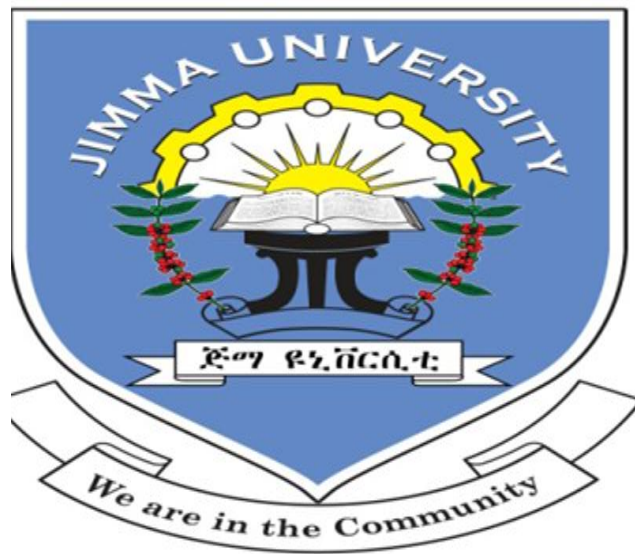NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG ELDERLY PEOPLE IN ANLEMO DISTRICT, SOUTHERN ETHIOPIA, 2016.

By:-Admasu Jemal (Bsc)

A THESIS SUBMITTED TO JIMMA UNIVERSITY, COLLEGE OF HEALTH SCIENCE, DEPARETMENT OF EPIDEMIOLOGY; IN PARTIAL FULFILLMENT FOR DEGREE OF MASTERS OF PUBLIC HEALTH IN EPIDEMOLOGY.

NUTRITIONAL STATUS AND ASSOCIATED FACTORS AMONG ELDERLY PEOPLE   IN ANLEMO DISTRICT, SOUTHERN ETHIOPIA.

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Abstract:-

Background: - Worldwide, the proportion of elderly people is constantly increasing. This rapidly growing elderly population could increase burden of malnutrition and non communicable diseases. This malnutrition is more common in the elderly population and results in many negative consequences on individual and community as well as social, political, and economical condition of population. Currently in Ethiopia elderly population is growing rapidly which could increase double burden, but their nutritional status and needs were rarely assessed and not have known precise estimate of elderly nutritional status for its intervention.

Objective: This study was aimed to assess nutritional status and associated risk factors among elderly populations in Anlemo district, southern Ethiopia.

Methods: A community based cross-sectional study was conducted. A total of 460 subjects was included. Multi- stage sampling technique was used to select study participants. Nutritional status was evaluated by Mini Nutritional Assessment (MNA)tool. Body mass index, mid-arm circumference, calf circumference was used to estimate anthropometric indices. Result was expressed in terms of mean and standard deviations for continuous variables, and frequencies and percentages for categorical variables. The associations between malnutrition and exposure variables, was tested using bivariate logistic regression analysis. Those candidate variables at bivariate logistic regression analysis was taken to the multivariate logistic analysis to test their independent contribution. The magnitude of the associations was quantified using the odds ratio (AOR) with 95% confidence intervals (CI), as ''p'' values of < 0.05 was considered statistically significant.

Results: A total of 460 elderly comprised of 207(45.0%) females and 253(55%) males study subjects was included with 451(98%) response rate. The magnitude of malnutrition and at risk of malnutrition was 120 (26.6%) and 178 (39.5%) respectively. Multivariate logistic analysis result was found that elderly who were unable to read and write (AOR= 2.2(1.2- 4.2), being widowed (AOR=3.4(2.0 -5.6), single/divorced/separated (AOR=5.3(2.3-12.4), chronic disease (AOR=2.2(1.4-3.5), household food insecurity status (AOR=2.9(1.2-7.0) were independently associated with nutritional status of elderly people.

Conclusion and Recommendation:-This study result indicated high magnitude of malnutrition and risk of malnutrition among elderly people in Anlemo district, south Ethiopia. Thus, malnutrition was an important public health burden among the elderly in the area and therefore deserves great attention. So, the need to involve elderly in the proper nutritional care , the need of formulation and implementation of a national policy on the elderly , particularly nutritional sector were highly recommended.   .

Keywords: Malnutrition, MNA, Elderly, Food Insecurity.

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List of abbreviations:-

1. BMI - Body Mass Index
2. BSC-Bachelor of Science
3. CSA - Central Statistical Agency
4. DM - Diabetic mellitus
5. E.C – Ethiopian calendar
6. ETB-Ethiopian birr
7. HFIAS-House hold food insecurity assessment scale
8. HH – House hold
9. Hp - Health post
10. HTN - Hypertension
11. MN - Malnutrition
12. MNA - Mini Nutritional Assessment
13. MNA.SF - Mini Nutritional Assessment Short Form
14. MOLSA - Ministry of Labour and Social Affairs
15. MPHE - Master of Public Health In Epidemiology
16. MUAC - Mid Upper Arm Circumference
17. NGO - Nongovernmental Organization
18. OR - Odds ratio
19. PAS-proportional allocation to size
20. SNNPR - Southern Nations and Nationalities Peoples Region
21. SSA - Sub-Saharan Africa
22. UN - United Nation
23. USD-United state dollars
24. WHO - World Health Organization

CHAPTER ONE:-INTRODUCTION

1.1 Background

The term 'elderly' or older age has different meaning in different countries; it is mainly explained to chronological age, functional age as well as retirement age(1).

Worldwide, the proportion of elderly people is constantly increasing. According to the United Nations, 2011; the global number of the elderly is projected to rise from an estimated 524 million in 2010 to nearly 1500 million in 2050, with most of this increase in developing countries (2). It projected to exceed the number of children for the first time in 2047 (3).

Nutritional status is an important factor contributing to health and functional ability of elder population and , malnutrition is more common in old age population but it is under estimated in diagnostic and therapeutic procedures (4).

Similarly in Ethiopia the definition of old age or elder has gained acceptance in Ethiopian context , used by the Ministers and relevant governmental offices (5). The rapidly growing elderly population could increase burden of malnutrition and other non communicable diseases in the future (6). According to Ethiopia mini demographic and health survey, 2014; 6.4% of total Ethiopian population were age 60 years and above. Of these, male and female account 6.9%, 5.7% respectively and urban and rural dweller estimated 5.9% and 6.3% respectively (7).

1.2. Statement of problem

Old age is not a disease in itself, it is an irreversible biological process which starts from conception and ends after death (9). But it becomes a problem when the obvious physical, mental changes brought by the advancing age and make them unable to do their own basic things. Thus make them more vulnerable for nutritional insults as compared to adults (10).

Globally the exact prevalence of malnutrition is unknown and this is partly because of the lack of a gold standard for the definition of elder malnutrition. However an international pooled dataset from different settings reported a 23% overall prevalence of malnutrition and 46% were at risk of malnutrition (11). But there is relatively little data on the prevalence of under nutrition among the elderly in the developing world (12).

In addition, the nutrition requirement varies with respect to age, gender and during physiological changes such as pregnancy, infant, lactating mothers and older age, nutritional status of elderly is an important determinant of their health and quality of life (10). Poor nutritional status was commonly observed among elderly people living at home in both rural and urban areas (13). Thus malnutrition

is more common in the elderly population not because that malnutrition is an inevitable side effect of ageing, but because many changes associated with the process of ageing can promote malnutrition (14). This nutritional status of older people results from a complex interplay between dietary, socio-economic, physical and psychological factors (29).

Additionally elderly population is at risk of malnutrition due to physical, cognitive as well as functional decline and change in dietary behaviour of older individuals because of health or social reasons, decrease in taste and smell, or a reduced ability to purchase and prepare food (15). Moreover, peoples socio-demographic characteristics, including gender (being female) , lower education ,food insecurity, declining family support systems, poor health services (16), and also combination of symptoms or conditions include : reduced food intake due to loss of appetite, episodes of fasting, poor dentition, swallowing difficulties, inability to eat independently ,chronic diseases that put older individuals at a higher risk of malnutrition (17). Also excessive alcohol consumption and smoking were possible risk factors of malnutrition(15).

In fact malnutrition is not only the relevant conditions that negatively affect the health of older people, it also   limit elder people the ability to move, perform daily activities, and worsen co-morbidities. Thus, nutritional status is a key factor in maintaining health and autonomy of old age people, especially when resources and health care are scarce (29).

Moreover malnutrition can have great impact on individual and community as well as social, political, and economical condition of population (18). In old age it result in many negative consequences such as increased morbidity, poor quality of life, increased health care costs, increased mortality(19). It is important to identify older people with poor nutritional status (20).

In general there is no doubt that ,malnutrition is associated with serious functional and health problems which affect the well-being and quality of life of the individual and also increase costs and burden our health-care system (21).

Similarly in Ethiopia, the elderly population is growing rapidly which could increase burden of malnutrition and other non communicable diseases (6), Older people are a not priority group in humanitarian support. Their needs are rarely assessed, and they are seldom targeted by governments and non-governmental organisations for specific projects. This is also particularly obvious in the nutrition sector, where interventions prioritise children and women of childbearing age, and the nutritional status of older people is almost never assessed, not much focus and explanation has been given for its precise estimate, despite their vulnerability (44).

Few Studies result around Zeway town ,2004 evidence; high prevalence of under nutrition (30.5%) ; with no difference   between older women and men (22). And also in Gondor town

,2014 show (21.9%) prevalence of under nutrition; it was higher in females (18.6%) than males (3.3%) (10).

Despite of this high prevalence of elderly malnutrition and of many possible factors that put older individuals at a higher risk of malnutrition (10), nutrition related issues are often neglected and they are not targeted for nutritional intervention. Most of nutritional studies and intervention programs were directed toward infants, young children, adolescents, and pregnant and lactating mothers. As result it was difficulties to estimate elder nutritional status of study area in current situation. Therefore, this study was conducted because to the best of our knowledge, there was very limitedly conducted study and have unknown elderly nutritional status and its determinants factors in the study areas.

1.3. Significance of the study:-

The result of this study was to reveal the magnitude and associated factors of elderly nutritional status using MNA. More over help as a baseline data for government officials and stake holders for planning and designing intervention of old age nutrition. It was also help as a baseline data for other researchers to conduct more studies in the area to solve elder community nutritional problems.

CHAPTER TWO: - LITERATURE REVIEW

2.1. Overview:-

Worldwide, the proportion of elderly people is constantly increasing. According to the United Nations, 2014; in 2025 it is estimated that the population aged 60 years or older will be 1.2 billion and 2 billion in 2050 representing about 22% of the world population (23).

Malnutrition in old age is common, multi factorial and has serious consequence due to physical, cognitive as well as functional decline(24). The elderly population is a nutritionally vulnerable group and the prevalence of malnutrition varies considerably depending on the population studied and the criteria used for the diagnosis (25).

2.1.1. Prevalence of malnutrition: -

Many studies have concluded that malnutrition is more common in the elderly population not because that malnutrition is an inevitable side effect of ageing, but because of many changes associated with the process of ageing, can promote malnutrition (14). The prevalence of malnutrition strongly dependent on the population studied and the criteria used for the diagnosis and, were high in older adults (26).

MNA showed 29.4% elderly had malnutrition and 60.4% were at risk of malnutrition. Females (59.4%) were significantly more malnourished than males (40.6%). this results showed more elderly to be at risk of malnutrition than actually malnourished(47)

Across sectional studies in india ,2014 according to MNA there were 20.83 % malnourished and 43.7 % were at risk of malnutrition and this was positively associated with age (p = 0.004) and female gender (p = 0.0001)(24). The MNA results revealed that 5.53% of subjects were malnourished and 42.10% were at risk of malnutrition. Malnutrition was more prominent in males (3.16%) as compared to the females (2.37%) of same age group. The prevalence of malnutrition was significantly higher in upper age group of geriatric (80 years and above) population. Age factor was negatively associated with the nutritional status (48).

