

Undernutrition and Associated Factors among Rural Elderly Population in Haramaya District, Eastern Ethiopia

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Abstract

Background: Undernutrition among the elderly is a major public health issue that contributes to increased morbidity and mortality in developing countries. However, it is frequently misdiagnosed, undertreated, and underfunded. Therefore, this study tried to determine the prevalence of undernutrition and its associated factors among the elderly in the Haramaya district, Oromia region, Eastern Ethiopia.

Methods: A community-based cross-sectional study was conducted among 465 elders selected by a simple random sampling technique from March 01 to 31, 2020. Data was collected using a mini nutritional assessment form, food Consumption Score, and nutritional assessment tool. Data were analyzed using Statistical Package for the Social Science version 22 software. Statistical significance was declared at p-value < 0.05.

Results: The prevalence of undernutrition was 51% (95% CI: 46.3, 55.5). Having comorbidities (AOR=2.1; 95% CI: 1.3, 3.5), living in a food insecure household (AOR=4.4; 95% CI: 1.6, 11.9), not having family/caregiver (AOR=3.2; 95% CI: 1.5, 6.6) and being in oldest-old age (≥ 85 years old) (AOR=6.6; 95% CI: 1.3, 33.6) were the factors associated with undernutrition.

Conclusions: the prevalence of undernutrition among the elderly population remains a major public health problem in the study area. Having chronic disease comorbidity, living in a household with food insecurity, being without a caregiver, and being of advanced age were identified factors associated with undernutrition. Therefore, attention should be given to the elderly with comorbidities, those living in food-insecure households, and those without family or caregivers.

Keywords: *Elderly; Undernutrition; Mini nutritional assessment; Eastern Ethiopia*

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Introduction

Undernutrition is common in elderly people (aged ≥ 60 years old). It usually presents as weight loss and is predominantly due to protein energy wasting (FAO, 2007) which is caused primarily by an inadequate intake of dietary or food energy (Morley, 2021). Poor nutritional status in old age is associated with increased demands on health services, lengthier hospital stays, and immune dysfunction. It is recognized as an important predictor of morbidity and mortality (Chernoff, 2005). However, the undernutrition problem is often poorly recognized and underdiagnosed (Morley, 2012).

Worldwide studies revealed that the prevalence of undernutrition among people of old age is high. According to a report from 25 studies, the average prevalence of undernutrition was 15% (Adhana *et al.*, 2019).

A study from sub-Saharan Africa showed that 6-48% of the elderly were underweight. (Kimokoti *et al.*,

2008). It affects both men (9.5-36.1%) and women (13-27%) in Africa (Charlton *et al.*, 2001). In Ethiopia, the prevalence of undernutrition among older adults was 20.5% (Yisak, 2022).

The elderly populations are not currently viewed as a priority group for nutrition services. Nutrition interventions in African countries, when available, are directed primarily toward infants, young children, and pregnant and lactating women. The lack of attention to the elderly in policies and programs is mirrored by the paucity of information on the condition (Charlton and Rose, 2001, Kulik *et al.*, 2014).

In Sub-Saharan Africa, less than one in every five older people (16.9%) receives an old-age pension, which provides a certain level of income security in old age (Organization, 2014). Few African countries offer social and welfare assistance programs for older adults (Holmes and Lwanga-Ntale, 2012).



Increased age, not reading and writing, health conditions, having a poor dietary diversity score, being elderly, smoking, and being food insecure were some of the factors associated with undernutrition in older age (Weldegebreal, 2022, Yisak *et al.*, 2022).

In Ethiopia, the National Nutrition Program II initiative's nutrition assessment and intervention strategy left out geriatric nutrition. The Ethiopian government also created a National Food and Nutrition Policy in 2017 to help it reach its objective of eliminating stunting and malnutrition among children by the year 2030 while ignoring the needs of the elderly (Save the Children., 2018).

