, which serves the people of Korce, Albania. One of Elderly Works' main services to Korce's elderly is a hot lunch delivery five days per week. Meals are prepared in a centralized kitchen following a monthly menu and delivered to approximately 50 clients. Clients are identified by subjective assessment as being in need of meal support.

Since Elderly Works provides its clients with a daily meal, the program's menu was particularly important in interpreting the assessment data. In the sample monthly menu, each week's menu included foods served at the following frequency per week: dairy 2 times, tomato and cucumber salad 2.75 times, whole fruit 4.5 times, sliced bread 3.25 times, and cake 0.75 times (Appendix B). The amount of protein provided in entrées was variable.

A convenience sample of Elderly Works clients who were receiving meals during July and August of 2011 were the subjects of this study (n=31). The full MNA questionnaire was administered to each subject by trained Albanian social workers. The Institutional Review Board

at Messiah College, Grantham, PA approved this study and all subjects gave informed consent prior to completing the MNA. Clients of the program who were not able/willing to answer the MNA questionnaire or physically unable to complete the anthropometric evaluation were excluded.

According to the MNA scoring system, the scores from the six items of the screening portion and twelve items of the assessment portion of the MNA were summed to yield a total assessment score which was used to determine the Malnutrition Indicator Score (MIS) category. A total assessment score  $\geq 24$  indicated normal nutritional status, between 17 and 23.5 points was considered at risk of malnutrition, and a total assessment score  $< 17$  points identified the subject as malnourished (Appendix A).

Body weight was measured with a Taylor dial scale with one pound precision and converted to kilograms. Height was measured to the nearest quarter inch and converted to the nearest 0.01 cm using a retractable tape measure with the subject standing erect against a wall. BMI was then calculated using the standard formula: weight (kilograms)/height<sup>2</sup> (meters<sup>2</sup>). Mid-arm circumference was measured with a tape measure at the mid-point of the arm between the acromion process and the olecranon process. Calf circumference was measured with a tape measure at the largest circumference of the left calf. In addition to the MNA items and demographic information, subjects' living location was recorded to differentiate between those living in the city of Korce and the surrounding villages, Maliq and Libonik.

Data were analyzed using MiniTab 16 where  $p < 0.05$  was considered significant and  $p > 0.05$  and  $p \leq 0.1$  was recognized as a trend in the data. Fisher's exact test was used to compare the frequency of the Malnutrition Indicator Score categories to the frequency of individual

responses to the MNA in 2x2 tables. As there were few subjects in the malnourished MIS category (n=2), subjects were grouped into two categories according to their Malnutrition Indicator Score: malnourished/at risk of malnutrition (n=22) and normal nutritional status (n=9). For MNA items with two or more possible responses, the responses were collapsed into two categories. For example, MNA item “A” asks if the subject has experienced a decrease in food intake over the past three months due to loss of appetite, digestive problems, chewing or swallowing difficulties (Appendix A). Possible answers are a severe decrease, moderate decrease, or no decrease. The three possible answer categories were collapsed into two groups: severe/moderate decrease and no decrease.

## **Results**

The Malnutrition Indicator Score revealed 65% (n=20) of subjects at risk of malnutrition, 6% (n=2) as malnourished, and 29% (n=9) with a normal nutritional status (Figure 1). The average age of the subjects was  $75 \pm 10$  years. Seven of the 31 subjects were under age 65, six of which were either malnourished or at risk of malnutrition according to the Malnutrition Indicator Score. However, there was no measurable difference in the Fisher’s exact test results when the younger (<65 years old) subjects (n=7) were excluded. Most (n=26) were living in the city of Korce, although a few (n=5) were living in distant villages, Libonik and Maliq. The sample was 68% (n=21) male and 32% (n=10) female (Table 1).

