

ORIGINAL ARTICLE**DIETARY DIVERSITY AMONG PEOPLE 40 YEARS AND ABOVE IN JIMMA TOWN, SOUTHWEST ETHIOPIA**Tefera Belachew¹, MD, MSc, DLSHTM, Tilahun Yemane², MD, MSc**ABSTRACT**

BACKGROUND: *Non-diversified diet can have negative consequences on individuals' health and well being, as this kind of diet is not likely to meet micronutrient requirements and is low in quality. Assessment of dietary quality is very important in older age groups to recommend appropriate dietary interventions to prevent occurrence of chronic degenerative diseases. This study aimed to assess dietary quality and associated socio-demographic factors among adults 40 years and above in Jimma Town.*

METHODS: *A cross-sectional study was carried out from December 1-30, 2006. A total of 526 subjects were selected from the three "Kefitegnas" of Jimma town using stratified cluster sampling technique employing proportional to size allocation to the kebeles. Data were collected using interviewer administered structured Amharic version questionnaire. Dietary quality was assessed by asking the consumption of the major food groups (cereals-legumes, fruits, vegetables and animal source foods) over the reference period of one month prior to the survey and calculating dietary diversity score as a composite variable constituted by the four food groups. The data were entered in to a computer and analyzed using SPSS for windows version 12.0.1.*

RESULTS: *Overall, 209 (39.7%) have non-diversified diet and 99 (18.8%) did not have animal source foods in their diet during the last one-month before the survey. Out of those who consumed non diversified diet, 50(9.5%) had only one food group while 159 (32.2%) had two food groups. Only 99 (18.8%) consumed all the four food groups during the last one month before the survey. Study participants in the households with higher income and those who were more educated consumed a diversified diet. Animal source food intake was significantly associated with being male, being merchant, being member of household with higher income and having higher educational status ($P<0.05$).*

CONCLUSION: *Large proportions of the study community had low quality diet implying the fact that they are nutritionally insecure and are at risk of developing micronutrient deficiencies and other chronic diet related diseases. Gender, income, educational status and occupation were associated with low quality diet consumption. Gender seem to play a great role in the consumption of animal source foods as significantly less number of females had animal source foods in their diet compared to males.*

Food security interventions focusing on enhancing the income and purchasing power of the households, nutrition behavior change communication on the importance of having diversified diet, creating better access of females to animal source foods and enhancement of interventions that address improvement of the overall educational status of the community are recommended to improve the quality of diet among adults in Jimma town.

KEY WORDS: *Dietary diversity, Southwest Ethiopia*

INTRODUCTION

Access to nutritionally adequate and good quality diet is essential for human health, productivity and employment output. Diverse diets that include a variety of foods from different food groups (vegetables, fruits, grains, and animal source foods) provide a balance of nutrients that promote healthy growth and development. Increasing the variety of foods across and within food groups is recommended in most dietary guidelines, (1, 2) as it ensures adequate intake of essential nutrients and to promote good health. Non-diversified diet can have negative consequences on individuals' health, well being, as this kind of diet is not likely to meet micronutrient requirements (3). Lack of dietary quality is a particularly severe problem among poor populations from the developing world as their diets are predominantly based on starchy staples and often include little or no animal products and few fresh fruits and vegetables (4). These

plant-based diets tend to be low in a number of micronutrients, and the micronutrients they contain are often in a form that is not easily absorbed (5). Animal source foods are energy-dense and an excellent source of high-quality and readily digested protein (6, 7).

Dietary diversity (DD) has long been recognized as a key element of high quality diets (8). It is usually measured by summing the number of foods or food groups consumed over a reference period (9,10). Although most dietary diversity measures consist of a simple count of foods or food groups, some measures used in developed countries are based on the number of servings (dietary score) of different food groups in conformity with dietary guidelines (11).

In the developing countries, the measurement of dietary diversity is complex as household members share food from a communal bowl (12). As a result, dietary diversity is frequently assessed by the use of simple tools such as

diversity scores measured by the number of food groups consumed over a reference period.

Several studies indicated that intake of animal source food and dietary diversity/variety are promising measurement tools in developing countries, and they are good proxies of overall dietary quality (13-17). They can be useful indicators of household food security and are also positively associated with the nutritional status (18-20).

After the age of 40 years Basal Metabolic Rate (BMR) slows down yearly and weight gain is very likely even if healthy eating pattern is followed. Cardiovascular diseases, type 2 diabetes and some cancers peak during this period (21-22). The main burden of chronic diseases is observed at this stage of life and, therefore, needs to be addressed.