A cross-sectional study result in Pakistan, 2013 revealed that 5.53% of subjects were malnourished and 42.10% were at risk of malnutrition, more prominent in males (3.16%) as compared to the females (2.37%) of same age group. The prevalence was significantly higher in upper age group of population (27). And other cross sectional study result in India ,2015 indicate 15% were found to be malnourished, 55% were at risk of malnutrition and 30% were well nourished. Also a significant association was found between the nutritional status and the older age groups (28). Separately

malnutrition and risk of malnutrition were present in 8.0% (95%CI 4.9%-11.1%) and 29.1% (95%CI 24.0%-34.2%) respectively of the participants, and more frequent in women (9.1% and 35.3% respectively) (29).

Studies in rural Egypt, 2013 nearly 38% out of 350 randomly chosen rural community elderly population had malnutrition or at risk of malnutrition. Of this 8.6% were malnourished, 29.7% were at risk of malnutrition and 61.7% were well nourished. Also it was found as age increases, the risk of malnutrition increases and females were more likely to be affected by malnutrition, as 9.8% of females were malnourished vs. 6.6% males(16). Another cross sectional studies result in Ghana,2015 shows 18.0% of the participants were underweight, 60.5% had normal weight and 21.5% were overweight (18). In both result, elderly females were more likely to be affected by malnutrition than males (9.8% vs. 6.6%) (16) and 17.0% vs. 25% respectively (18).

Similarly cross-sectional study result in Ethiopia around zeway town,2004 ; reveal that   the prevalence of under nutrition was high (30.5%) ,with no difference   between women and older men (22). And in Gonder town, 2014 , prevalence of under nutrition was 21.9%, higher in females (18.6%) than males (3.3%) and more frequent in old age group (10).

2.1.2. Socio-demographic factors:-

Peoples socio-demographic characteristics, have been found to be highly correlated to elderly health and nutrition status (24).Factors such as female gender, older age, being widowed, a low educational level, appeared to be independently associated with poor nutritional status (13).

A cross-sectional study result in India, 2015 reveal older age, low literacy level, gender, marital status were found to be the factors affecting under nutrition of elderly people and, prevalence of malnutrition and at risk of malnutrition was more common in female than male (15.13% vs. 9.52%) and (48.64% vs. 44.44%) (30).Other cross sectional studies result in 2014, India, indicate malnutrition and at risk of malnutrition according to literacy status were Illiterate (26.03% vs. 53.25%), literate (8.47% vs59.32%), primary(0%vs 64.28%), middle(6.15%vs.55.38%),secondary(3.89% vs. 38.96%) , college (2.06% vs. 20.61%)and professional was (0% vs.20.0%)respectively; which was significantly difference(χ^2=41.92 P=0.001).Thus malnutrition more in illiterate than educated. (4).

Other cross-sectional study result in Iran,2011; the prevalence of malnutrition were more in female than male (65.4% vs. 34.6%; $p<0.05$), in the ones having more than 4 children than less than 4 (51.9% vs. 48.1%; $p<0.05$), in non educated than educated (82.4% vs. 17.3%; $p<0.001$), in lonely

living ones than living with family (75% *p*<0.05), in married ones than un married (94.2% vs. 5.8%;p<0.05) .Thus malnutrition were independently associated with female gender, low level education, high number of child(r=1.178, 1.808, -1.481) respectively) (31). Also the cross-sectional study result in india,2015 shows ; significant association between the nutritional status , the older age groups, female gender, functionally dependency (28) and was found to be more in elderly females, illiterates and those who were not working and it went on increasing with advancing age (24).

Also a community based cross-sectional study conducted in Portuguese,2015 show; being widowed were the major factors independently associated with their under nutrition (32) ,and in Pakistan 2013, age factor and gender were negatively associated with the nutritional status and correlated significantly (0.05-.001) with MNA screening score (27).

Similarly in Ethiopia, across sectional study result in Gonder, 2014; shows that unable to read and write [AOR 2.7 95% CI (1.7-5.2)], being female [AOR 3.0 95% CI (1.6-5.4)], being older [AOR 38.1 95% CI (15.0-96.9)] and being poor [AOR 1.8 95% CI (1.0-3.2) are independently and negatively associated with nutritional status of elderly people, where females were three times more likely to be undernourished as compared to males (10).

2.1.3. Economic factors:

Economic status was also recognized factors to influence the nutritional vulnerability of the elderly (33). Factors such as low income and food insecurity have been highly associated with under nutrition in older adults (34). And lower income of family (*p* < 0.001) were independently associated with lower MNA scores (30).

A cross-sectional study result in Lebanese, 2013 indicate poor income was significantly higher among women than in men, that women were highly disadvantage regarding their socio economic status and health . Indeed, women were significantly more often had a lower income than men, were two times more likely to suffer from worse financial status. More than 40% of the study sample did not have any health insurance(*29).* Also other cross-sectional study result in india,2014 revealed the prevalence of malnutrition and at risk of malnutrition was more common in those dependent on others than self dependent (17.56% v/s 6.94%) and (68.85% v/s 40.0%) respectively, and was significantly difference to their occupation; Malnutrition (P=0.001)and at risk of malnutrition (P=0.001) *(4).*Other result in Lebanese shows about two thirds participants were partially or totally dependent on their children, Regarding the current work-status, nearly 30% of men were still working(*29).* Prevalence of malnutrition and risk of malnutrition was more common in those

dependent on others than self dependent (17.56% v/s 6.94%) and (68.85% v/s 40.0%)(p=0.0001)respectively *(4)*.

Similarly in Ethiopia a cross-sectional study result in Gondor town, 2014, indicate the risk to be undernourished in low income elderly was 1.8 higher than in rich elderly [AOR 1.8 95% CI (1.0-3.2)] ,middle income elderly were 2.5 times more likely to be undernourished as compared to rich [AOR 2.5 95% CI (1.4-4.7)] and females were three times more likely to be undernourished as compared to males. Thus wealth index score of respondents found to be associated with under nutrition in elderly people (10)

A community based cross-sectional study result in Addis Ababa indicate ,the mean repoted monthly household income was 1477.8 Ethiopian birr (82.8 USD). The mean monthly per capita income for this sample was 342 birr (19.2 USD), which is equivalent to 0.64 US dollar per day. Among the total 550 household s , 412 (74.9 %) reported scores that classified them a s food insecure. According to the scale , 128 (23 .3%) of households were classified as severely food insecure, while 113 (20.5 %) and 171(31 .1%) households were mild and moderately food insecure respectively. Thus a total of 129 (23.5 %) household s had a score of 0, indicating they never experienced any form of food insecurity, 53 (9.6%) respondents reported that they have ever experienced sleeping hungry , and 18 (3.3%) participants reported that they did not eat for an entire day at the time of survey. Two hundred eighty six (52%) households have reduced the variety of food that they consumed, 197 (35.8 %) have reduced the amount of food that they consume, and 140 (25.5%) have reduced their meal frequency (49)

Community based cross sectional studies result in north west Ethiopia ,fara district shows a high proportion (67.6 %) of the heads of the households had worries about the availability of enough food for their family. Similar proportions of the household heads (68.3 %) reported the absences of preferred food to eat and 66.7% of respondents reported that they consumed a limited variety of food . The overall prevalence of food insecurity was 70.7% (Table 2). Nearly three quarters of the households (70.7%) had food insecurity. Households headed by females (AOR = 3.18, 95% CI:1.08, 15.21), lack of education (AOR = 2.59, 95% CI: 1.46, 4.60), family size of 4-7 (AOR = 2.39, 95% CI: 1.21,4.70), family size of >7 (AOR = 13.23,95% CI:6.18, 28.32), few or absence of livestock (AOR = 5.60, 95% CI:1.28, 24.43), absence of income from off-farm activities (AOR = 3.12, 95% CI:1.53, 6.36), lack of irrigation (AOR = 3.54, 95% CI:2.14, 5.18) and lack of perennial income (AOR = 3.15, 95% CI:1.88, 5.27) were factors associated with food insecurity(50) .

Other study in India found that a total of 77.2% households were food-insecure, with 49.2% households being mildly food-insecure, 18.8% of the households being moderately food-insecure, and 9.2% of the households being severely food-insecure. Higher education of the women handling food (AOR 0.37, 95% CI 0.15-0.92; p≤0.03) and number of earning members in the household (AOR 0.68, 95% CI 0.48-0.98; p≤0.04) were associated with lesser chance/odds of being food-insecure (51).

Study result from Malaysia 28.4% as mildly food insecure, 27.5% as moderately food insecure and 8.8% as severely food insecure based on the Household Food Insecurity Access Scale (HFIAS) rest (35.3%) of the households were in food secure level. In the light of the findings from the study, low socio-economic status ;Households with more children, low fathers education level, larger household size, working mother and household income were significantly (p<0.05) associated with household food insecurity (52).

2.1.4. Life style related factors:-

Elderly life style pattern had associated with nutritional status, like smoking, excessive alcohol consumption, and excessive use of medication play a role in elder malnutrition (35) and were found to be low BMI (18). Studies result in Iran 2011; shows smoking and alcohol consumption were seen among men, at 15 % and 6 %, respectively, the prevalence of malnutrition was higher in the ones smoking than no smoking were (80.8% vs. 19.2 %) (31). Also a cross-sectional study result in Cuba, 2010 the probability of underweight increased progressively in older age and was higher in the group of smokers in relation to the group that never smoked (AOR = 1.63, 70-79 years; AOR = 2.05, ≥80 years) and among smokers (AOR = 1.83). The lower likelihood of overweight was observed among men, smokers (36).

Other cross- sectional studies result in india,2014 indicate prevalence of malnutrition and at risk of malnutrition in smokers, ex-smokers, tobacco- chewers and non-addicts were found as 20.25%, 13.38%,0% and 8.30% and 48.10%,47.88%,50.0% and 44.40% respectively. Thus smokers were more at risk of malnutrition compared to non-smokers (p=0.01) (4).

2.1.5. Disease related factors:-

Malnutrition is almost always disease-related in the elderly, causes are more diverse. Besides the above-mentioned age-related physiological decrease in appetite, many common characteristics of old people – including chewing and swallowing problems, adversely affect their dietary intake and have repeatedly been shown to be related to malnutrition (37). Thus malnutrition and at risk of malnutrition were found to be associated with multi-morbidity, psychiatric problems, visual

impairment, anaemia and neurological diseases (24). It was higher among elderly persons who had chronic diseases (such as heart disease, stroke, cancer, chronic respiratory diseases and diabetes) and acute disease (include colds, influenza) vs those who had not (13.2% vs. 5.3% and 16.9% vs. 0% respectively) (p < 0.001). And 54.7% participant reporting more than three chronic diseases, mostly hypertension, followed by diabetes, dyslipidemia and cardio vascular disease more in women (p < 0.001)(16). Thus chronic diseases and presence of acute illness were significantly associated with malnutrition occurrence among older populations (29). But there were negative association between underweight and hypertension and diabetes but hypertension (AOR = 1.99) was positively associated with overweight(36).