There are several studies on elderly undernutrition and associated factors in different parts of the world.(Yisak *et al.*, 2022; Li *et al.*, 2020; Jésus *et al.*, 2017; da Silva Alexandre *et al.*, 2014). However, there were only limited studies conducted in Ethiopia on elderly nutrition and they did not include household food security status as one of the study variables. (Weldegebreal, 2022; Tadesse *et al.*, 2023; Mezemir *et al.*, 2020) .To the best of our literature searches, there is no study conducted on the elderly population's undernutrition in the East Hararghe zone of Ethiopia. Therefore, this study aimed to assess the prevalence of undernutrition and its associated factors among the elderly population in Haramaya district, eastern Ethiopia.

Materials and Methods

Study Setting, Design, and Period

A community-based cross-sectional study was conducted in Haramaya District, East Hararghe Zone, Oromia Regional State, Ethiopia from March 1st to 31st, 2020. Haramaya district is located 500 km away from Addis Ababa, the capital city of Ethiopia, with an altitude that ranges from 1400 to 2340 meters above sea level. According to data taken from the district, the total population of the Haramaya district is estimated to be about 310,363 of which 155,379 are males and 154,984 are females (Haramaya District Municipality, 2020). The total number of the elderly population was estimated to be 15,084 of which 7,512 are males. Khat, vegetables, and fruits are important cash crops in the area (Central Statistical Agency, 2017).

Population, Inclusion/ Exclusion Criteria

The study populations were all elderly individuals aged ≥ 60 years old who were living in the selected kebeles (smallest administrative units in Ethiopia) of the Haramaya district. All elderly individuals available at home during the data collection period were included in the study. Those who were unable to communicate and give information due to serious illness and whose both extremities were amputated were excluded from this study.

Sample Size Determination and Sampling Technique

The sample size was calculated using the single population proportion formula using the 22.7% prevalence of undernutrition in the elderly in Gonder town (Adhana *et al.*, 2019), a margin of error of 4.0%, and a non-response rate of 10.0%. The final sample size was 465.

A simple random sampling technique was employed to select seven kebeles from 33 rural kebeles in the Haramaya district. The total number of elderly individuals ≥ 60 years old in the selected kebeles was obtained by extracting data from the Haramaya Demographic and Health Surveys (EDHS). The final sample size was proportionally allocated to the selected kebeles based on the total number of elders living in the kebeles. Then, simple random sampling techniques were used to select one elderly person from framed household codes (Figure 1).

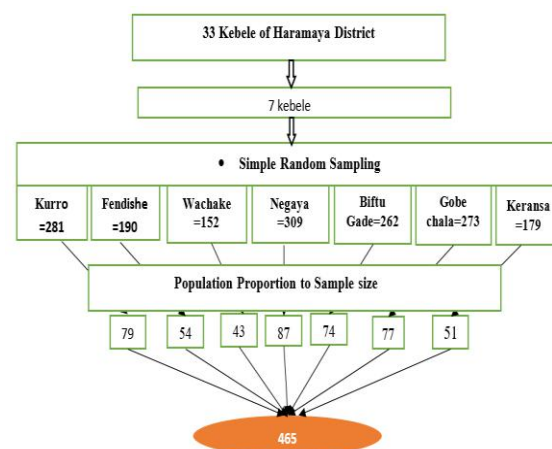


Figure-1; Schematic representation of sampling procedure Haramaya district Ethiopia, 2020.

Data Collection Techniques

Data were collected by the following method;

Face-To-Face Interview: Six diploma nurses conducted face-to-face interviews using a pre-tested structured questionnaire. The questionnaire contains different factors like socio-demographics, lifestyle, seven days of dietary and feeding practices (WFP, 2014), and health-related (comorbidity) factors. The questionnaire also included mini nutritional assessment full form (MNA) assessment questionnaires (Guigoz, 2006; Nestle Nutrition Institute, 2012).

The Household Food Security Status: The study participants were assessed by using the Food Consumption Score (FCS) from food consumed at the household level within the past seven days before the data collection period. The food consumption groups include starches, pulses, vegetables, fruit, meat, egg, dairy, fats, and sugar (WFP, 2014).