Analysis of anthropometric data from the subjects’ MNAs (Appendix A) revealed an average height of  $159 \pm 10$  cm (5 ft. 2 in.), average weight of  $65.5 \pm 15$  kg (144 lbs.) and 71% (n=22) of subjects with a BMI  $\geq 23$  kg/m<sup>2</sup>. Responses for screening items with more than two possible answers were collapsed as follows for Fisher’s exact test: for food intake decrease,

moderate-severe vs. none; for weight loss, >3 kg and doesn't know vs. 0-3 kg; for mobility, bed/home bound vs. able to go out; for neuropsychological problems, mild-severe dementia vs. none, and for BMI,  $\geq 23$  kg/m<sup>2</sup> vs. <23 kg/m<sup>2</sup>. Among these six items, food intake decrease was the only item that was significantly associated with the malnourished/at risk MIS category (p=0.004) (Table 2).

The malnourished/at risk MIS category was also significantly associated with MNA responses for meat/fish/poultry consumption less than one serving per day (p=0.017), and negative self-views of nutritional status (p=0.005) and health status (p=0.006). A trend was observed between the malnourished/at risk MIS category and responses to consumption of 1-2 meals per day (p=0.10) and overall protein intake consisting of 0-1 protein markers as defined by the MNA (p=0.07) (Table 3).

The screening scores (MNA items A through F) for the 31 subjects were positively correlated to the total assessment score ( $R^2=0.587$ ). Five subjects were incorrectly classified with a more favorable screening score than the actual total assessment indicated. Three additional subjects were incorrectly classified with a less favorable screening score than indicated by their total assessment score (Figure 2).

## **Discussion**

A low frequency of malnutrition was expected since Elderly Works provided subjects with one full meal each day, and assumed that their clients were also obtaining food from other sources. Malnutrition based on MIS categories was not prevalent among the Elderly Works clients (6%) although nearly two-thirds of the subjects were at risk of malnutrition (65%). This is comparable to a dataset which reviewed nutrition assessments using the MNA from 13



countries and identified 32% of elderly living in communities at risk of malnutrition and 6% as malnourished (13).

Responses to individual MNA items were compared to MIS categories to determine which items significantly predicted overall nutritional status. By addressing problem areas identified by the most significant assessment items, the program can best help clients improve their overall nutritional status. Although recent weight loss is an important component in nutrition assessment, as indicated by its inclusion as one of the six items in the screening portion of the MNA (10), weight loss data from this study were not considered credible since the majority of subjects (71%) did not know if they had lost weight during the past three months. Subjects likely do not have a firm concept of their weight and weight change over time, in part because most subjects do not have easy access to scales.

There was a positive association between several items answered on the MNA and the malnourished/at risk MIS category including decrease in food intake, meat/fish/poultry consumption less than one serving per day, and negative self-views of both nutritional status and health status. A decrease in food intake during the three months prior to the time of assessment was expected to be strongly associated with either a malnourished or at risk score as less nutrient and calorie consumption impacts overall health. The item regarding recent poor food intake is also included as one of the six items of both the screening portion and the Mini Nutritional Assessment-Short Form (MNA-SF) because decreased food intake is a determining factor in nutritional status. Although the most sensitive version of the revised MNA-SF excluded the food intake item in exchange for considering mode of feeding, the currently recommended version which includes the food intake item has the same specificity and correlation between the full

MNA and the screening portion (10). In this study, all subjects who reported a moderate or severe decrease in food intake were either malnourished or at risk according to the MIS categories. Additionally, there was a trend among those who ate one to two meals per day and having a malnourished/at risk of malnourishment MIS category. These two associations show that the amount of food eaten both in a day and over time are strongly associated with overall nutritional status.

Not only is the amount of food consumed indicative of nutritional status, but an adequate amount of protein is needed to maintain health. Protein is of particular importance among the elderly as protein requirements increase as the body's ability to synthesize protein declines (14). In this study, there was a positive association between consumption of less than one serving of meat/fish/or poultry per day and the malnourished/at risk MIS category ( $p=0.017$ ). The Elderly Works menu provides meat or poultry approximately two to three days per week. It was assumed that the sample menu (Appendix B) was reflective of each monthly menu throughout the year and that clients consumed the complete meal each day. In general, subjects who reported less than two markers for protein consumption were more likely to be at risk or malnourished. According to the frequency of menu offerings, subjects do not receive enough protein from Elderly Works to account for any of the three protein markers (one serving of dairy products per day, two or more servings of legumes or eggs per week, or meat/fish/poultry every day). Subjects must supplement the meal they receive from Elderly Works with additional protein in order to have any positive markers for protein consumption according to the MNA. Although micronutrient deficiencies (15) and dehydration are also often observed among older adults (14) there was no trend or significance found between overall nutritional status and the

MNA items related to fruit and vegetable intake (which tend to be abundant micronutrient sources) or fluid intake.