Other cross-sectional studies result in Ghana,2015 show the majority of the participants(79.8%) had never been screened / diagnosed with any disease and among those with diagnosed conditions, cardiovascular disease, specifically hypertension was the most prevalent(9 %) followed by 6 % arthritis,(2.7%) digestive system diseases and (2.3%)diabetes mellitus(18). And most of the participants (94.2%) reported having symptoms of disease in the previous week, 53.2% of whom had more than one symptom, more prevalent among females (18). Also a cross-sectional study result in Ethiopia shows,37.6% were sick in the last three months from those who were sick, 67% of elderly were taking medication at the time of data collection because of joint pain 29% , hypertension 25.3% and diabetic mellitus 13.7% (10).

In general, older people are more vulnerable to malnutrition for many reasons including socio-demographic, lack of financial support, physiological and functional changes that occur with age, inadequate access to food and the functional status of the elderly, that affect their day to day activities including preparation of food and intake (28), there by affecting their nutritional status and has serious health consequences (24).

Conceptual framework of elder malnutrition:
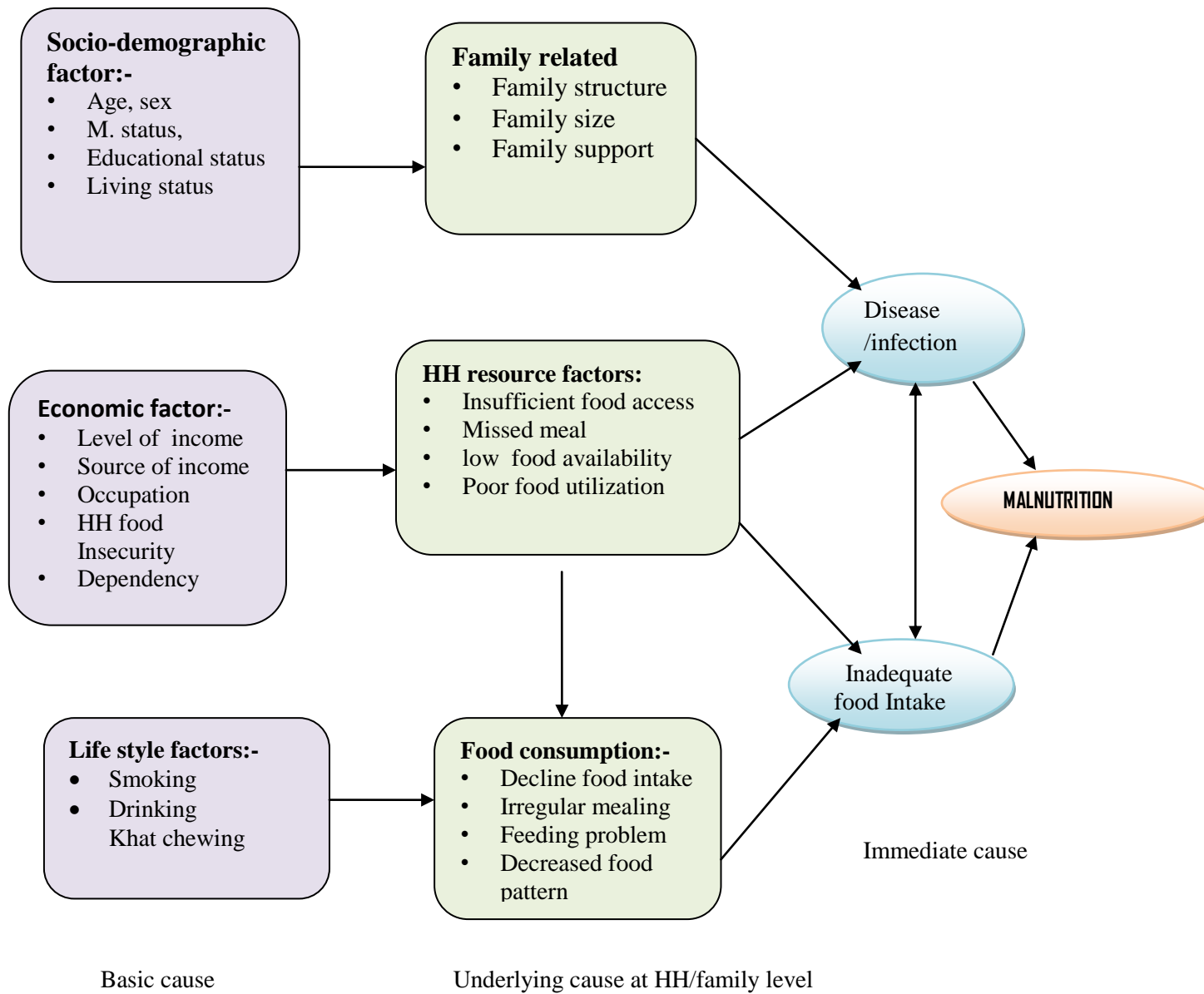
Figure 1: Conceptual framework of elderly nutritional status and its determinants developed by reviewing of different literatures.

CHAPTER THREE: - OBJECTIVE

3.1. General objective:- the general objective of this study was to assess nutritional status and associated factors among elderly population in   Anlemo district of Southern Ethiopia, 2016.

3.2. Specific objective:-

- To assess prevalence of malnutrition among elderly people in Anlemo district of Southern Ethiopia.
- To assess factor associated with elderly malnutrition in Anlemo district of Southern Ethiopia.

CHAPTER FOUR:-METHODS AND MATERIALS

4.1. Study area and Period:

The study area Anlemo district was one of among 11 district of Hadiya zone, Southern Ethiopia. The district were located 224 km far from Addis ababa in the southwest and 232km from Hawassa . It has 28 kebeles which bordered by Sileta zone in the north , Shashogo district in east, Lemo district in the south & west direction. It has climatic condition of 9.8% highland and 90.1 % mid land. According to 2008 E.c population estimation the district has the total population of 85237 ,of which 42448 (49.8%)were males and 42789 (50.2%) females residing in 17395 HH. Regards to district labor and social service office report, the district has a total of 1374 elder people whose age 60 years and above. Of this 590 (42.9%) male and 787(57.1%) female elder reside in the district . Having this numbers of total elders, there was government office called labor and social service which coordinate and facilitate their overall social and economic issue of elder population (8).This study was undertaken from February 22 – 29/2016.

4.2. Study design*: -* Community based cross sectional study was utilized.

4.3. Population.
4.3.1. Source Population: - All elder population of age 60 and above years residing in Anlemo district.

4.3.2. Study Population:- Sampled eligible elder people age 60 and above residing in the Anlemo district.

4.4. Eligibility criteria

4.4.1. Inclusion criteria:-
- Age $\geq$60 years, Who had lived in the village for the past 6 month and more.
- Able to communicate during the interview.

4.4.2. Exclusion criteria:-
- Those who could not stand unsupported and critically ill .
- Those with visible body oedema.

4.5. Sample Size Determination and Sampling Procedure:
4.5.1. Sample Size:-The sample size was determined using sample size determination for estimation of a single population proportion and taking 'P' as a suggestion of (38) as follows:-

$$n = \frac{(Z\,a/2)^2 P\,(1\text{-}P)}{d^2} = \frac{(1.96)^2\,0.3(1\text{-}0.3)}{(0.05)^2} = 323$$

Assumption:-

P =estimate of 0.3(30%) the proportion of elder population have under nutrition (10)

d = Margin of sampling error tolerated 5% (0.05)

α = Critical value at 95% confidence interval of certainty (1.96)

- Accounting $d_{eff=2}$, it give maximum sample of (n=646)

Since the source population was 1374 elder that was below 10,000, finite population corrections was needed;

$$Nf = \left(\frac{n}{1+\frac{n}{N}}\right)= \left(\frac{646}{1+\frac{646}{1374}}\right)= 439$$

Where N_f= The sample size from a finite population

N=number of elder population

n = Sample size estimation of single population proportion

Finally by adding non response rate of 5%, the total sample size become 460 elder.

4.5.2. Sampling Technique:-

Among 28 kebele of the district, 8 kebele was selected using simple random sampling. The final calculated sample was allocated to each selected kebele based on Proportional to size of elder as shown in the following sample frame (Fig.2)

Schematic presentation of the sampling procedure:

```
                    ┌─────────────────────────┐
                    │     Anlemo district     │
                    │       (28 kebele)       │
                    └─────────────────────────┘
                                │
              ╔═══════════════════════════════════════╗
              ║      SIMPLE RANDOM SAMPLING            ║
              ╚═══════════════════════════════════════╝
```

K 1 Tigo	K 2 mento	K 3 M/anl emo	K 4 L/lenka	K 5 B/kombo ta	K 6 L/kebecho	K 7 M/homa	K 8 D/fonko
Total Elder =85	Total Elder =81	Total Elder =87	Total Elder =63	Total Elder =66	Total Elder =60	Total Elder =55	Total Elder = 88

PAS in each kebele.

67   64   68   50   52   47   43   69

Random walk

=460 sample
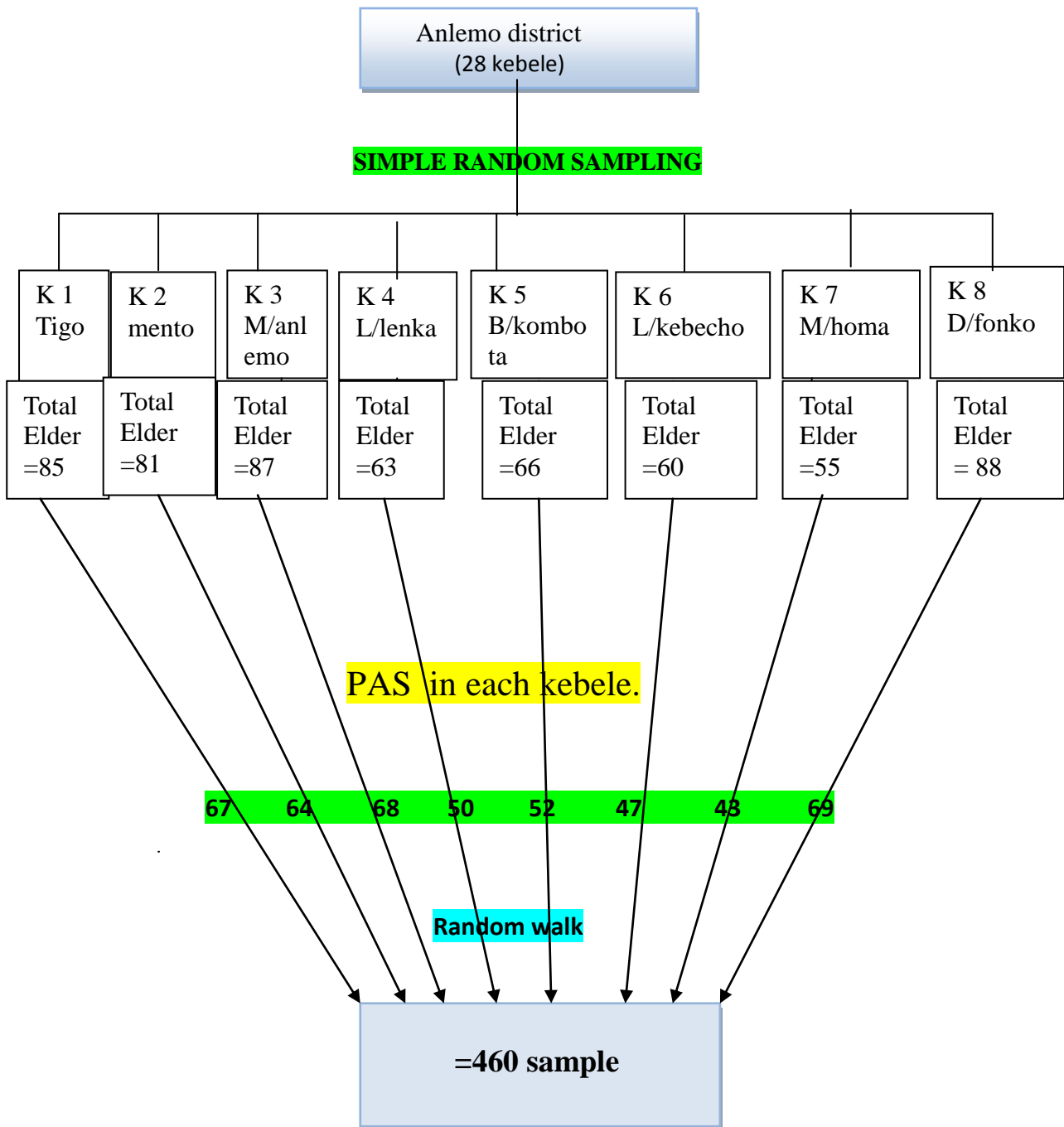
Figure 2: Schematic presentation of sampling frame in Anlemo district, May 2016.