Nutritional Status Assessment: A portable height meter was used to measure height. Before the measurement, participants were instructed to take a deep breath, hold it, and maintain an upright posture. The measurement board touches a flat, upright sliding headgear with their heels, buttocks, shoulders, and heads. The participants' legs were placed together, making the knees and ankles touch each other. The height measurement was done twice to the nearest 0.1 cm. However, for those who could not stand, the half arm-span distance (from the midline at the sternal notch to the tip of the middle finger) was taken in centimeters and doubled (Aggarwal *et al.*, 1999). Demi-span measurement was used by quantifying the distance from the midline at the sternal notch to the web between the middle and ring fingers along the outstretched arm whenever participants were unable to stand on the stadiometer or have severely curved spines and finally height was calculated using a standard formula (females height in cm = $(1.35 \times \text{demi span in cm}) + 60.1$ and males height in cm = $(1.40 \times \text{demi span in cm}) + 57.8$) for each study participants measured with demi span (Hickson *et al.*, 2003).

A portable calibrated digital weight scale was used to measure the weight of the study participants. Participants were instructed to dress as simply as possible and maintain their stillness in the center of the scale's

platform. The weight was measured twice, and an average was used by rounding to the nearest 0.5 kg.

Mid upper arm circumference (“MUAC”): was measured to the nearest 0.1 cm at the mid-point between the tip of the acromion and the olecranon process on the back of the arm while the subject held the forearm in the horizontal position (UNICEF, 2000).

The Calf Circumference Measurements: were taken to the nearest 0.1cm with the tape between the ankle and knee in a sitting position and bent at a 90° angle. (Nestle Nutrition Institute, 2012)

Data Quality Control

The data collection tools were pre-tested on 5% of the study's sample size at Babile district to check the accuracy, and understandability, estimate the time it takes, and necessary changes considered. The study used a worldwide validated full-form MNA tool for nutritional status assessment which has 96% sensitivity, 98% specificity, and 97% positive predictive values according to the clinical status (Vellas *et al.*, 1999). A nutrition expert checked the validity of the content before data collection began. To maintain the consistency of the data, the questionnaire was first translated from English to Afaan Oromoo and translated back to English for consistency checks. Two days of training were given to both data collectors and supervisors for two consecutive days by the investigation teams on how to handle study participants and use the data collection tool. Data collectors were supervised by the supervisors and research team closely daily to ensure the questionnaire was filled correctly or not and the completeness of the collected data. Any missing data were identified and confirmed before the start of the next day's schedule for each data collector.

Data Processing and Analysis

Data were entered using EpiData 3.02 and exported to SPSS 22 for data analysis. Descriptive statistics like median, interquartile range, mean, standard deviation, and frequency were calculated and presented in the form of tables, charts, and graphs. Each food item was given a score between 0-7 based on the number of days it was consumed, and then the scores for each food group were calculated. The food consumption score was established by the sum of the weighted food group scores, which were created by multiplying the value

acquired for each food group by its weight. Then, FCS of 0 to 21, 21.5 to 35, and >35 points were regarded as, family food insecure, borderline, and food secured respectively (WFP, 2014). The BMI was calculated by dividing the weight in kg by the height in meters squared and was expressed in kg/m² and presented as MUAC cut-off points were established as a score of 0 (MUAC less than 21cm), 0.5 (MUAC 21–22cm) and 1 (MUAC greater than 22cm) and calf circumference 0 (<31 cm) and 1 (≥31cm). Each study participant's nutritional status was categorized as having malnutrition, being at risk of malnutrition, or being normal based on the total sum of their MNA scores. Nutritional status was evaluated using the whole MNA score (out of 30), with points less than 17 indicating undernutrition, 17 to 23.5 indicating an increased risk of malnutrition, and 24 and higher indicating normal nutritional status (Vellas *et al.*, 1999b). Finally, the outcome variable is dichotomized as undernutrition and normal nutritional status by considering the risk of undernutrition as normal. Bivariate and multivariate logistic regression analysis was used to identify factors associated with undernutrition. The multicollinearity effect was checked by using the variance inflation factors. All covariates with p-value < 0.25 in the bivariate analysis were taken to multivariate analysis. In multivariate analysis variables with p < 0.05 at a 95% confidence interval were factors associated with undernutrition.