The subjects' self-views of both their nutritional status and overall health status were indicative of their overall nutritional status where those who reported their nutritional status as malnourished or unknown were likely to be malnourished or at risk. Those who reported a self-view of their overall health status health as worse or unknown in comparison with others were also more likely to be malnourished or at risk. Since there was a significant positive association between both self-view of health status ( $p=0.006$ ) and nutritional status ( $p=0.005$ ) with MIS category, it appeared that clients were accurately aware of their nutritional health.

The MNA-SF consists of the first six questions of the full MNA which, in the full MNA, are considered as the screening portion. This tool was validated in 1993 for its accuracy and sensitivity and developed to provide a shortened nutritional screening that could be performed in less time (10). In a recent study, the MNA-SF had 100% sensitivity and 56.4% specificity when compared to the full MNA (16). In the present study, the correlation of subjects' screening and assessment scores indicated that while screening often predicts the same MIS category as the full MNA assessment, the screening portion, or MNA-SF, was not completely accurate. The screening (MNA-SF) was inaccurate for 26% ( $n=8$ ) of the assessments by placing subjects in a different MIS category as the full MNA assessment. In five instances (16%), the screening portion (MNA-SF) classified subjects in a higher category than the full MNA and in three cases (10%) the screening (MNA-SF) classified subjects in a lower category than the full MNA. Kaiser et al. validated a revised version of the MNA-SF showing 9% of subjects were classified in one category higher using the MNA-SF compared to the full MNA and 11% of subjects were

classified in one category lower (10). For the present study, the full MNA was more useful than the screening portion (MNA-SF) alone in obtaining information regarding food intake and providing a comprehensive picture of the subjects' dietary needs.

### **Application**

Implementation of several practical solutions will allow clients with malnourished or at risk scores to be monitored and improve their nutritional status. It was assumed that clients consumed the full meal as provided by the Elderly Works program. However, the meals provided should account for two or more protein markers according to the MNA, which is currently not the case based on the sample monthly menu. To achieve this, the program should work to provide a weekly menu with two of the following three options: one serving of dairy (milk, cheese, yogurt) per day, two or more servings of legumes/eggs per week, or meat/fish/poultry every day. According to the sample menu (Appendix B), this can be achieved by incorporating eggs or lentils once more per week, meat/fish/poultry twice more per week, or a dairy product three times more per week.

Documentation of weight monitoring and annual nutritional assessment using the full MNA will provide records for long term clients and will show their improvement or decline over time (6,7). Since the full MNA provided more insight into clients' specific needs, this assessment tool is recommended over the MNA-SF. Clients who fall in the at risk MIS category according to the MNA will typically need more calories, vitamins, and protein, but likely will not have had significant weight loss (5). Interventions for these clients should provide them with more food, as a previous study has shown that increasing food provision in meal delivery programs improves nutritional status according to the MNA in six months (17). Elderly Works

should increase the amount of food provided to increase their clients' food intake and specifically incorporate additional sources of protein to help clients receive the particular foods they need.

During routine nutritional assessment, those who report a moderate or severe decrease in food intake should be further questioned to determine the reason for decreased food consumption. Clients should be encouraged to continue to eat healthy amounts of food and educated on the importance of maintaining adequate food consumption. The reason they report consuming only one to two meals per day should also be determined and addressed. If necessary, additional meal or food support should be provided to individuals who cannot obtain their own food.

Areas for further study include determining which assessment items that have significant association with the at risk/malnourished MIS category are most easily addressed by Elderly Works to improve clients' nutritional status. The ease of implementing menu modifications and barriers to change should also be considered. A longitudinal study of the subjects would give insight into the effectiveness of making changes in the menu and success of Elderly Works in improving its clients' nutritional health. Comparing subjects' MIS category as determined by the MNA to serum albumin values would add validity to the MNA as an assessment tool for this population, and the use of an additional nutritional assessment tool could be used among the same population. The same study using the MNA can also be performed among samples from different meal delivery programs, both in Albania and other countries, as delivery programs such as Elderly Works strive to provide clients with nutritional support that best meets their needs.

