

# Prevalence of Malnutrition Among Elderly. A Community Based Cross Sectional Study from Ernakulam Kerala

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## ABSTRACT

**Background:** Prevalence of malnutrition is high in India with many elderly at the risk of malnutrition. The quality nutrition in the elderly may significantly influence the overall condition and severe deficiencies contribute to multiple comorbidities and this is found to be more common in resource poor countries. Identifying the prevalence of malnutrition and risk factors will bring the problem to a greater focus for better care of the rising geriatric population.

**Objectives:** To estimate the prevalence of malnutrition among elderly aged 65 years and above in an urban area in Ernakulam district, Kerala. To assess the possible risk factors (covariates) of malnutrition among the elderly.

**Materials and Methodology:** A community-based cross-sectional study conducted within a radius of 10 Kms from Amrita Institute of Medical Sciences, Kochi from August 2016 to August 2018 (2 years). A sample size of 1000 was taken using the cluster sampling technique. MNA (Mini Nutritional Assessment Scale) was used as a study tool. Demographic details, functional characteristics, and other risk factors were taken in detail using a semi-structured questionnaire using IBM SPSS version 20.0 software. Categorical variables are expressed using frequency and percentage. Continuous variables are presented by the mean and standard deviation.

**Results:** This community-based cross-sectional study from Ernakulam, which included 1000 elderly population. Most of the participants 75.4% were in the age group between 65-74 years majority being females 59.1%. Most of the participants had educational status less than 12<sup>th</sup> standard. The prevalence of malnutrition reported during the period of 2 years (2016-2018) was 17.3% with 36.8% of the population at risk of malnutrition. The independent risk factors for malnutrition included age, female gender, widowed participants, low socioeconomic status, low education, multiple comorbidities, more than 2 drug use. Participants dependent on IADL and ADL and those using a walking aid had higher rates of malnutrition. Lifestyle characteristics like smoking and alcohol were associated with the risk of malnutrition.

**Conclusion:** The overall prevalence of malnutrition in my study was 17.3% and 36.8% were at risk of malnutrition. Approaches to improve nutritional status should focus on those who are older, female gender, low educational and socioeconomic status, those elderly with multiple comorbidities and medication use, and those who are functionally dependent. Better strategies are of utmost priority to improve the nutritional status of the elderly population.

**Keywords:** Malnutrition; Geriatric; Activities of daily living; MNA; Obesity; Underweight

## INTRODUCTION

The number and the proportion of older persons, defined as aged 60 and over, are growing in virtually all countries, and worldwide trends are likely to continue unabated. In 2002 there were an estimated 605 million older persons in the world, nearly 400 million of whom were living in low-income countries. By 2025, the number of older persons worldwide is expected to reach more

than 1.2 billion, with about 840 million of these in low-income countries [1]. The quality nutrition in the elderly may significantly influence the overall condition and severe deficiencies contribute to multiple comorbidities and this is found to be more common in resource-poor countries [2]. India is the second-most populous country in the world also has approximately 76.6 million people at or over the age of 60, constituting above 7.7% of the total population. Kerala has registered the highest proportion of elderly

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**Received:** December 5, 2020; **Accepted:** January 20, 2021; **Published:** February 2, 2021

**Citation:** Paul AB, Vijayakumar P, Paul G (2021) Prevalence of Malnutrition Among Elderly. A Community Based Cross Sectional Study from Ernakulam, Kerala. *J Trop Dis* 9:274.

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in the whole of India. The aged in Kerala constitute 11% of the population as compared to 7.7% in India. Their population, which was 9% in 1991, is expected to increase to 37% by 2051. This rise in the geriatric population is the result of demographic transition and healthcare developments in the country. But along with the rise in the geriatric population, there is also a rise in geriatric related morbidity which requires special attention and care [3]. Malnutrition may be due to several factors like, inadequate food intake, food choices that lead to dietary deficiencies, and illness that causes increased nutrient requirements, increased nutrient loss, poor nutrient absorption, or a combination of these factors [4]. The correction of poor nutrition is an important goal that is to be considered by geriatricians and physicians. The prevalence of malnutrition is high in the elderly in India from existing studies. Malnutrition is often neglected poorly recognized and treated leading to poor immunity, functional disabilities worsening the recovery from other systemic illnesses with the increased hospital stay. Identifying the prevalence of malnutrition in our geographic area will bring the problem of malnutrition into a sharper focus.