Ethical Consideration

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee (IHRERC) of the College of Health and Medical Sciences, Haramaya University with the ethical number of HIR-ERC/046/2020. A written permission letter was obtained from the Haramaya district health office to each selected kebeles leader for their cooperation during the data collection period. Before beginning the data collection each study participant was given information about the study's potential risks, benefits, confidenti-

ality, voluntary participation, right to withdraw, and the time the questionnaire was given to each participant. Finally, a voluntary written informed consent was signed between data collectors and each study participant.

Results

Socio-Demographic Characteristics of Participants

A total of 449 elderly people participated in the study giving a response rate of 96.6%. The age of study participants ranged from 60-100 years with a mean (\pm SD) age of 67.9 (\pm 7.5) years. The majority of the study participants were female (65.5%), 60-75 years old (82%), married (61%), and unable to read and write (94.4%). A total of 179 (40 %) study participants were economically dependent on their families. The majority of the study participants had khat (59.2%) and crop farm (54.1%) and monthly income of < 500 Ethiopian Birr (70.4%) (Table 1).

Medical Conditions of the Study Participants

About one-fourth, 117 (26.1%) of the study participants had a chronic disease. Hypertension (20.5%), renal disease (21%), heart disease (16%), hearing problems (12%), and vision problems (11%) were among the self-reported chronic diseases, and the rest (19.5%) had a different chronic illness.

Behavior of Study Participants

More than half, 246 (54.8%) of the study participants consumed meals only once per day. The majority of the study participants reported eating food with family (65.9%), not consuming alcohol (98.2 %), not smoking (81.7%), and consuming meals only once per day (54.8%). Three hundred fifty-three (78.6%) of the study participants were Khat chewers and of these 245 (69.4%) of them were chewing daily. The majority of participants (98%) did not use alcohol. Eighty-two percent of the participants did not smoke cigarettes (Table 2).

Table 1: Socio-demographic and socio-economic characteristics of the elderly population in Haramaya district, Oromia region, Eastern Ethiopia, 2020 (n=449).

Characteristics	Category	Number	Percent
Sex	Male	155	34.5
	Female	294	65.5
Age in years	60-75	368	82
	75-85	61	13.6
	≥85)	20	4.5
Marital status	Married	274	61.0
	Widowed	165	36.7
	Divorced	10	2.2
Ethnicity	Oromo	448	99.8
	Amhara	1	0.2
Religion	Muslim	447	99.6
	Orthodox	2	0.4
Educational level	Unable to read and write	426	94.9
	Able to read and write	23	5.1
Occupation	Farmer	154	34.3
	Housewife	116	25.8
	Dependent on family	179	39.9
<i>Khat</i> farm ownership	Yes	266	59.2
	No	183	40.8
size of <i>Khat</i> farm in Qind*	0.5-4	250	94.0
	5-20	16	6.0
Crop farm ownership	Yes	243	54.1
	No	206	45.9
Land size of crop farm in Qind	0.5-1.5	162	66.7
	1.51-2	81	33.3
Average monthly family income in Ethiopian Birr (ETB)	0-500	316	70.4
	501-1000	76	16.9
	≥1001	57	12.7
Having a Family/caretaker	No	93	20.7
	Yes	356	79.3
Family size	One	53	14.9
	Two	50	14.0
	Three and above	253	71.1
Weight loss during the last 3 months (code given in MNA questionnaire)	Weight loss >3kg	65	14.5
	Does not know	153	34.1
	Weight loss between 1 to 3kg	159	35.4
	No weight loss	72	16.0