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# Appendix A



## Mini Nutritional Assessment MNA<sup>®</sup>

Last name:		First name:		
Sex:	Age:	Weight, kg:	Height, cm:	Date:

Complete the screen by filling in the boxes with the appropriate numbers. Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening	
<b>A</b>	<b>Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?</b> 0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake
<b>B</b>	<b>Weight loss during the last 3 months</b> 0 = weight loss greater than 3kg (6.6lbs) 1 = does not know 2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs) 3 = no weight loss
<b>C</b>	<b>Mobility</b> 0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out
<b>D</b>	<b>Has suffered psychological stress or acute disease in the past 3 months?</b> 0 = yes 2 = no
<b>E</b>	<b>Neuropsychological problems</b> 0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems
<b>F</b>	<b>Body Mass Index (BMI) (weight in kg) / (height in m<sup>2</sup>)</b> 0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater
<b>Screening score</b> (subtotal max. 14 points)	
12-14 points:	Normal nutritional status
8-11 points:	At risk of malnutrition
0-7 points:	Malnourished
For a more in-depth assessment, continue with questions G-R	

Assessment	
<b>G</b>	<b>Lives independently (not in nursing home or hospital)</b> 1 = yes 0 = no
<b>H</b>	<b>Takes more than 3 prescription drugs per day</b> 0 = yes 1 = no
<b>I</b>	<b>Pressure sores or skin ulcers</b> 0 = yes 1 = no

<b>J</b>	<b>How many full meals does the patient eat daily?</b> 0 = 1 meal 1 = 2 meals 2 = 3 meals
<b>K</b>	<b>Selected consumption markers for protein intake</b> <ul style="list-style-type: none"> <li>At least one serving of dairy products (milk, cheese, yoghurt) per day    yes <input type="checkbox"/>    no <input type="checkbox"/></li> <li>Two or more servings of legumes or eggs per week    yes <input type="checkbox"/>    no <input type="checkbox"/></li> <li>Meat, fish or poultry every day    yes <input type="checkbox"/>    no <input type="checkbox"/></li> </ul> 0.0 = if 0 or 1 yes 0.5 = if 2 yes 1.0 = if 3 yes
<b>L</b>	<b>Consumes two or more servings of fruit or vegetables per day?</b> 0 = no 1 = yes
<b>M</b>	<b>How much fluid (water, juice, coffee, tea, milk...) is consumed per day?</b> 0.0 = less than 3 cups 0.5 = 3 to 5 cups 1.0 = more than 5 cups
<b>N</b>	<b>Mode of feeding</b> 0 = unable to eat without assistance 1 = self-fed with some difficulty 2 = self-fed without any problem
<b>O</b>	<b>Self view of nutritional status</b> 0 = views self as being malnourished 1 = is uncertain of nutritional state 2 = views self as having no nutritional problem
<b>P</b>	<b>In comparison with other people of the same age, how does the patient consider his / her health status?</b> 0.0 = not as good 0.5 = does not know 1.0 = as good 2.0 = better
<b>Q</b>	<b>Mid-arm circumference (MAC) in cm</b> 0.0 = MAC less than 21 0.5 = MAC 21 to 22 1.0 = MAC 22 or greater
<b>R</b>	<b>Calf circumference (CC) in cm</b> 0 = CC less than 31 1 = CC 31 or greater

Assessment (max. 16 points)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Screening score	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Total Assessment (max. 30 points)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Malnutrition Indicator Score	
24 to 30 points	<input type="checkbox"/> normal nutritional status
17 to 23.5 points	<input type="checkbox"/> at risk of malnutrition
Less than 17 points	<input type="checkbox"/> malnourished

Ref. Vellas B, Villars H, Abellan G, et al. Overview of MNA<sup>®</sup> - Its History and Challenges. J Nutr Health Aging 2006; 10: 456-465.  
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 For more information: [www.mna-elderly.com](http://www.mna-elderly.com)