4.5.3. Sampling procedure: -

Individual from selected kebele was interviewed by visiting households through random walk methods. Data collectors were go to the center of each kebeles of the 8 selected kebeles and spin a pencil/pen and followed the spin direction to collect data from every other household. In each house visited, it was enquired if there were any individuals age ≥60 years and lived for more than six month. When eligible participants were found, they was informed either (alone or in the presence of other members of the household) about the purpose of the study and related issues indicated in the consent form. If there is more than one elder individual aged ≥60 years in same household, only one elder were selected randomly. If the person in the specified age group is not available, the next nearest household (HH) was surveyed. Finally the respondent interviewed and measured until the required number of the sampled elderly was achieved in each selected kebele.

4.6. Data collection Instrument, Tools and Personals:

4.6.1. Data collection and collectors: -

Four diploma nurse data collectors, one B.s.c. Nurse supervisors, eight guider from each selected kebele and one motor cycle driver was recruited. Data was collected for four days. At each household, firstly respondent verbal consent was taken, interview following measurement were done as shown in Annex II.

4.6.2. Data collection Instrument and tools:-

Data was collected through respondent face to face interviewing and observation /measurement using the following tools and procedure.

I. Mini-Nutritional status assessment tool (MNA):- The Mini-Nutritional Assessment tool (MNA) was the most widespread used nutritional screening and assessment tool to identify older adults who are malnourished or at risk of malnutrition. It is a validated first-level nutritional screening instrument highly used in elderly people in a variety of settings (40). MNA exhibits good sensitivity and specificity compared to other nutritional assessment parameters including biochemical values, anthropometric values and dietary intake (46). Thus full MNA was an excellent tool for the research setting.

MNA is also a reliable and valid nutritional assessment method for identifying malnutrition and at risk of malnutrition among community dwelling elderly in Ethiopia. It is recommended and fit for Ethiopian elderly populations with its established cut-off points (45). It has good accuracy (84 %) to identify malnutrition and risk of malnutrition among community dwelling elderly in Ethiopia. Full MNA is composed of 18 questions which are divided in to four main categories; dietary assessment,

subjective assessment, global assessment and anthropometric data. MNA gives a maximum of 30 points and it classifies the elderly in: malnourished (MNA < 17 points), at risk of malnutrition (MNA: 17–23.5) and well nourished/ Normal nutritional status (MNA; 24 - 30 points) (42). It is a rapid, easy and reliable tool capable to identify malnourished individuals and those who are at risk of malnutrition. It showed high sensitivity and high specificity (41). The sensitivity and specificity of the MNA tool using established cut off point were found 80.1 and 72.5 % respectively in our country (45). An advantage of the tool is that no laboratory data are needed. It was developed to be user friendly, quick, non-invasive, and inexpensive and takes about 5 minutes to complete the questions easily.

II. Anthropometric measurements: -

Height was measured using locally produced portable stadiometer. Participant were informed to be barefoot, legs straight, shoulders relaxed and to look straight ahead at the horizontal plane. Participant was asked to inhale deeply, hold the breath and maintain an erect position just before taking the measurement. Each of them stands upright with their heels, buttocks, shoulders and the back of their head against the stadiometer. With each participant looking straight ahead along the Frankfort plane, the headpiece will lowered to touch the crown of their head gently but firmly. Reading of height measurement were taken to the nearest 0.1 cm. But for those people of standing height were not possible with kyphosis and unable to measure their height, demi span were used instead (42). Demispan measurement were used by quantifying the distance from the midline at the sterna notch to the web between the middle and ring fingers along outstretched arm whenever participants were unable to stand on the stadiometer.

Height were then calculated using a standard formula:-

- Females height in cm = (1.35 × demispan in cm) + 60.1 and
- Males height in cm = (1.40 ×demispan in cm) + 57.8)

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 holding the forearm in horizontal position. The measurement were performed on the subject's arm hanging freely along the trunk using inextensible MUAC tape.

The widest calf circumference were measured between the ankle and knee to the nearest 0.1 cm using non stretchable tape in a sitting position with the leg bent 90° at the knee and manipulated to maintain close contact with the skin without compression of underlying tissues.

The weight was also measured using locally available portable Seca digital floor weighing scale. Participants were informed to wear minimum clothing and standing upright and unsupported in the middle of the scale's platform. Reading of weight was taken to the nearest 0.1g. Portable Scales were calibrated regularly to ensure accurate measurements using known weights at the beginning of a stand. Weights was not measured in individuals with visible body oedema. Individual were weighed and measured in a setting that provides privacy and confidentiality.

All anthropometric measurements was taken twice and the average was recorded. If the measurements varied by more than 100 g for weight, 0.5 cm for height a third measurement was taken . The average of the nearest two measures was recorded. BMI was calculated using the standard formula: weight in kg/(height in m)^2. All measurement was taken through standardized measurement procedure guide line as indicated in Annex II.

House hold food security status was measured by using the Household Food Insecurity Access Scale (HFIAS) tool. All socio-demographic, economic, life style and functionality data was collected from study subjects through face to face interview through pre-tested structured questionnaire after verbal informed consent.

4.7. Data quality management (data quality control):-

Two days training was given on data collection tools and on measurement procedure. The questionnaire was developed in English and translated to Hadiyigna then back to English to check for its consistency. Prior to the actual data collection questionnaire was pre tested on similar population of adjacent kebele. During the actual data collection supervisors & the principal investigator was review and check collected data for completeness & consistency information, also subsequent supervision was performed. Data were collected for 4 consecutive days.

4.8. Study variables:-
- Dependent variable: - Elderly malnutrition as per MNA score
- Independent variable: - Socio-demographic variable, Economic variable, Lifestyle related variables and disease related variables.

4.9. Data analysis: - Data were cleaned and entered into Epidata 3.1. and transported to SPSS version 16.0 for analysis. Mean and standard deviations were used to describe continuous variables while frequencies and percentages for categorical variables. The associations between malnutrition and exposure variables, were tested using bivariate logistic regression analysis. Those candidate variables at bivariate logistic regression analysis were taken to the multivariate logistic analysis to

saw their independent contribution. Hosmer and Lemeshow Goodness-of-Fit test were used to test fitness of model. The magnitude of the associations was quantified using the Odds Ratio (AOR) with 95% Confidence Intervals (CI).

4.10. Dissemination plan:-

The Finding of the studies will be summated to Jimma University (JU) College of Health science. Subsequent, attempts will be made to present it on concerned meetings; on scientific conferences and publish it on scientific journal. Also reports will submitted to Hadiya zone health Department, respective district health office and to concerned government, donor and sponsoring organization.

4.11. Operational definitions:-

- Elder or older persons – people whose age is 60 years and above in term of chronological age.
- Malnutrition- those elder whose MNA assessment score less than 17 points.
- At risk of malnutrition -those elder whose MNA assessment score in between 17-23.5 points
- Normal nutritional status -those elder whose MNA assessment score in between 24-30 points
- Household- those of that sleep under the same roof and take meals together at least for the past six month.
- Cigarette smoking - active smoking of one or more manufactured or hand rolled tobacco cigarettes, from purchased or home grown tobacco irrespective of dosage.
- Active smoking - the intentional inhalation of tobacco smoke.
- A smoker is a person who, currently smokes any tobacco product either daily or occasionally.(i.e. either daily or occasional smokers)
- A daily smoker is a person, who smokes any tobacco product at least once a day (except that people who smoke every day, but not on days of religious fasting, are still classified as daily smokers).
- An occasional smoker is a person, who smokes, but not every day.
- Number of cigarette smoke – total rolled cigarette which consumed or smoked by respondent per day
- A non-smoker is a person who, currently does not smoke cigarettes (include former -smokers, never-smokers).
- Alcohol drinking - active drinking of one or more manufactured or home hand rolled alcohol, irrespective of dosage.
- Alcohol drinker - is a person who, currently drink any alcoholic product either daily or occasionally.(i.e. either daily or occasional drinker)

- A non- drinker is a person who, currently does not drink alcoholic products (include former - drinker, never- drinker).

- A daily drinker is a person, who drink any alcoholic product at least once a day (except that people who drink every day, but not on days of religious fasting, are still classified as daily drinker).

- An occasional drinker is a person, who drink, but not every day.

- Khat chewer-consuming of khat , irrespective of dosage.

- Khat chewer - is a person who, currently chew khat either daily or occasionally.(i.e. either daily or occasional khat chewer)

- Non khat -chewer is a person who, currently does not chew khat (include former – khat chewer , never- khat chewer).

- A daily khat chewer is a person, who chew khat at least once a day (except that people who chew khat every day, but not on days of religious fasting, are still classified as daily khat chewer).

- An occasional khat chewer is a person, who chew khat , but not every day.

- Diagnosed health problem- The diseases had been diagnosed and confirmed by health care professionals

4.12. Ethical consideration:-

 A formal letter was obtained from Jimma University Research Ethical review committee to the Hadiya Zone Health Dept and, permission was obtained from each respective local authority. Verbal consent to participate in the study were secured before conducting the interview. For this a one-page consent letter were attached to the cover page of each questionnaire stating about the general purpose of the study. Issues of confidentiality was discussed by interviewers before proceeding with the interview. Additionally, participants were informed that they have a full right to refuse or discontinue participation.

CHAPTER FIVE: - RESULTS

5.1. Socio-demographic characteristics of the respondents:

The older adults evaluated were aged between 60 and 100 years, and the mean age was 70 years (SD=7 years) and almost similar in both genders (69 female and 71 male). A total of 451 elderly comprised of 203 (45.0%) females and 248(55%) males were included for this study, after excluding 9 study subjects due to non-response. The minimum and maximum age of the respondent were 60 and 99 years respectively. Regarding educational status, most of the respondent 390(86.5%) were unable to read and write. And more than half of the participants 294(65.2%) were married while 127(28.2%) had widowed and 145(32.2%) of respondent were in the age limit of 60-65 years. About 216(47.9%) of the participants had live with both partners and their children's with 348(77.2%) of monogamy family structure as presented in Table 1.

Table 1: Socio-demographic characteristics of elderly people in Anlemo district, May 2016.