1Qind; 0.125 hectares, ETB; Ethiopian birr

Table 2: Behavioral factors of the elderly population in Haramaya district, Oromia region, Eastern Ethiopia, 2020 (n=449)

Characteristics	Category	Number	Percent (%)
Food eating habit	Alone	153	34.1
	With family	296	65.9
Daily meal frequency	Once	246	54.8
	Twice	172	38.3
	Three or more	31	6.9
	Yes	353	78.6
<i>Khat</i> chewing	No	96	21.4
	Every day	245	69.4
Frequency of chewing	Every other day	83	23.5
	Some times	25	7.1v
	Yes	8	1.8
Alcohol consumption	No	441	98.2
	Yes	82	18.3
Cigarette smoking	No	367	81.7
	Every day	67	81.7
Frequency of smoking	Every other day	14	17.1
	Some times	1	1.2

Food Consumption and Food Security

About two-thirds (65.5%) of the study participants consumed foods made from cereals and grains daily within seven days before the data collection period. Only 1.1% of the study participants consumed meat and eggs 3-6 times per week within seven days before the data collection period (Figure 2). A total of 277 (61.7%), 141(31%), and 31(7%) study participants were food insecure, borderline, and food secure, respectively.

Nutritional Status at Admission and Discharge

More than half, 252 (56.1%) of the study participants had a decreased food intake over the past three months due to appetite loss, digestive problems, or chewing or swallowing difficulties.

More than half of 246 (54.8%) of the study participants ate only one meal/per day. The majority of the study participants were moving out of their homes (97%), not taking more than three drugs daily (95%), and without pressure sores or skin ulcers (96%). The majority of the study participants were self-fed without any problem (87.5%) and drink fluid less than or equal to five cups or one and a half liters per day (80.6%). Of the study participants about one-third (34.1%) were not know whether their weight was lost or not while about 35% lost weight between 1 to 3 kg during three months. About 40%, 63%, and 60% of the study participant's BMI, MUAC, and calf circumference are < 19kg/m², >22 cm, and < 31cm respectively (Table 3).

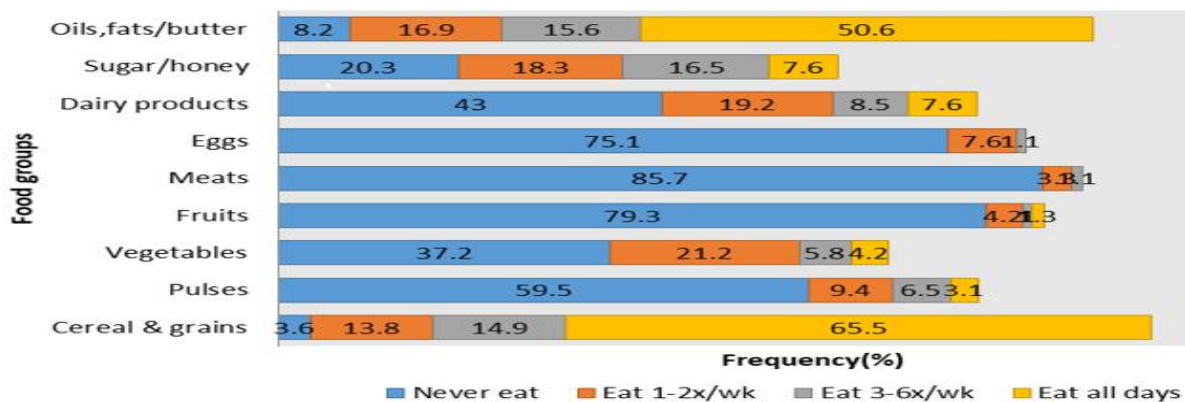


Figure 2: Food consumption frequency of study participants of Haramaya district, Oromia region, Eastern Ethiopia, 2020(n=449).

Table 3: Mini Nutritional Assessment (MNA) result of the elderly population in Haramaya district, Oromia region, Eastern Ethiopia, 2020 (n=449).