## Appendix B

### Sample Monthly Menu for Elderly Works Meal Delivery Program

	<b>Entrée</b>	<b>Dairy<sup>a</sup></b>	<b>Salad<sup>b</sup></b>	<b>Fruit<sup>c</sup></b>	<b>Bread<sup>d</sup></b>	<b>Cake<sup>e</sup></b>
<b>Week 1</b>						
M	Chicken and rice	x		x		
T	Beef with vegetables		x		x	x
W	Soup with noodles and ground beef		x	x	x	
Th	Peppers stuffed with rice		x	x	x	
F	Lentils and rice pudding			x	x	
<b>Week 2</b>						
M	Macaroni and cheese			x		
T	Beef with potatoes		x	x	x	
W	Byrek <sup>f</sup> with yogurt and eggs	x		x		
Th	Soup with rice and meat		x	x	x	
F	Vegetable soup		x	x	x	
<b>Week 3</b>						
M	Chicken and rice	x		x		
T	Soup with meat and noodles		x	x	x	
W	Cabbage with meat			x	x	x
Th	Pastice (spaghetti pie egg and milk)	x		x		
F	Beans		x	x	x	
<b>Week 4</b>						
M	Macaroni	x		x		
T	Soup with rice and ground beef		x	x	x	
W	Peppers stuffed with cheese		x	x	x	x
Th	Lentils		x	x	x	
F	Byrek <sup>f</sup> with tomatoes and onion	x		x		

a: Dairy was primarily 2 cups plain yogurt

b: Vegetable salad consisting of tomatoes, cucumbers, olive oil and salt

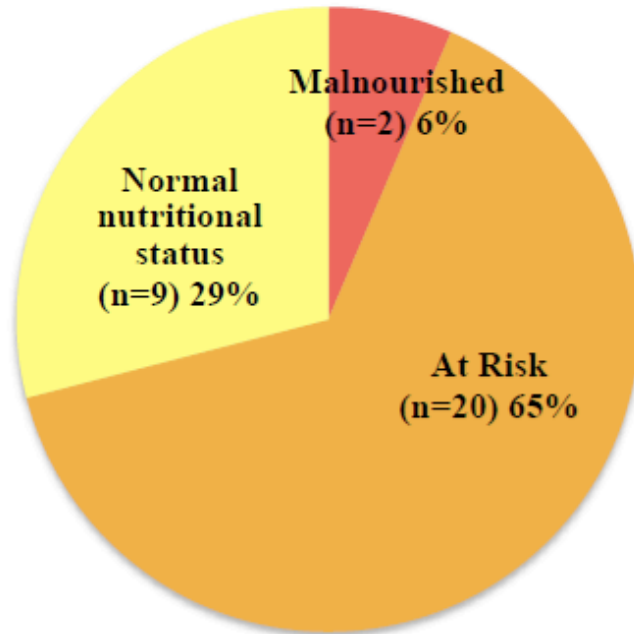
c: Whole fruit (pears, peaches or watermelon slices)

d: Two large slices white bread

e: One slice of frosted cake roll

f: Phyllo dough pie

**Figure 1.** Occurance of Malnutrition Indicator Score categories in meal recipients of Elderly Works in Albania (n=31), during July and August 2011



**Table 1.** Demographic information including location, gender, and age group for meal recipients of Elderly Works in Albania (n=31), during July and August 2011, by Malnutrition Indicator Score categories

	<b>Total</b> <b>% (n)</b>	<b>Malnourished</b> <b>% (n)</b>	<b>At Risk</b> <b>% (n)</b>	<b>Normal</b> <b>% (n)</b>
<b>Location</b>				
Korce	84 (26)	6 (2)	55 (17)	23 (7)
Libonik/ Maliq	16 (5)	0 (0)	10 (3)	6 (2)
<b>Gender</b>				
Male	68 (21)	6 (2)	32 (10)	29 (9)
Female	32 (10)	0 (0)	32 (10)	0 (0)
<b>Age Group</b>				
40-59	16 (5)	3 (1)	10 (3)	3 (1)
60-64	6 (2)	0 (0)	6 (2)	0 (0)
65-69	6 (2)	0 (0)	6 (2)	0 (0)
70-79	25 (8)	3 (1)	13 (4)	10 (3)
>80	45 (14)	0 (0)	29 (9)	16 (5)