## MATERIALS AND METHOD

It was a community-based cross-sectional study conducted within a radius of 10 Kms from the Amrita Institute of Medical Sciences, Kochi from August 2016 to August 2018 (2 years).

### Inclusion criteria

Residents of Ernakulum district and above the age of 65 years formed the study population of this study.

### Exclusion criteria

A patient diagnosed with malignancy, bedridden patients, and participants who were not willing for the study.

### Sample size

Based on the rate of malnutrition among the elderly in a study by Evan C et al. with 95% Confidence Interval and 20% allowable error minimum sample size comes to 400 [5]. Assuming a non-responsive rate of 20% I will be including a maximum of 500 subjects. In cluster sampling design effect was taken as equal to 2 making the total sample size in the study 1000.

### Sampling technique

A total of 40 clusters (Cluster size 25) were selected from a

geographical area within a 10 km radius from the study site (Amrita Institute of Medical Sciences, Kochi). This comprised of one corporation, 4 Municipalities, and 10 Panchayats. Using the Population Proportional to Size Technique (PPS), it was decided to collect data from 20 clusters from the corporation, eight clusters from the Municipality, and 12 clusters from the Panchayats. The clusters were then randomly chosen by the lots method. From each cluster, 25 participants were enrolled in the study. The study personnel visited the households (sequentially from a random start point) and the interviews were conducted within household premises by the principal investigator.

### Study tool

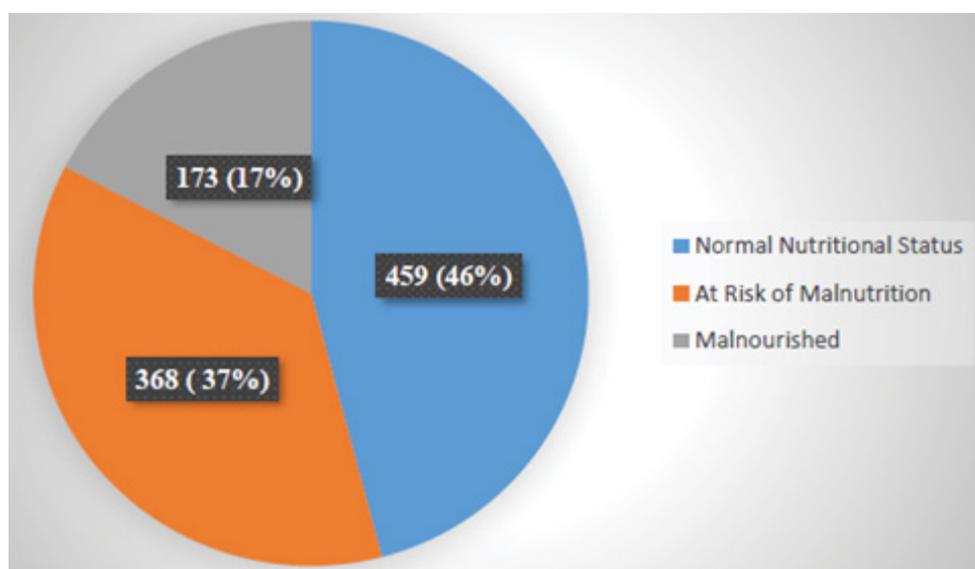
MNA (Mini Nutritional Assessment Scale), a validated questionnaire, and a semi-structured questionnaire were used for the study after consent from Nestle. MNA is internationally validated and a validity assessment of MNA among the elderly population in Kerala was done in a study by Jose Shilpa and Kumari KS [6]. A semi-structured questionnaire consisting of the socio-demographic profile, lifestyle characteristics, somatic characteristics, comorbidities, functional characteristics, socioeconomic characteristics, educational status, household, and marital status was prepared using data from various published studies and literature on malnutrition as shown in figure 1.