Variables	Categories	Total n(%)
Age	age 60-65 age 66-70 age 71-75 age 76-80 age >81 Total	145(32.2) 124(27.5) 96(21.3) 57(12.6) 29(6.4) 451(100)
Educational status	Unable to read and write Primary school(1-8grade) Secondary school (9-12grade) Total	390(86.5) 56(12.4) 5(1.1) 451(100)
Marital status	Married Widowed Other * Total	294(65.2) 127(28.2) 30(6.7) 451(100)
Family structure	Monogamy Polygamy None [a] Total	348(77.2) 26(5.8) 77(17.1) 451(100)
Living status	With Partner only With Children only Both Partner & children Alone/ Relatives Total	61(13.5) 164(36.4) 216(47.9) 10(2.2) 451(100)

a living alone   * Single, separated, divorced .

5.2. Economic and House hold characteristics of the elderly:

More than half 307(68.1%) of elderly were occupation of farmer while 111(24.6%) were supported by children. A total of 188(41.7%) participants were household income source of agriculture. Majority of household 281(62.3%) were average house hold monthly income less than 300 ETB and about 205(45.5%) of elderly household had dependents ranging from four up to six as shown in Table 2.

Table 2: Economic characteristics of elderly people in Anlemo district, May 2016

Variables	Total No (%)
Occupation	
Farmer	307(68.1)
Employee	10(2.2)
Support by children	111(24.6)
Other *	23(5.1)
Total	451(100)
Income source	
Agriculture	188(41.7)
Children	82(18.2)
Other **	181(40.1)
Total	451(100)
Monthly income	
<300	281(62.3)
>=300	170(37.7)
Total	451 (100)
Total Household member	
≤5 Household member	298(66.1)
>5 Household member	153(33.9)
Total	451(100)
Total dependent on income	
0-3 HH member	115(25.5)
4-6 HH member	205(45.5)
Greater than 6 HH member	131(29)
Total	451(100)

* Unskilled work, self business ** Ngo/community support etc

5.2.1. Household Food Insecurity status:

According to house hold food insecurity assessment, majority 305(67.6%) of elderly house hold were worry that their household would not have enough food in past four weeks and a total of 303(67.2%) participants were not able to eat the kinds of foods they preferred in past four weeks. Over eighty percent 363(80.5%) of participants consume a limited variety of foods. Eight (1.8%) participants were eat some foods that they really did not want to eat because of a lack of resources to obtain other types of food. 331(73.4%) of sampled participants eat a smaller meal than felt/ they need and 318(70.5%) have eat fewer meal in a day because there was not enough food. About 26 (5.8%) experience ever no food of any kind to eat in their household in the past one month. A total of 27(6%) and 7(1.6%) of participant household members were go to sleep at night hungry and go a whole day and night without eating anything because there was not enough food respectively. Moreover, male was experienced majority of HFIAS occurrence and occurrence-frequency question than female but female experience no food to eat of any kind and go to sleep at night hungry than male ,Table 3.

Table 3: House hold food insecurity assessment question response of elderly house hold in Anlemo district, May 2016.

HFIAS	Categories	Total No (%)
Worry to not have enough food	No	146(32.4)
	Yes	305(67.6)
	Total	451(100)
Not able to eat kind of food you preferred	No	148(32.8)
	Yes	303(67.2)
	Total	451(100)
Eat limited variety of food	No	88(19.5)
	Yes	363(80.5)
	Total	451(100)
Eat food that really not want	No	443(98.2)
	Yes	8(1.8)
	Total	451(100)
Eat smaller meal than felt	No	120(26.6)
	Yes	331(73.4)
	Total	451(100)
Eat fewer meal a day	No	133(29.5)
	Yes	318(70.5)
	Total	451(100)
Ever no food to eat any kind	No	425(94.2)
	Yes	26(5.8)
	Total	451(100)
Go to sleep hungry at night	No	424(94)
	Yes	27(6
	Total	451(100)
Go whole day and night without eating	No	444(98.4)
	Yes	7(1.6)
	Total	451(100)

According to HFIAS, only 86 (19.1%) of sampled elderly household were food secured with the rest being food insecure at different levels as shown below in Fig.3.
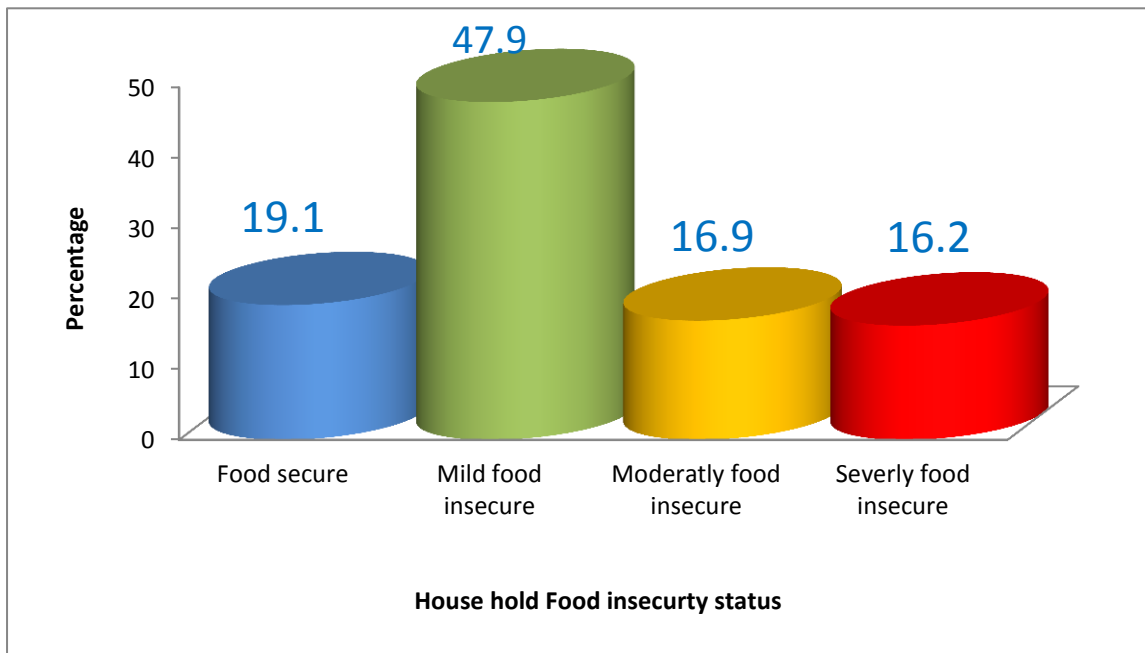
Figure 3: Diagrammatic presentation of HH food security status in Anlemo district, May 2016

5.3. Nutritional status of elderly people:

According to this study results, MNA classified participant as malnourished (MNA score less than 17 points), at risk of malnutrition (MNA score between 17 and 23.5points) and normal nutritional status (MNA score above 24 points) as shown in Fig.4.
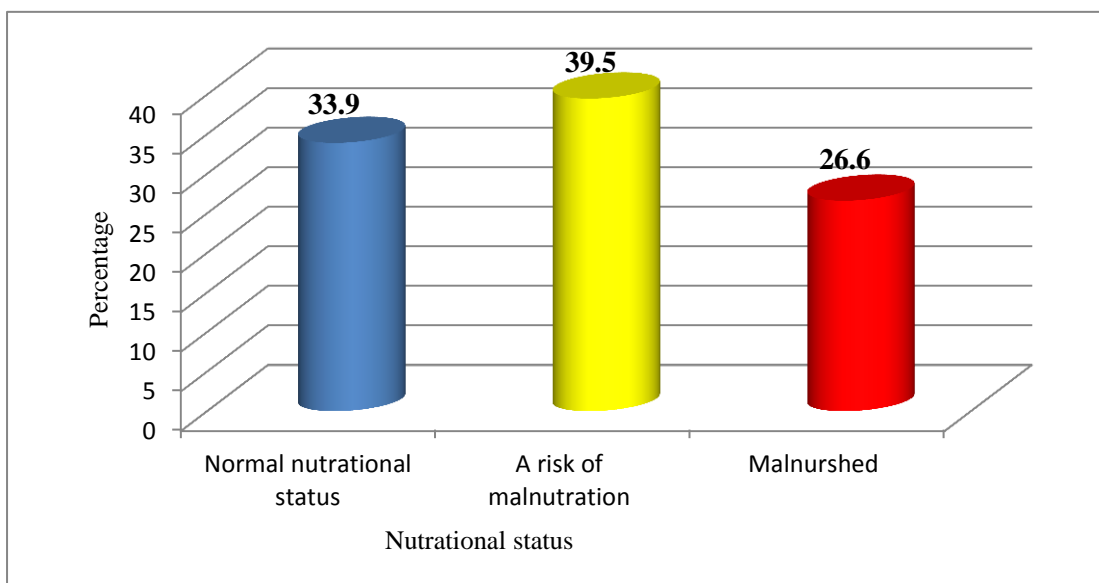
Figure 4: Nutritional status of elderly in Anlemo district, May 2016

The study result also shows that, the mean nutritional assessment score were '21' for both male and female with (SD = 4) and it deteriorating with increasing age .

5.4. Disease status of elderly:

Regarding the health status of respondents, majority of participant elder 282(62.5%) were face acute illness (sick) in the past four weeks. From those who were sick, 59(21.1%) of elderly had visit health facility but the rest were not visit any health facility for treatment. The commonly mentioned reason for not to visit health facility were; not be serious of illness 76(34.7%) and lack of money 60(27.4%). The majority 232(51.4%) of the participants reported not being diagnosed with any disease. 166(75.8%) elderly were not taking medication/follow-up at the time of survey for the diagnosed diseases , Table 4.

Table 4: Disease status of elderly participants in Anlemo district, May, 2016.

Variables	Categories	Total No (%)
Face any acute illness	Yes	282(62.5)
	No	169(37.5)
	Total	451(100)
Visit health facility	Yes	62(22)
	No	220(78)
	Total	282(100)
Reason not to visit HF	Not-serious	77(34.7)
	Lack transport-access	6(2.7)
	Lack-money	60(27.4)
	Distrust Hw	7(3.2)
	Other*	70(32)
	Total	220(100)
Diagnosed / confirmed health problem	Yes	219(48.6)
	No	232(51.4)
	Total	451(100)
Type	Joint-pain	72(32.9)
	Hytn	23(10.5)
	Dm	3(1.4)
	TB	4(1.8)
	More than-two cases	54(24.7)
	Other*	63(28.8)
	Total	219(100)
Take medication / follow-up	Yes	53(24.2)
	No	166(75.8)
	Total	219(100)

*different individual reason other than mentioned.

5.5. Elderly Life style Pattern:

The result of study show 411(91.1%) and 375(83.1%) of the participants (both males and females) did not habitually smoke & consume any form of cigarette and alcohol. And 336(74.5%) of participants were not chew khat. Majority of smoker and drinker consume locally hand rolled cigarettes 25(62.5%) and alcohol 53(69.7%) ,Table 5.

Table 5: Life style pattern of elderly participants in Anlemo district, May 2016.

Variable categories	Total No (%)
Smoking status	
Current smoker	40(8.9)
Current non smoker	411(91.1)
Subtotal	451(100)
Cigarette type	
Manufactured	4(10.0)
Locally-rolled	25(62.5)
Both*	11(27.5)
Total	40(100%)
Drinking status	
Current drinker	76(16.9)
Current non drinker	375(83.1)
Subtotal	451(100)
Alcohol type	
Manufactured	1(1.3)
Locally-rolled	53(69.7)
Both*	22(28.9)
Total	76(100%0
Khat chewing status	
Current chewer	115(25.5)
Current non chewer	336(74.5)
Subtotal	451(100)

*Manufactured + Local handed

5.6. Associated factors for elder malnutrition at Bivariate analysis:

To determine the association between nutritional status and explanatory variables, bivariate analysis was performed to each independent variables using logistic regression model. Those variables that show significant association were taken to the multivariate analysis to see their independent contribution.