Characteristics	Category	Number	Percent (%)
Food intake in the last 3 months	Severely decrease	101	22.5
	Moderately decrease	151	33.6
	Not decrease	197	43.9
Current mobility status	Bed or chair bound	6	1.3
	Able to get out of bed/chair but does not go out	9	2.0
	Goes out	434	96.7
Amount of fluid intake l/day	<1	190	42.3
	1-1.5	172	38.3
	1.5	87	19.4
Lives independently (Does not have regular follow-up or admission at any hospital)	Yes	137	30.5
	No	312	69.5
Full meals frequency/day	One meal	246	54.8
	Two meals	172	38.3
	Three meals	31	6.9
Mode of feeding (self-fed or need assistance to eat food)	Unable to eat without assistance	9	2.0
	Self-fed with some difficulty	47	10.5
	Self-fed without any problem	393	87.5
Self-view of nutritional status	Views self as being malnourished	183	40.8
	Uncertain nutritional status	183	40.8
	Having no nutritional problem	83	18.5
Self-view of health status	Not good	158	35.2
	Does not know	79	17.6
	Good	168	37.4
	Better	44	9.8
Taking > 3 prescription drugs/per day	Yes	24	5.3
	No	425	94.7
Pressure sore	Yes	18	4.0
	No	431	96.0
Intake of fruits or vegetables/day	Yes	359	80.0
	No	90	20.0
Weight loss in the last 3 months	Weight loss >3kg	65	14.5
	Does not know	153	34.1
	Weight loss between 1 & 3kg	159	35.4
	No weight loss	72	16.0
BMI (Kg/m ²)	BMI < 19	181	40.3
	BMI ≥ 19 to <21	124	27.6
	BMI ≥ 21 to <23	79	17.6
	BMI ≥ 23	65	14.5
Mid-Upper Arm Circumference (MUAC) in cm	MUAC < 21	56	12.5
	MUAC 21 to 22	110	24.5
	MUAC > 22	283	63.0
Calf circumference (CC) in cm	CC < 31	271	60.4
	CC ≥ 31	178	39.6

Prevalence and Factors Associated With Undernutrition among the Elderly Population

The overall prevalence of undernutrition among the elderly population in Haramaya district was 51% (95% CI: 46.3%, 55.5%). About 55% of elderly women had undernutrition. The condition was higher in middle age (67%) and oldest elderly (90%) (Table 5).

In bivariable logistic regression analysis, factors such

as being female, being in the aged age group (age 75-84 years old) and being in the oldest-old age group (age ≥85 years old), being widowed, not having a *Khat* farm, not having a crop farm, not having family/supporters, being a housewife and economically depends on the family, having chronic disease comorbidity and living in food insecure household were candidate variables for multivariate analysis.

In multivariable logistic regression, age group >85, not having a family/caretaker, being a housewife, having chronic disease comorbidity, and living in a food insecure household, were factors significantly associated with elderly undernutrition at $p < 0.05$. Those study participants in the age group (≥ 85 years old) were about 6.6 times more likely to be undernourished as compared to those in the age group 60-75 years (AOR=6.6; 95% CI: 1.3, 33.6). The odds of undernutrition were 3 times higher among study participants who did not have family/caretaker than their counterparts (AOR=3.2; 95% CI: 1.5, 6.6).

Being a housewife in occupation was about 2.4 times more likely to be undernourished as compared to farmers (AOR=2.4; 95% CI: 1.2, 4.7). Elderly individuals with chronic disease comorbidities were about two times more likely to be undernourished compared to those who had no chronic disease comorbidities (AOR=2.1; 95% CI: 1.3, 3.5). Those study participants living in a food-insecure household were about 4.4 times more likely to be undernourished as compared to those living in a food-secured household (AOR=4.4; 95% CI: (1.6, 11.9 (Table 4).

Table 4. Factors associated with elderly undernutrition among the elderly population in Haramaya district, Oromia, Eastern Ethiopia, 2020 (n=449).