### Statistical analysis

Statistical analysis was performed using IBM SPSS version 20.0 software. Categorical variables are expressed using frequency and percentage. Continuous variables are presented by the mean and standard deviation. To test the statistical significance of the association of categorical factors with nutritional status chi-square test was used. Written informed consent was taken and the study was approved by the Ethics Committee of Amrita Institute of Medical Sciences, Kochi.

## RESULTS AND OBSERVATION

**As per table 1:** Most of the participants 754 (75.4%) were in the age group between 65-74 years. The mean age of the study population was 71.94. The study population consisted of 591 (59.1%) females and 409 (40.9%) males. Amongst the participants, 883 (88.3%) had a normal BMI. While 62 (6.2%) were underweight and 52 (5.2%) were overweight. THE mean BMI was 21.71. The majority of the



**Figure 1:** Prevalence of malnutrition in the study population.

Table 1: Baseline characteristics of the study participants.

Sl. No.	Variables	Frequency (% , n=1000)
<b>Age</b>		
1	65-75 (in Years)	754 (75.4%)
	76-85 (in Years)	221 (22.1%)
	86 and Above (in Years)	25 (2.5%)
<b>Gender</b>		
2	Female	591 (59.1%)
	Male	409 (40.9%)
<b>Body Mass Index</b>		
3	Underweight	62 (6.2%)
	Healthy Weight	883 (88.3)
	Overweight	52 (5.2%)
	Obese	3 (0.3%)
<b>Education Level</b>		
4	Less than 12 <sup>th</sup> Standard	848 (84.8%)
	Graduate	135 (13.5%)
	Post-graduate	17( 1.7%)
<b>Household Status</b>		
5	Living Alone	9 (0.9%)
	Living with Spouse	148 (14.8%)
	Living with Children and Family	826 (82.6%)
	Joint Family	17 (1.7%)
<b>Marital Status</b>		
6	Single	6 (0.6%)
	Widowed	142 (14.2%)
	Married	852 (85.2%)
<b>Income (per capita)</b>		
7	Class I (>5770 per capita income)	298 (29.8%)
	Class II (2890-5770 per capita income)	655 (65.5%)
	Class III (1730-2890 percapita income)	45 (4.5%)
	Class IV and V (870-1730 &<870 percapita income)	2 (0.2%)
<b>Pension</b>		
8	No	782 (78.2%)
	Yes	218 (21.8%)
<b>Study Distributions</b>		
9	Corporation	500 (50%)
	Municipality	200 (20%)
	Panchayat	300 (30%)

study population was living along with the family 826 (82.6%). While 148 (14.8%) was living along with a spouse. 9 participants (.9%) were found to be living alone. 655 (65.5%) had class II (2890-5770 per capita income) and 298 (29.8%) had class I (>5770 per capita income). The majority of participants 782 (78.2%) were non pensioners.

**As per table 2:** The study of the prevalence of malnutrition in the study population between the year 2016-2018 showed 173 (17.3%) of the study population was malnourished according to the mini nutritional assessment scale. 368(38.6%) were at risk of malnutrition and 459 (45.9%) were having a normal nutritional status.

**According to table 3:** 937 (93.7%) were independent in activities of daily living like dressing or washing while 63 (6.3%) were dependent. 772 (77.2%) were independent in instrumental

activities of daily living like cleaning the household or shopping independently. 70 (7%) of the study population was using an assistive device like a walking aid.

**As per table 4:** Malnutrition was significantly more in the age group above 75 (35.7%) and (42%) between these age groups were found to be at risk of malnutrition. Study participants above the age of 86, 60% were found to be malnourished. There is a statistically significant association between age and nutritional status with a p-value of (<0.001). Malnutrition was found to be more in females [133 (22.5%)] compared to [40 (9.8%)] in males. This was found to be statistically significant with a p-value of (<0.001). The majority of the study participants were living with children and family 826 (82.6%). There was no statistically significant association between living conditions and malnutrition in my study. Malnutrition rates were significantly higher in widowed participants 82 out of 142

(57%) compared to married 89 (10.9%) out of 852 participants. There was a statistically significant association between marital status and malnutrition with a p-value of (<0.001). Malnutrition rates were higher in participants with Class II and Class III per capita income. 125 (19.1 %) out of 655 participants in Class II (2890-5770 per capita income). 20 (44.4%) out of 45 participants with Class III (1730-2890 per capita income) income was malnourished. There was a statistically significant association between income status and malnutrition with a p-value (<0.001). However, there was no significant association between pension status and malnutrition.