5.6.1. Socio- demographic variables:

As shown in the table, association were found between elder malnutrition with some socio-demographic variables (p<0.25) .Concerning elder marital status , those elder who have currently unmarried were more likely malnourished than those elder who were currently married (COR=4.2(2.6 - 6.6)). Educational status is another factor found to affect the nutritional status. Elderly people who cannot read and write were more likely to be malnourished than those able to read and write (COR=2.6(1.4-4.7) as shown in Table 6.

Table 6: Association of socio-demographic variables with nutritional status in Anlemo district, May, 2016.

Variables	Nutritional status			
	Malnourished(n)	Not malnourished (n)	COR,95%CI	P-value
Age				
Age 60-69 years	55	170	1	
Age 70-79 years	45	131	1.0(0.7-1.7)	0.796
≥ 80years	20	30	2.0(1.0 -3.9)	0.027*
Sex				
Female	63	140	1.5(0.99-2.3)	0.055*
Male	57	191	1	
Marital status				
Married	48	246	1	
Widowed	57	70	4.2(2.6-6.6)	0.000*
Others [a]	15	15	5.1(2.3-11.2)	0.000*
Educational status				
Unable to read and write	105	241	2.6(1.4-4.7)	0.001*
Able to read and write	15	90	1	

a Single/divorced/separated   * show significant variables at bivarate analysis (p<0.25).

5.6.2. Economic factors associated with elder malnutrition:

Statistically significant differences were found regarding economic factors. As shown in the table, those elder who were non farmer were more likely malnourish as compared to farmer (COR= 2.8(1.8-4.3). And also those elder whose source of income children were more likely malnourished as compared to source agriculture (COR=2.4(1.4- 4.2)).

More over elderly respondent HH food insecurity status were another factor that shows association with nutritional status(i.e.those elderly house hold that were food insecure at different categories were more likely malnourished than food secure house hold (COR=3.6(1.5-8.2) as shown in Table 7.

Table 7: Association of economic variables with nutritional status in Anlemo district, May, 2016.

Variables	Nutritional status		COR,95%CI	p-value
	Malnourished (n)	Not malnourished(n)		
Occupation				
Farmer	61	246	1	
Non farmer [a]	59	85	2.8(1.8 -4.3)	0.000*
HH income source				
Agriculture	46	142	1	
Children	36	46	2.4(1.4-4.2)	0.002*
Salary and other	38	143	0.8(0.5-1.3)	0.427
Monthly income				
<300	65	188	1	
>=300	55	143	0 .9(0.6-1.3)	0.619
Total HH member				
≤5 member	70	201	1	
>5 member	50	130	1.1(0.7-1.7)	0.647
HH food insecurity				
Food secure HH	14	79	1	
Mild food insecure HH	52	164	3.6(1.5-8.2)	0.003*
Moderately food insecure HH	30	46	7.3(3-18)	0.000*
Severely food insecure	31	42	8.3(3.4-20.5)	0.000*

a Supported by children/self employee/different daily based activities   *shows significant variable at bivarete analysis (p<0.25)

5.6.3. Life style and morbidity related variables associated with elder malnutrition:

As shown in the table, significant association were found regarding elderly life style and morbidity with malnutrition as presented in Table 8.

Table 8: Association of Life style and morbidity related variables with nutritional status in Anlemo district, May, 2016.

Variables	Elder Nutritional status		COR,95%CI	p
	Malnourished (n)	Not malnourished(n)		
Khat chewing status				
Current chewer	18	97	0.4(0.2-0.7)	0.003*
Current non chewer	102	234	1	
Diagnosed health problem				
yes	76	143	2.3(1.5 - 3.5)	0.000*
no	44	188	1	

*shows significant association at bivarete analysis at (p<0.25)

5.7. Associated factors of elder malnutrition at Multivariable logistic regression:-

After bivariate analysis, multivariate analysis of logistic regression was performed to filter the net effect of each independent variable that associate in the bivariate model analysis with elder nutritional status by controlling the other independent variables in table.

The multivariate analysis showed that some of the variables originally associated were maintained significant association throughout the study. Thus, respondent marital status, educational status, having chronic disease, House hold food insecurity were found to have significant association with elder malnutrition . Whereas, other predictable variables like age, sex, source of income, occupation and others have no association with elderly malnutrition (p>0.05).

Concerning educational status, those elderly people who cannot read and write were more likely to be malnourished than those able to read and write (AOR=2.2(1.2-4.2).

Respondent marital status was another factor found to affect the elderly nutritional status. Those elderly who have currently widowed were more likely malnourished than those elder who were currently married (AOR=3.4(2.0-5.6)) and currently divorced/single were also more likely malnourished than those elder who were currently married (AOR=5.3(2.3 -12.4)). On the other hand, those elder who have diagnosed and confirmed chronic disease in the past were more likely to malnourished than who not have any chronic disease (AOR= 2.2(1.4-3.5)).

House hold food insecurity status were another factor that show significant association with elder malnutrition. Thus, elderly house hold that were food insecure at different categories were more likely malnourished than those food secure elderly house hold. (i.e. Mild Food insecure (AOR=2.9(1.2-7.0), Moderately food insecure(AOR=7.0(2.7-17.7),Severely food insecure(AOR=5.9(2.3-15.3)), Table 9.

Table 9: Factors associated with elderly malnutrition in, Anlemo district, 2016.

Variables	Malnourished (n)	Not malnourished (n)	AOR,95%CI	p-value
Educational status				
Unable to read & write	105	241	2.2(1.2-4.2)	0.015*
Able to read & write	15	90	1	
Marital status				
Married	48	246	1	
Widowed	57	70	3.4(2.0 - 5.6)	0.000*
Others [a]	15	15	5.3(2.3-12.4)	0.000*
HH food insecurity status				
Food secure HH	7	79	1	
Mild food insecure	52	164	2.9(1.2 - 7.0)	0.015*
Moderately food insecure	30	46	7.0(2.7 – 17.7)	0.000*
Severely food insecure	31	42	5.9(2.3 -15.3)	0.000*
chronic disease				
Yes	76	143	2.2(1.4-3.5)	0.001*
No	44	188	1	

a single/divorced/separated   *shows significant association (p<0.05)

CHAPTER SIX:-DISCUSSION

This community-based cross-sectional study determined the nutritional status and associated factors of 253 elderly males and 207 elderly females residing in Anlemo district of southern Ethiopia. The nutritional status of elderly was measured by MNA tool in this study.

Present study shows 26.6% of the elderly malnourished and 39.5% were at risk of malnutrition. These findings were slightly higher than study done in Dehradun but showed a lower prevalence (43.7%) for the category of at risk of malnutrition (24). Also a lower prevalence of malnutrition (15%) and higher prevalence of at risk of malnutrition (55%) among the elderly was observed in studies result in India (28) as compared to this study. This discrepancy may be because of difference in socio economic condition of study population and dietary usage.

Present study also revealed that educational status was one of the factors which had showed significant association with elder malnutrition. Thus elderly people who cannot read and write were more likely to be malnourished than those able to read and write (AOR=2.2(1.2-4.2). Thus prevalence of malnutrition were more in unable to read and write than educated. This finding is comparable with studies done in, India , & Iran, (4, 24,31). Similarly in Ethiopia, across sectional study result in Gonder, 2014; shows that unable to read and write were more likely malnourished (10). This is could be because of , those educated elder were better access and understanding of nutritional information which may contributed to good feeding practice and have better life style.

According to this study finding, another important factor that independently associated with elder nutritional status was respondent marital status. Those elderly who have currently widowed (AOR=3.4(2.0-5.6) and separated/divorced (AOR=5.3(2.3-12.4)) were more likely malnourished than those elder who were currently married. This finding is similar with study done in France, Iran & Portuguese (13, 31, 32). This might be elder become widows and divorced early and live their life through alone because of socio cultural value in the society (particularly elder women).

According to this study finding, another important factor that influences nutritional status of elder was house hold food insecurity status. Thus even though food is a basic necessity of life and essential for sustenance, house hold food insecurity was one of the most crucial problem threatening millions of people. In this study the HFIAS measurement revealed that only 10.2% sampled household was food secure and 89.8% of the households were food insecure at different food insecurity category . The level of food insecurity reported in the current study is almost similar with previous studies done in India (51). But demonstrated considerably higher level of food insecurity

than study done in Ethiopia (49). The higher level of food insecurity identified in our study, could be due to the being rural of study area and seasonal factor that contribute to food insecurity. Another explanation is that this study was specific to elderly in which they are limited functional capacity to participate in income generation, where they are dependent on other family /relatives for their food supply.

The majority of the older adults investigated in this study were food insecure with different categories ,this food insecure house hold elderly were more likely be malnourished as compared to food secure(i.e. mild food insecure house hold (AOR=2.9(1.2-7.0)) , moderately food insecure house hold (AOR=7.0(2.7-17.7)) ,severely food insecure house hold (AOR=5.9(2.3-15.3)). These results were consistent with previous reports of food insecurity have been highly associated with under nutrition in older adults (34, 51). This might be food insecure house hold have low access & availability of food, which leads to reduction food utilization at house hold level.

On the other hand elder diseased was other factors that significantly associate to elder nutritional status. Thus, those elder who have diagnosed chronic disease were more likely malnourished than who not have diagnosed disease(AOR=2.2(1.4-3.6). This is Similar with study conducted in Lebanese, demonstrated presence of chronic diseases and acute illness were significantly associated with malnutrition occurrence among elder populations (29), but there were negative association between hypertension and diabetes with underweight in their studies in Cuba (36).

6.1. Limitation:-
This study had conducted only on rural dwellers elderly and might not represent the urban dwellers. And no assessment of biochemical parameters of nutritional status were done. The house hold food security data were collected at post harvest time which may misestimate the response.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions:

The result of this study shows elderly nutritional status and associated factors in Anlemo district of southern Ethiopia. The findings revealed high prevalence of elderly who were malnourished (26.6%) and at risk of malnutrition (39.3%). From multiple logistic regression analysis factors such as household food insecurity, chronic disease and elderly marital status and low educational status were found to be significant predictors of malnutrition ($p<0.05$) in this study. However, other predictable variables like age, occupation, income source and others have no association with nutritional status of elderly.

7.2. Recommendations:-

This was the alarming fact besides of their physiological vulnerability, where malnutrition is an important public health burden among the elderly in the study areas. Paying enough attention to their nutritional health and efforts to improve their socio-economic status can be a great extent to improve the their health. Therefore,

- The community and local organization: - who done on development should prioritize and participate elderly in their daily developmental agenda to maintain their house hold food security.

- Health sectors:-
    - ✓ The need to screen, monitor and involve elderly people in proper nutritional care.
    - ✓ The need to formulation and implementation of a national elderly nutritional policy.

- Researcher:- Further studies were needed to generate a more evidence for effective policy making and planning for their nutritional interventions.

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ANNEX:-

ANNEXES I: - Data collection tools and consent form.

Consent form

Good morning/good afternoon?

How are you?   My name is _____, I am from Jimma university students of public health master's degree. As part of our academic requirements, I am expected to conduct student research on community health and health related problems. This interview is prepared for obtaining appropriate information on elderly nutritional status in the communities. Therefore, you are kindly requested to be included in the study and provide appropriate information, which will have importance in improving elderly nutritional health status. Participation in this study is completely voluntary based. You have full right to decide not to participate in the study. If you are volunteer, you will be asked and taken some physical measurement about elderly nutritional status. The overall interview may take about 20-30 minutes.

May I continue?