**Table 2.** MNA screening items A-F for meal recipients of Elderly Works in Albania (n=31), during July and August 2011, by Malnutrition Indicator Score categories

	Total % (n)	Category A		B
		Malnourished % (n)	At Risk % (n)	Normal % (n)
<b>Food Intake Decrease <sup>a</sup></b>				
none	52 (18)	0 (0)	29 (9)	29 (9)
moderate	39 (12)	6 (2)	32 (10)	0 (0)
severe	3 (1)	0 (0)	3 (1)	0 (0)
<b>Weight Loss</b>				
none	6 (2)	0 (0)	0 (0)	6 (2)
1-3 kg	16 (5)	0 (0)	10 (3)	6 (2)
>3 kg	6 (2)	3 (1)	3 (1)	0 (0)
doesn't know	71 (22)	3 (1)	52 (16)	16 (5)
<b>Mobility</b>				
bed/chair bound	3 (1)	0 (0)	3 (1)	0 (0)
doesn't go out	16 (5)	0 (0)	13 (4)	3 (1)
goes out	81 (25)	6 (2)	48 (15)	26 (8)
<b>Psychological Stress</b>				
yes	13 (4)	0 (0)	10 (3)	3 (1)
no	87 (27)	6 (2)	55 (17)	26 (8)
<b>Neuropsychological Problems</b>				
severe dementia	3 (1)	0 (0)	3 (1)	0 (0)
mild dementia	13 (4)	0 (0)	10 (3)	3 (1)
none	84 (26)	6 (2)	52 (16)	26 (8)
<b>BMI (kg/m<sup>2</sup>)</b>				
<23	29 (9)	6 (2)	16 (5)	6 (2)
≥23	71 (22)	0 (0)	48 (15)	23 (7)
<b>Screening Score</b>				
Malnourished	0 (0)	0 (0)	0 (0)	0 (0)
At Risk	74 (23)	6 (2)	55 (17)	13 (4)
Normal	26 (8)	0 (0)	10 (3)	16 (5)

<sup>a</sup> p-value=0.004 using Fisher's exact test

Shaded regions include possible responses which were collapsed for Fisher's exact test

**Table 3.** Association of MNA assessment items G through R with malnourished/at risk MIS category for meal recipients of Elderly Works in Albania (n=31), during July and August 2011

Assessment Item	p-value	Assessment Item	p-value
<b>Medication</b> ≥3 vs. <3 per day	1.000	<b>2 Fruits/Vegetables per Day</b> no vs. yes	0.132
<b>Pressure Ulcers</b> no vs. yes	1.000	<b>Fluid Intake (c)</b> <3 vs. >3	0.693
<b>Number of Meals per Day<sup>a</sup></b> 1-2 vs. 3	0.106	<b>Mode of Feeding</b> difficult vs. no difficulty	0.295
<b>Servings of Milk per Day</b> ≤1 vs. >1	0.220	<b>Self-View of Nutrition Status<sup>b</sup></b> malnourished/uncertain vs. no problems	0.005
<b>Servings of Legumes/ Eggs per Week</b> ≤2 vs. >2	0.537	<b>Self-View of Health Status<sup>b</sup></b> worse/don't know vs. as good/better	0.006
<b>Servings of Meat/Fish/ Poultry per Day<sup>b</sup></b> ≤1 vs. >1	0.017	<b>Mid Arm Circumference (cm)</b> ≤22 vs. >22	1.000
<b>Overall Protein Intake<sup>a</sup></b> 0-1 markers vs. 2-3 markers	0.068	<b>Calf Circumference (cm)</b> <31 vs. ≥31	0.286

<sup>a</sup> p-value >0.05 and ≤0.1  
<sup>b</sup> p-value < 0.05

**Figure 2.** Correlation of MNA screening and total assessment scores for Elderly Works meal recipients (n=31) during July and August 2011