**As per table 5:** 937 participants were Independent in activities of daily living like dressing or washing themselves of which 119 (12.7%) were malnourished. The prevalence of malnutrition was significantly higher in participants who were dependent on activities of daily living 54 (85.7%) of 63 who were dependent on caregivers. Prevalence of malnutrition was more in participants who were dependent on Instrumental activities of daily living like shopping and cleaning household 126 (55.3%) of 228 who were dependent. Malnutrition rates were more in participants who used a walking aid 54 (77%) out of 70 participants. All these 3 variables showed a statistically significant association with malnutrition with a significant p-value (<0.001).

## DISCUSSION

Most of the participants 75.4% were in the age group between 65-

**Table 2:** Prevalence of malnutrition in study population.

Sl. No.	Prevalence of malnutrition	Frequency (% , n=1000)
1	Normal nutritional status	459 (45.9%)
	Risk of malnutrition	368 (36.8%)
	Malnourished	173 (17.3%)

**Table 4:** Univariate analysis of selected socio-demographic factors with malnutrition.

Sl. No.	Variable	Category	Nutritional Status			p-value
			Normal Nutritional Status	At Risk of Malnutrition	Malnourished	
1	Age	65-75 (in years) (754)	409 (54.2%)	266 (35.3%)	79 (10.5%)	<0.001
		>75 (in years) (246)	50 (20.3%)	102 (41.5%)	94 (38.2%)	
2	Gender	Female (591)	251 (42.5%)	207 (35%)	133 (22.5%)	<0.001
		Male (409)	208 (50.9%)	161 (39.4%)	40 (9.8%)	
3	Household Status	Living with Spouse & Living Alone	69 (43.9%)	61 (38.9%)	27 (17.2%)	0.085
		Living with Children and Family & Joint Family	390 (46.3%)	307 (36.4%)	146 (17.3%)	
4	Marital Status	Single and Widowed (148)	24 (16.2%)	40 (27%)	84 (56.8%)	<0.001
		Married (852)	435 (51.1%)	328 (38.5%)	89 (10.4%)	
5	Income (per capita)	Class I (298)	177 (59.4%)	95 (31.9%)	26 (8.7%)	0.001
		Class II (655)	270 (41.2%)	260 (39.7%)	125 (19.1%)	
		Class III & IV (47)	12 (25.5%)	13 (27.7%)	22 (46.8%)	

**Table 5:** Univariate analysis of functional characteristics and malnutrition.

Sl. No.	Variable	Category	Nutritional Status			p-value
			Normal Nutritional Status	At Risk of Malnutrition	Malnourished	
1	Activities of Daily Living (ADL)	Independent (937)	458 (48.9%)	360 (38.4%)	119 (12.7%)	<0.001
		Dependent (63)	1 (1.60%)	8 (12.70%)	54 (85.7%)	
2	Instrumental Activities of Daily	Independent (772)	436 (56.5%)	289 (37.4%)	47 (6.1%)	<0.001
		Dependent (228)	23 (10.1%)	79 (34.6%)	126 (55.3%)	
3	Walking Aid	No Walking Aid (930)	453 (48.7%)	358 (38.5%)	119 (12.8%)	<0.001
		Using Walking Aid (70)	6 (8.6%)	10 (14.3%)	54 (77.1%)	