1. Yes   2. No

Interview Starting Time---------------------------Ending time---------------------

IDENTIFICATION:-

Woreda_____Kebele_____village/gotti_____HH.Id.No_____

Section 1. Socio Demographic Characteristics

S.NO	Questions	Answers
1	Sex of respondents	1. Female 2. Male
2	How old are you (age)?	_____
3	What is your marital status	1. Single. 2. Married 3. Widowed 4. Separated 5..Divorced
4	What is your educational status?	1. Illiterate (unable to read and write) 2. Primary education (grades1-8) 3. Secondary education (grades 9-12) 4. college and above
5	With whom respondents are living?	1. With partner 2. With children 3. With partner and children 4. Living alone. 5. Living with relatives/ others------------------
6	Family Structure.	1. Monogamy 2. Polygamy. 3. Other
7	Total no of household members?	------------------

Section 2:- Economical related and Household Food Insecurity Assessment

1	What was respondent occupation?	1. Farmer 2. Employee 3. Self-employed 4. Supported by children 5. Others
2	What were the Sources of your HH income?	1. Agriculture 2. Children 3.Pension 4. Other------------------
3	What is your average household monthly income?	------------------
4	How many household members earn an income?	--------------------
5	Number of dependents on income	--------------------

Complete:- Yes(1), No(0) , Rarely(once or twice in the past four weeks), Sometimes (three to ten times in the past four wks) ,Often (more than ten times in the past four weeks)

1	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes
1a	How often did this happen?	1 .Rarely 2 .Sometimes 3. Often
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0. No (skip to Q3) 1.Yes
2a	How often did this happen?	1. Rarely 2. Sometimes 3 .Often
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0. No (skip to Q4) 1.Yes
3a	How often did this happen?	1.Rarely 2 .Sometimes 3 Often
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes
4a	How often did this happen?	1. Rarely 2.Sometimes 3. Often
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0=No (skip to Q6) 1 = Yes
5a	How often did this happen?	1.Rarely 2 .Sometimes 3.Often

6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes
6a	How often did this happen?	1.Rarely 2 .Sometimes 3 .Often
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes
7a	How often did this happen?	1. Rarely 2 .Sometimes 3. Often
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes
8a	How often did this happen?	1. Rarely 2 .Sometimes 3. Often
9	In the past four weeks, did you or any household member go whole day and night without eating anything because there was not enough food?	0 = No (finished) 1 = Yes
9a	How often did this happen?	1.Rarely 2 .Sometimes 3 .Often

Section 3:-   Life style related

1	Do you smoke cigarettes?	1. Yes, daily 2. Yes, occasionally 3. No
2	If yes, Which type of cigarette you use mostly?	1. manufactured 2. Locally hand rolled 3. both 4. Other (specify) ------------------------ .
3	On average, how many rolled cigarettes do you smoke a day?	---------------------------
4	Do you drink alcohol?	1. Yes daily 2. Yes occasionally 3.No
5	If yes, Which type of alcohol you use mostly?	1. manufactured 2. Locally hand rolled 3. both 4. other(specify)-----------------------
6	Do you chew khat ?	1. Yes, daily 2.Yes, occasionally 3. No

Section 4:-   Morbidity related

1	Is there any Illness you face in the last 4 weeks?	1. Yes 2. No	
2	Have you visit health facility?	1. Yes 2. No	
3	If no, what was the reason?	1 .Not serious 2.lack transport access 3. Lack money 4. Does not like/ distrust HW 5. Other (specify)----------------------------	
4	Is there any health problem, you had been diagnosed and confirmed by health care professionals?	1. Yes 2. No	
5	If yes, What was it?	1. Joint pain /Arthritis 2. Hypertension 3. DM 4. TB 5. More than two cases 6. Not I have 99. Other -------------------	
6	Are you taking medication/follow-up?	1. Yes 2. No	

Section 5:- Mini Nutritional Assessment (MNA) Weight _____kg: Height (standing)_____ or (Dim span) _____cm:		

Complete the screening by filling in the boxes with the appropriate numbers. Add the numbers for the final screening score and mark it (✓).

1	Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?	0 = severe decrease in food intake 1 = moderate decrease in food intake 2 = no decrease in food intake
2	Weight loss during the last 3 months	0 = weight loss greater than 3 kg 1 = does not know 2 = weight loss between 1 and 3 kg 3 = no weight loss
3	Mobility	0 = bed or chair bound 2 = goes out 1 = able to get out of bed / chair but does not go out
4	Has suffered acute disease or psychological stress in the past 3 months?	0 = yes 2 = no
5	Neuropsychological problems	0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems
6	Body Mass Index (BMI) (weight in kg) / (height in m)	0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater
7	Lives independently (not in nursing home or hospital)	1 = yes 0 = no
8	Takes more than 3 prescription drugs per day	0 = yes 1 = no
9	Pressure sores or skin ulcers	0 = yes 1 = no
10	How many full meals does the patient eat daily?	0 = 1 meal 1 = 2 meals 2 = 3 meals
11	Selected consumption markers for protein intake:- • At least one serving of dairy products (milk, cheese, yoghurt) per day yes • Two or more servings of legumes or eggs per week yes • Meat, fish or poultry every day yes no	0.0 = if 0 or 1 yes 0.5 = if 2 yes 1.0 = if 3 yes
12	Consumes two or more servings of fruit or vegetables per day?	0 = no 1 = yes
13	How much fluid (water, juice, coffee, tea, milk...) is consumed per day?	0.0 = less than 3 cups 0.5 = 3 to 5 cups 1.0 = more than 5 cups
14	Mode of feeding	0 = unable to eat without assistance 1 = self-fed with some difficulty 2 = self-fed without any problem
15	Self view of nutritional status	0 = views self as being malnourished 1 = is uncertain of nutritional state 2 = views self as having no nutritional problem
16	In comparison with other people of the same age, how does the patient consider his / her health status?	0.0 = not as good 0.5 = does not know 1.0 = as good 2.0 = better
17	Mid-arm circumference (MAC) in cm	0.0 = MAC less than 21 0.5 = MAC 21 to 22 1.0 = MAC greater than 22
18	Calf circumference (CC) in cm	0 = CC less than 31 1 = CC 31 or greater
	Total Assessment Score = 24 - 30 points ;- Normal nutritional status [ ] 7 - 23.5 points ;-At risk of malnutrition ar[ ] 17 points ;- Malnourished [ ]	

Name of the interviewer _____ Sign _____ Date _____

Name of the supervisor _____ Sign _____ Date _____

Hadiyigna Version Questionery

Amaxasanichi I: - Ittamichi sagalane wixacha forimma.

Xuuma gata /xuuma hoossa?

Xuumam helaka?   Ii suumi _____, yamamomo. Ani Jimmi yuniverisitee la,im diggireei losanichcho. Losomi losano exxa ,minadaphi fayaomi quuxo sorobimi baxo baximi egeramoko. Ku xamichi xamomoki kinni hanqi ihako wosha ihimi hasisokoki. Ku kini masomi wocci muli minadabinaami horiyemi awodoko. Ihubikina ka sorobima quxone exxitona habayisamo.ka quxone exximi ki gaqi shenee. Ku sorobimi hore lopha masuka 20-30 daqiqa.

Asherima xanomonihe?

        1.   oyaa   2.   ihoyoo

Xamimi ashshero saataa --------------------------bedichi saataa--------------------

43

Gaqqi Laisha.

wooeada_____qabalee_____goxxa_____gaqqi min xigo_____

Qoxxoi 1. Gaqi bigina			
S.NO	Xamichcha	Dabachcha	
1	alibachcha	2. mentichcho 2. Gonichcho	
2	Uumuri me,oo?	_____	
3	Tidally quxxomii?	1. agisukoyo. 2. agisako 3. fatakako 4. ananihamako 5..tafatamako	
4	Maha ki baxi?	1. abulancho 2. Adili baxanicho 3. Gaqi baxo baxancho 4.ossine haramamacho 5.mullane....	
5	Ki losani gabalomi	1. losumoyo 2. Luxxi gabala 3. laimi gabala 4. Koleja/yuniversitee	
7	Ayenete helokoki	1. iimini amane 2. Ii ossine 3. Ii abarosinemi 4. mulami. 5 .ii qarinemi-	
8	Wametti hee,a?.	1. matoo 2. Lami hananete. 3. Mahimi bee,e	
9	Mee,oo ki abarosi?	--------------------	
qoxxoi 2:- Amaxxi quxxi bikinaa			
1	Ki mini amaxi shotoii maha?		1. abula 2. osso 3.xurata 4. damooza 5. mulane--------------
2	Ki min again lambeanchi agii meeo?		-------------------
3	Hinkani mana baxoo?		-------------------
4	Meei mana ixxene hee,oo		---------------------
Kani woroni yooki xamichuwa ihoyoo(0) ,ooyaa(1), higahigate(mati teimi lami amane higu agana), matimatiamane (sasinse tomi kore higu agana) ,lobakati amane (tomi kori hanani ihakoo amane higu aganane)			
1	Higu agaani woroone ki mini abarosina huribati hofeokoo yitaa kichela laqqoo?		0 = ihooyo (tophphihe xam 2) 1=ooya
1a	Hinkani amanina eeisa ihukoki?		1 .higahiga 2 .matimati amanina 3. Lobakati amane
2	Higu againi woroone atti teime ki mini abarosi itakami huribati hofechinse kiaa gaqi sheneise tocho huribata itaka laqakamonhe?		0. ihooyo 1.oyyaa
2a	Hinikani amane ihoko?		1. higahigate 2. Matimati amane 3 .lobakati amane
3	Higu againi woroone atti teimi ki mini abarosi itakami luwwi bechi kiaa horeemi hoffi huribata itaka laqakamoo?		0. ihooyo 1.oyyaa
3a	Hinikani amane ihokko?		1.higahiga 2 .matimati amane 3 lobakati amane
4	Higu agaani woroone ati teimi kimini abarosi itima hasakami beei huribata, huribati bechi kiaa itaka laqakamo?		0 = ihooyoo (xophihee Xam 5) 1 = oyyaa
4a	Hinikani amanee?		1. Higahiga 2.matimati amane 3. Lobakati amane
5	Higu agaani woroone ati teimi kimini abarosi itimi hasakami qaxii hoffi huribata,huribati bechi kiaa itaaka laqakamo?		0=ihooyo (xophihee Xam6) 1 = oyyaa
5a	Hinikani amanina?		1.higahiga 2 .matimati amanina 3.lobakati amanina
6	Higu agaani woroone ati teimi kimini abarosi itimi		0 = ihoyyo (xophphihe Xam7)