Variable	Category	Undernutrition		COR (95%CI)	AOR (95%CI)
		YES (%)	NO (%)		
Sex	Male	67(43.2)	88(56.8)	1	1
	Female	162(55.1)	132(44.9)	1.6(1.089,2.386)*	0.89(0.48,1.66)
Age in years	60-75	170(46.2)	198(53.8)	1	1
	75-85	41(67.2)	20(32.8)	2.39(1.35,4.23)*	1.43(0.68,3.02)
	≥ 85	18(90)	2(10)	10.48(2.40,45.83)*	6.63(1.31,33.60)**
Marital status	Married	123(44.9)	151(55.1)	1	1
	Widowed	101(61.2)	64(38.8)	1.94(1.31,2.87)*	1.56(0.81,2.99)
	Divorced	5(50)	5(50)	1.23(0.35,4.34)	0.77(0.15,3.89)
Educational level	Able to read & write	9(39.1)	14(60.9)	1	1
	Unable to read & write	220(51.6)	206(48.4)	1.66(0.70,3.92)*	0.91(0.33,2.52)
Khat farm ownership	Yes	117(44)	149(56)	1	1
	No	112(61.2)	71(38.8)	2.01(1.37,2.95)*	1.04(0.42,2.62)
Crop farm ownership	Yes	113(46.5)	130(53.5)	1	1
	No	116(56.3)	90(43.7)	1.48(1.02,2.15)*	0.51(0.23,1.14)
Food eating style	Alone	105(68.6)	48(31.4)	3.03(2.01,4.58)*	1.61(0.85,3.07)
	With family	124(41.9)	172(58.1)	1	1
Has family/caretaker in the home	Yes	152(42.7)	204(57.3)	1	1
	No	77(82.8)	16(17.2)	6.46(3.62,11.51)*	3.19(1.54,6.61)**
Occupation	Farmers	55(35.7)	99(64.3)	1	1
	Housewife	62(53.4)	54(46.6)	2.07(1.26,3.38)*	2.35(1.17,4.70)**
	Depend on family	112(62.6)	67(37.4)	3.01(1.92,4.71)*	1.31(0.63,2.74)
Average monthly family income in ETB	0-500	172(54.4)	144(45.6)	1.64(0.93,2.91)*	0.90(0.45,1.81)
	501-1000	33(43.3)	43(56.7)	1.06(0.53,2.11)*	0.86(0.40,1.85)
	≥ 1001	24(42.1)	33(57.9)	1	1
Chronic disease comorbidities	Yes	73(62.4)	44(37.6)	1.87(1.216,2.882)*	2.11(1.27,3.52)**
	No	156(47)	176(53)	1	1
Household food security status	Poor	178(64.3)	99(35.7)	7.19(2.844,18.19)*	4.37(1.60,11.93)**
	Borderline	45(31.7))	97(68.3)	1.86(0.709,4.856)	1.36(0.49,3.78)
	Acceptable	6(20)	24(80)	1	1

Discussion

The overall prevalence of undernutrition among the elderly population in Haramaya district was 51% (95% CI: 46.3%, 55.5%). Being a housewife, not having a family, being in the oldest-old age group, and being from a food insecure household were the factors associated with elderly undernutrition.

The finding of this study shows that undernutrition affected more than half of the older population. This finding is higher than the study from Northwest Ethiopia (21.9%) and Eastern Ethiopia (16.6%), (Wassie, 2014; Weldegebreal, 2022) and different areas of India including Pondicherry and South India (24.8% and 17.9%, 9.1%) (Kalaiselvi *et al.*, 2016; Krishnamoorthy

et al., 2018; Konda *et al.*, 2018). This difference might be due to differences in the nutritional status tool, sample size, socioeconomic, culture, care/support, and others.