In general, older people need to have diversified diet to get more calcium and vitamin D for bone health, eat more fiber to prevent constipation, cut back on sugar, and make sure they get the recommended daily allowance of important vitamins and minerals (22). Assessment of dietary quality in this age group is very important to recommend appropriate dietary interventions to prevent occurrence of chronic degenerative diseases. However, there is no any study, which documented dietary quality in this age group in Ethiopia in general and in the study area in particular. The aim of the present research was to assess dietary quality and associated socio-demographic factors among adults 40 years and above living in Jimma Town.

SUBJECTS AND METHODS

This cross-sectional study was carried out from December 1- 30, 2006 in Jimma Town, which is 357 kilometers southwest of Addis Ababa. The Town has a total estimated population of 151,527 projected from 1994 population and housing census residing in three administrative divisions ("kefitegnas"). From CSA report adult population 40 years and above constitutes 12.5% of the urban population of Oromia region. Taking this in to account the source population was estimated to be 18,941 (23).

The sample size was calculated using formula for descriptive cross-sectional study employing expected prevalence of consuming quality diet to be 50% as there was no prior study on the subject, at 95% confidence level and 5% margin of error giving a sample size of 384. For the cluster sampling, a design effect of 1.5 was used to give a total sample size of 576. One kebele was randomly selected from each of the three 'Kefitegnas' of the town. The total sample size was distributed to the three "kebeles" employing proportional to size allocation to the kebeles from each Kebele; a systematic sampling technique was used to identify the study households. In the cases where there were more than one eligible individual in the household, a lottery method was used to pick one from each household. In the event that there was no eligible person in the selected household, the next door was visited. Data were collected by experienced 12

grade complete interviewers using a pre-tested structured Amharic version questionnaire. The data collectors were given a one day training on the interview techniques and on the questionnaire before data collection.

Dietary diversity was assessed by asking the consumption of the major food groups (cereals-legumes, fruits, vegetables and animal source foods) over the reference period of 1 month before the survey using simple food frequency questionnaire. The foods were grouped as such based on the nutritional values of the different food groups, their cost and values given to them by the society in general. Animal source foods are rich in micronutrients and are relatively expensive, fruits are source of micronutrients, but less available in the study area and have higher costs second to animal source foods while vegetables, cereals and legumes are source of macronutrients and micronutrients. Cereals and legumes are common staples that have relatively lower costs.

Participants were asked as to whether they had consumed each of these food items over the last one month. The responses were documented either per day, per week or per month. However, all of the responses were converted into per day for ease of computation. So a consumption of each food item was given the value of 1 if it was consumed at least once in a month time before the survey and a value of zero if not. Then dietary diversity score (DDS) was calculated as a composite variable by summing up the scores of the four categories, which were either one or zero. This gives a score between 0 to 4 and the median score 3 was used as a cut-off point to dichotomize dietary diversity. Accordingly, those who had total dietary diversity scores of 3 and above were labeled as having had diversified diet and the rest as having had non-diversified diet. The study participants were also asked whether they had animal source foods during the reference period.

The study was ethically approved by the Jimma university ethical review committee. Permission was obtained from each 'kebele' representative through a formal letter written from the Research and Publication Office (RPO) of Jimma University. The participants were informed about the purpose of the study and verbal consent was obtained before each interview. The data were entered in to a computer and analyzed using SPSS for windows version 12. Statistical tests for significance were performed where appropriate at the level of significance of 5%.

RESULTS

Out of 576 subjects planned to participate in the study, 526 were enrolled, of which 120 were males and 406 were females giving a sex ratio of 0.3:1 and a response rate of 91.3%. The mean (\pm Sd) age was 53(\pm 11.4) years. Three hundred twenty eight (62.4%) had a monthly income of less than 200 Birr followed by those who get 200 -1000 Birr. Two hundred seventy two (51.7%) were married, 270(51.3%) were illiterate followed by those who attended grade 1-6 accounting for 147(27.9%). The majority, 332(63.1%) were Orthodox Christian followed

by Muslim and others including protestant, catholic, accounting for 178(33.8%) and 15(2.8%), respectively.

Overall, 209(39.7%) have non-diversified diet and 99(18.8%) did not have animal source foods in their diet

during the last one-month before the survey (Fig.1). Out of those who had non-diversified diet, 50(9.5%) had only one food group and 159(30.2%) had only two food groups (Fig. 2).