	hasakami qaxii hoffi huribata balane itaka laqakamo,huribaxxi hoffechi kiaa?	1 = oyyaa	
6a	Hinikani amanee?	1.higahiga 2 .matimati amane 3 .lobakati amanee	
7	Higu agaani woroone amaxi hoffechi kiaa mahemi itakami huribati beea la,oo?	0 = ihooyoo (xophphhe xam8) 1 = oyyaa	
7a	Hinikani amanee?	1. higahiga 2 .matimatiamanee 3. lobakatiamane	
8	Higu agaani woroone ati teimi kimini abarosi huribaxxi bechchi kiaa sibatakoissa isselaka laqakamo?	0 = ihoyyo (xophphihee to xam9) 1 = oyyaa	
8a	Hinikani amanee?	1. higahiga 2 .matimatiamanee 3. lobakatiamane	
9	Higu agaani woroone ati teimi kimini abarosi huribaxxi bechchi kiaa balami himomi mahami itakoni hosaka laqakamo?	0 = ihoyyo (bedakko) 1 = oyyaa	
9a	Hinkani amanee?	1. higahiga 2 .matimatiamanee 3. lobakatiamane	
Qoxxoi 3:- hechchi qaniqi quxxi bikinaa			
6	Tamibaa aggakamoo?	1. oyyaa,balinabalina 2. Oyyaa higahiga 3. agomoyyo	
7	Agommo yitilasse,hinikido tamibaa lophphita awaxitokoki?	1. fabiriqanee 2. Amibanee gudokokaa 3. Lamomi 4. mullanee (kurree) -----------------	
8	Ballanee lamibeanichisa,hinikani tamibaa ago??	----------------------------	
9	Araqqee agoohonihee?	1. oyyaa balinabalina 2. Oyaa higahiga 3.agomoyoo	
9	Agommo yitilasse ,hinikido araqqee lophphita awaxxitotoki?	1. fabiriqanee 2. Amibanee gudookoka 3. Lamomi 4. mullanee (kurree) ------------------	
10	Chatta itohoniyee?	1. oyyaa balinabalina 2. Oyaa higahiga 3.itomoyyoo	
Qooxxoi 4:- jabbi/xissi bikinna related			
1	Higuagani woronee orachi channa laoo?	1. oyyaa 2. chanukoyoo	
2	Fayaomi/hakimii mine mata helitoo?	1. oyyaa 2. marumoyoo	
3	Marumoyo yitilasse,mashikai maha?	1 .xissi kemubeibikinna 2.takisso luwa hogaa 3. Dinatee be,aa 4. Fayaomi mine amanima hogaa 5. mulanee (*kurree*)-----	
4	Kani illagenii kessene hakimi saraya kuruki jabbi yoohoniye?	1. oyyaa 2. Be,ee	
5	Yokkoyitilassi,mahi heukoo?	1. lamaxxi/mogolei jaboo 2. dammigifitaa 3. Sukali jaboo 4. qakkee 5. Lami hananetee 6. mullanee -------------------	
6	Qararee awaxitolanhee/masitolanihee?	2. oyaa 2. masomoyoo	

	Qoxxoi 5:- gaqqi orachchi huribaxi qaxxomi bikina killoi _____killoigraminee: qeralommi(ullichanee) _____ (angi qeralomaa) _____cm:	
Kanii woroni yoo xamichuwina haniqoi dabacha wonishee.eelasagee hunidemi quxxuluwami edda waruu qoxxoi dabachane mare isse(✓).		
1	Higu sasi again woronee ,huribaxii itimi qanassaa heukkonihee,huribaxi sheneomi beea teimi liqichimi qedominne teimi ichimi qedominee?	0 = horeemi huribaxxi ittimi qanassakoo 1 = lamibeanichisa huribaxxi ittimi qanassakoo 2 = mahami huribaxxi ittimi qanasukkoyo
2	Higu sasi again woronee ki killoi qanassa laohoniyee?	0 = 3 kiloii hanani qanasakoo 1 = mahami laumoyoo 2 = 1 and 3killoi lamibee qanassakoo 3 = mahami qanasukoyoo
3	Mikimikaxi bikinaa	0 = qaraii teimi barccumise mikimikoy 2 = biraa firra agookoo 1 = qarainsee/barccumise kiooko ginni birafirimma xanoyyo
4	Higu sasi again woronee ,xissita laqqoo?	0 = oyyaa 2 = xissukoyoo
5	Horolii jabii bikinaa	0 = kemali kichechi jaboo 1 = lamibeanchchi kichechii jaboo 2 = mahemi kichechi jabbimi bee,e
6	Ki orachchi killoi amaxxi (killoi kg) / (qeralommi (m)	0 =orachchi amaxxi < 19 1 = orachchi amaxxi 19 -21 2 = orachchi amaxxi 21 -23 3 = orachchi amaxxi 23 lophokoo
7	Mulamanihee helokoki?	1 = oyya 0 = mullaayoo
8	Sassi hanani ihakoo kinina balane massitoo?	0 = oyyaa 1 = masomoyyo
9	Issi lophimii kiaa Orachch qusulii yoo?	0 = oyyaa 1 = bee,e
10	Hinikani huribata balanee itotokii?	0 = 1 huribata 1 = 2 huribata 2 = 3 huribata
11	Proini huribata itimi qoxxo marraxxe:- • hofeukii beyonee addoo ,borru,salaloo balane itokkoo oyya yyoo • lamii hanani ihakko luwaa quniqa,gittee sanitii woronne ittokko oyyaa yyoo • marraa, qurixummee balinbalina itookoo oyyaa ittoyoo	0.0 = 0 teimi 1 oyyaa 0.5 = 2 oyyaa 1.0 = 3 oyyaa
12	Lamii hanani ihakoo atakilituwaa balinbalina awaxokoo?	0 = awaxoyoo 1 = oyyaa
13	Hinikani agaa (woo,o, jussaa, bunnaa, shahee, addoo...)balanee agooo?	0.0 = < 3 sinaa 0.5 = 3 - 5 sinnaa 1.0 = ≥ 5 sinnaa
14	Ittimmi bikinnaa	0 = haramachi bee,e itimma xanoyoo 1 = hogukuyami itokko 2 = mahemi hawi bee,e itookoo
15	Gaqqi orachii huribaxxi amaxxi bikinna	0 = orrachi danamissaa yokooed 1 = irrigixagnayoo 2 = mahemi hawimi bee,e
16	Ki fayaomi bikina muli lommani issa mollohare hinikidete?	0.0 = danamoyyo 0.5 = laumoyyoo 1.0 = danamissa yommoo 2.0 = horemii errane
17	Angii lamibeanichi kululessi maxxana	0.0 = MAC < 21 0.5 = MAC 21 - 22 1.0 = MAC > 22
18	Loki kululessi maxxanaacenitimetirinee	0 = loki kululessi < 31 1 = loki kululessi 31 lobanee
	hundemi dabachi exxoo = 24 - 30 naxxibba ;- [____] 17 - 23.5 naxxibaa [____] < 17 naxxibbaa ;- [____]	

Xamaanichi summa_____ Firrimmaa _____ _____Ballaa _____

Akkeshanichi summa _____Firimma _____Ballaa _____

Gallaxxommoo !!!!!

ANNEX II: Standardized measurement procedure and equipment

1. RECOMMENDED EQUIPMENT

        (i) 1 portable stadiometer

        (ii) 1 portable seca scale (tested for accuracy),

        (iii) 8 measuring tape, 8 MUAC

        (iv) General office supplies (1 step stool, batteries, standard weights for checking accuracy , data collection forms/records).

2. PROCEDURE

Measuring height using a stadiometer:-

1. Ensure the floor surface is even and firm.
2. Have subject remove shoes and stand up straight with heels together, and with heels, buttocks and shoulders pressed against the stadiometer.
3. Arms should hang freely with palms facing thig
4. hs.
5. Take the measurement with the subject standing tall, looking straight ahead with the head upright and not tilted backwards.
6. Make sure the subject's heels stay flat on the floor.
7. Lower the measure on the stadiometer until it makes contact with the top of the head.

Measuring height using demispan:-

Demispan is the distance from the midline at the sternal notch to the web between the middle and ring fingers along outstretched arm.

1. Locate and mark the midpoint of the sternal notch with the pen.
2. Ask the patient to place the left arm in a horizontal position.
3. Check that the patient's arm is horizontal and in line with shoulders.
4. Using the tape measure, measure distance from mark on the midline at the sternal notch to the web between the middle and ring fingers.
5. Check that arm is flat and wrist is straight.
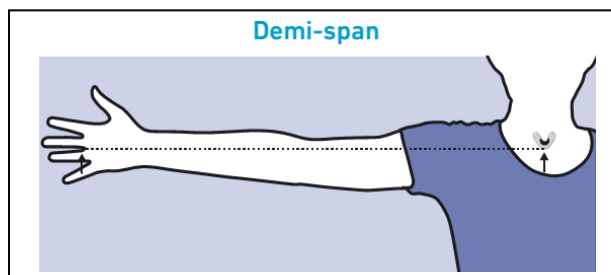6. Take reading in cm.
Calculate height from the formula standard formula:
Females
Height in cm = (1.35 x demispan in cm) + 60.1
Males
Height in cm = (1.40 x demispan in cm) + 57.8


Demi-span

Measuring Weight:-

1. Ask the participant to remove their footwear (shoes, slippers, sandals, etc) and socks.
2. Ask the participant to step onto scale with one foot on each side of the scale.
3. Ask the participant to:stand, face forward, place arms on the side an
4. Record the weight in kilograms on the participant's instrument

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Measuring mid arm circumference:-

1. Ask the patient to bend their non-dominant arm at the elbow at a right angle with the palm up.

2. Measure the distance between the acromial surface of the scapula (bony protrusion surface of upper shoulder) and the olecranon process of the elbow (bony point of the elbow) on the back of the arm.

3. Mark the mid-point between the two with the pen.

4. Ask the patient to let the arm hang loosely by his/her side.

5. Position the tape at the mid-point on the upper arm and tighten snugly. Avoid pinching or causing indentation.

6. Record measurement in cm.

7. If MAC is less than 21, score = 0.

If MAC is 21-22, score = 0.5.

If MAC is 22 or greater, score = 1.0.
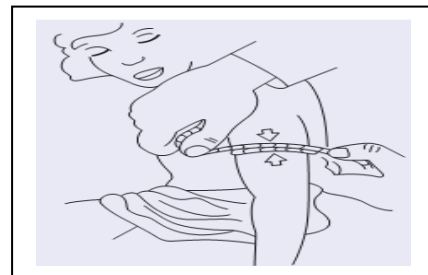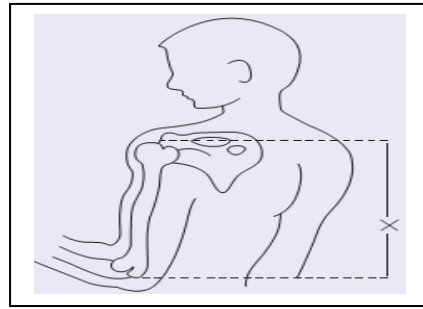
Measuring calf circumference:-

1. The subject should be sitting with the left leg hanging loosely or standing with their weight evenly distributed on both feet.
2. Ask the patient to roll up the trouser leg to uncover to calf.
3. Wrap the tape around the calf at the widest part and note the measurement.
4. Take additional measurements above and below the point to ensure that the fist measurement was the largest.
5. An accurate measurement can only be obtained if the tape is at a right angle to the length of the calf, and should be recorded to the nearest 0.1 cm.

    Score: -   0 = CC less than 31

    1 = CC 31 or greater

Annex III. Recommended nutritional action flow chart :

MNA recommended nutritional intervention flow chart based on elder nutritional status:-

Full MNA® Score

Normal Nutritional Status (24-30 points)

At Risk of Malnutrition (17-23.5 points)

Malnourished (<17 points)

At Risk of Malnutrition branches into:
- No Weight Loss
- Weight Loss

RESCREEN
- After acute event or illness
- Once per year in community dwelling elderly
- Every 3 months in institutionalized patients

MONITOR
- Close weight monitoring
- Rescreen every 3 months

TREAT
- Nutrition intervention
  - Diet enhancement
  - Oral nutritional supplementation (400 kcal/d)[1]
- Close weight monitoring
- Further in-depth nutrition assessment

TREAT
- Nutrition intervention
  - Oral nutritional supplementation (400-600 kcal/d)[2]
  - Diet enhancement
- Close weight monitoring
- Further in-depth nutrition assessment