Housewives are among the significantly highest group affected by elderly undernutrition. This finding is in line with the study findings from Puducherry, India, and Nepal, (Krishnamoorthy *et al.*, 2018; Tamang *et al.*, 2019). This may occur because most housewives are unemployed which can directly lead to food insecurity ultimately resulting in undernutrition (Etana *et al.*, 2017). Similar findings obtained in a study report from south India revealed unemployment was statistically significant in association with elderly undernutrition (Tamang *et al.*, 2019; Krishnamoorthy *et al.*, 2018).

Being in the oldest-old age group was found to be statistically significantly associated with elderly undernutrition. This finding was supported by a study conducted in Debra Markos of Ethiopia, Bogota Colombia, Sri Lanka, and China (Adhana *et al.*, 2019; Chavarro-Carvajal *et al.*, 2015; Damayanthi *et al.*, 2018; Wei *et al.*, 2018). Aging can lead to an accumulation of diseases like chronic illness, cognitive and physical decline, depressive symptoms, and emotional variations (Kimokoti and Hamer, 2008; Abate *et al.*, 2020; Jacobsen *et al.*, 2016) and socioeconomic changes (Abate *et al.*, 2020). The above factors might have a direct impact on the balance of nutritional needs and intake. In addition, the digestive systems of old age might undergo several changes that can affect their food intake and/or nutrient uptake. Digestive problems have been shown to have a significant impact on nutrition in elderly people. About 85% of them are more likely to become malnourished when they have digestive problems (Corcoran *et al.*, 2019).

Chronic disease comorbidity was found as one of the factors that increase the chance of being undernourished. This finding was supported by the studies conducted in Nigeria (Adebusoye *et al.*, 2014), rural areas of West Bengal (Ghosh *et al.*, 2017), Bogota of Colombia (Chavarro-Carvajal *et al.*, 2015), and Nepal and Taiwan (Tamang *et al.*, 2019; Poda *et al.*, 2019). This could be due to chronic conditions impairing quality of life, affecting employment, and reducing appetite, which can affect an individual's nutritional intake, leading to undernutrition (Gregory *et al.*, 2017)

In this study, those elders who did not have a family/caretaker had an increased chance of being undernourished. This finding was supported by the studies conducted in Saudi Arabia (Nykanen *et al.*, 2013). According to the systematic review family/caregivers play an important role in improving the nutrition of older people because they have a unique understanding of their environment, values, traditions, and beliefs (Roberts *et al.*, 2019).

Food-insecure elderly persons have lower nutrient intake than those that were food-secure (Lee *et al.*, 2001). In the current study, the elderly from food-insecure households were more likely to suffer from undernutrition when compared to those from food-secure households. This finding was supported by the result of the study done in Gondar (Legesse *et al.*, 2019).

Unlike hospital-based studies, this study was conducted in the community among older people with and without acute health problems. Therefore, it has a significant impact on providing information about the nutritional status of the older population, which can assist policymakers in identifying new research areas. However, this study only looked at rural elderly populations, which may not be representative of urban residents. In addition, the magnitude of undernutrition in this study only showed the results of the three months preceding the data collection period, and the micronutrient status of research participants was not evaluated due to a lack of resources.

Conclusion

The prevalence of undernutrition among the elderly population was high and it is a major public health problem in the study area. Being a housewife, having chronic disease comorbidity, being household food insecure, lacking a caretaker, and being in advanced age (≥ 85 years) were factors associated with undernutrition among the elderly. Therefore, government bodies and non-governmental organizations should work on the elderly undernutrition by giving attention to the elderly with comorbidities, those living in food-insecure households, and those without family or caregivers. A longitudinal study design with consideration of micronutrient investigation might be needed to assess nutritional status and its risk factors among the elderly population.

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Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

OG KT and TW took part in the proposal writing, data collection, analysis, and manuscript review. SG and MT participated in the analysis, interpretation, and critical review of the manuscript. The final manuscript was reviewed and approved by all authors

List of abbreviations

AOR; Adjusted Odds Ratio, CI: Confidence Interval, COR; Crude Odds Ratio, EDHS; Ethiopian Demographic and Health Survey.

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