74 years majority being females 59.1%. Most of the participants 848 (84.8%) had educational status less than 12<sup>th</sup> standard. 93.7% of the participants were independent in the activities of daily living and 7% were using an assistive device. The majority of the study population was living along with the family 826 (82.6%). In the study participants, 852 (85.2%) participants were married. 142 (14.2%) were widowed. This study of the prevalence of malnutrition in the study population between the year 2016-2018 showed 173 (17.3%) of the study population was malnourished according to the mini nutritional assessment scale. 368 (38.6%) were at risk of malnutrition and 459 (45.9%) were having a normal nutritional status. A similar study conducted in Pathanamthitta district Kerala by Elsheba et al. in 129 participants using MNA questionnaire showed the prevalence of Malnutrition to be 11.6% with 46.5% at risk of malnutrition and 41.9% had normal nutritional status [7]. A study conducted in the urban area in Coimbatore, Tamilnadu by Mathew et al. in 190 participants showed a prevalence of malnutrition to be 19.47%-24.73% at risk of malnutrition [8]. The study conducted by Ramya et al. in an Urban area in Bangalore, Karnataka in 182 participants using the

**Table 3:** Functional status of study population.

Sl. No.	Physical Activity level	Frequency (% , n=1000)
<b>Activities of Daily Living</b>		
1	Independent	937 (93.7%)
	Dependent	63 (6.3%)
<b>Instrumental activities of Daily Living</b>		
2	Independent	772 (77.2%)
	Dependent	228 (22.2%)
<b>Walking Aid</b>		
3	No Walking Aid	930 (93%)
	Using Walking Aid	70 (7%)

MNA questionnaire showed the prevalence of malnutrition to be 21.3% with 47.33 % were at risk of malnutrition and 31.3% had normal nutritional status [9]. A study done by Baweja et al. in the field practice area of a Medical college in Rajasthan showed 7.3% of the study population to be malnourished with 48% at risk of malnutrition [10]. These differences in the prevalence of malnutrition could be because of differences in socio-economic characteristics of the study population in these study settings. In my study Malnutrition was significantly more in the age group above 75 (35.7%) with (42%) between these age groups to be at risk of malnutrition. Study participants above the age of 86 (60%) were found to be malnourished. In my study malnutrition rates were significantly higher in widowed participants 82 out of 142 (57%) compared to married participants. A study was done by Chitrasena et al. in Kancheepuram district in Tamilnadu and Mathew et al in Coimbatore Tamilnadu showed high rates of malnutrition in widowed people [8,11]. Studies were done by Ramya et al. in Bangalore, Chitrasena et al. in Kancheepuram Tamilnadu showed higher rates of malnutrition in low socioeconomic status [9,11]. However, my study did not show any association between pension status and malnutrition. The majority of the participants 848 were having educational status less than 12<sup>th</sup> and malnutrition rates were more in this group. A study done by Joymati et al. and Elsheba et al. showed higher rates of malnutrition in low educational and illiterate groups [7,12]. There is a statistically significant association between age and nutritional status. In my study, the prevalence of malnutrition was significantly higher in participants who were dependent on activities of daily living (85.7%). The prevalence of malnutrition was more in participants who were dependent on Instrumental activities of daily living like shopping and cleaning the household (55.3%). Malnutrition rates were more in participants who used a walking aid 77%. A study done by Mathew et al. showed higher rates of malnutrition in participants who were dependent on Instrumental activities of daily living [8]. A similar result was seen in a study done by Manmadir et al. which showed higher malnutrition rates in elderly with functional impairment [13].

## CONCLUSION

This community-based cross-sectional study from Ernakulam, which included 1000 elderly population. The prevalence of malnutrition reported during the period of 2 years (2016-2018) was 17.3% with 36.8% of the population at risk of malnutrition. The independent risk factors for malnutrition included age, female gender, widowed participants, low socioeconomic status, and low education. Participants dependent on IADL and ADL and those using a walking aid had higher rates of malnutrition. Lifestyle characteristics like smoking and alcohol were associated with an increased risk of malnutrition. Findings in the present study indicate multifactorial conditions contributing to malnutrition in

the elderly and treatment should be multidisciplinary. This study emphasizes the importance of nutritional assessment as a part of normal clinical assessment in elderly patients and nutritional advice and intervention should be tailored according to each patient. This will help in preventing functional decline and improve the quality of life in a rising elderly population. Further research is required to develop appropriate guidelines for nutritional screening and interventions among the geriatric population in tropical countries.

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