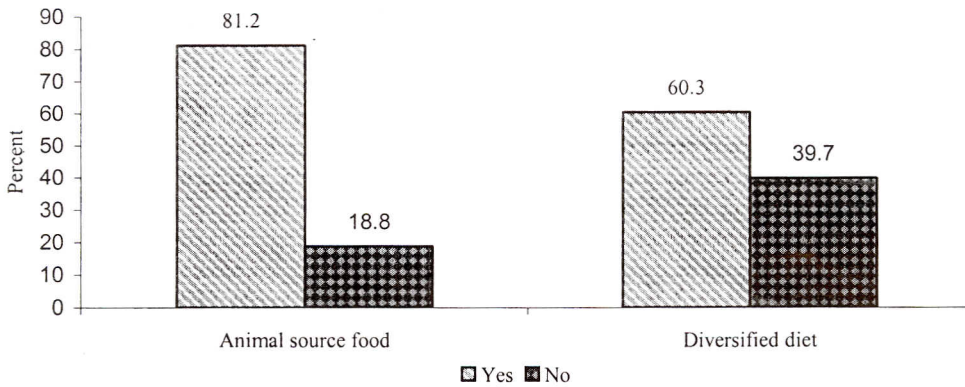


Figure 1. Consumption of diversified diet and animal source food during the last one month before the survey among adults in Jimma Town

Consumption of diversified diet was significantly associated with the level of household income ($P < 0.01$) and educational status ($P < 0.05$). Larger proportion of the study participants in the households with higher income(75%) and those who were more educated(90%)

consumed a diversified diet compared to their counterparts who were in the household with lower monthly income and those subjects who are less educated, respectively(Table-1).

Table 1. Dietary diversity by socio-demographic variables, Jimma town Southwest Ethiopia.

Socio-demographic variables	Had diversified Diet during the last 1 month		P value
	Diversified (n = 317)	Non-diversified (n = 209)	
Sex			
Male	76(63.3)	44(36.7)	0.4
Female	241(59.4)	165(40.6)	
Age			
40-50	182(62.1)	111(37.9)	0.6
51-60	37(59.7)	25(40.3)	
>60	98(57.3)	73(42.7)	
Household monthly income (Birr)(n=408) [†]			
<200	186(59.1)	128(40.9)	0.03
200-1000	54(75.0)	18(25)	
>1000	17(77.0)	5(23)	
Educational status			
Illiterate	146(54.1)	124(45.9)	0.007
Read & write	28(68.1)	13(31.7)	
Grade 1-6	95(64.6)	52(35.4)	
Grade 7-8	18(72.0)	7(28.0)	
Grade 9-12	12(52.2)	11(47.8)	
Grade 12+	18(90.0)	2(10.0)	
Occupation [‡]			
Merchant	54(65.9)	28(34.1)	0.3
Housewife	178(60.1)	118(39.9)	
Gov.employee	31(66.0)	16(34.0)	
Others*	51(53.0)	47(47.0)	

*Daily laborer, driver, pensioner, [‡]Occupation of one person is missing, [†] income data was not obtained for 118 subjects

Large proportion, 105(87.5%) of males consumed animal source foods compared to their females counterparts accounting for 322(79.3%), $P < 0.05$. Similarly, large

proportion, households earning a monthly income of > 1000 Birr consumed animal source foods compared to those earning less than 200 Birr a month($P < 0.01$).

Consumption of animal source food was significantly associated with the occupation ($P<0.001$), and educational status ($P<0.05$). Study participants who were more educated (90%) and government employees (66%) consumed animal source foods more frequently compared to their counterparts (Table-2).

Table 2. Consumption of diversified animal source food by socio-demographic variables, Jimma town Southwest Ethiopia.

Socio-demographic variables	Had animal sourced food in the diet during the last 1 month		PV
	No(n = 99)	Yes (n =427)	
Sex			
Male	15(12.5)	105(87.5)	<0.05
Female	84(20.7)	322(79.3)	
Age, Y			
40-50	60(20.5)	233(79.5)	0.5
51-60	11(17.7)	51(82.3)	
>60	28(16.4)	143(83.6)	
Household monthly income in Birr (n=408)			
<200	95(30.3)	219(69.7)	<0.01
200-1000	4(11.8)	30(88.2)	
>1000	1(4.5)	21(95.5)	
Educational status			
Illiterate	63(23.3)	207(76.7)	<0.05
Read& write	7(17.1)	34(82.9)	
Grade 1-6	24(6.3)	123(83.7)	
Grade 7-8	3(12.0)	22(88.0)	
Grade 9-12	2(8.7)	21(91.3)	
Grade 12+	0(0.0)	20(100.0)	
Occupation			
Merchant	66(22.3)	230(77.7)	<0.001
Gov.employee	5(6.1)	77(93.9)	
Housewife	1(2.1)	46(97.9)	
*Others	27(27.0)	73(73.0)	

*Daily laborer, driver, pensioner, †Occupation of one person is missing, ‡ income data was not obtained for 118 subjects.

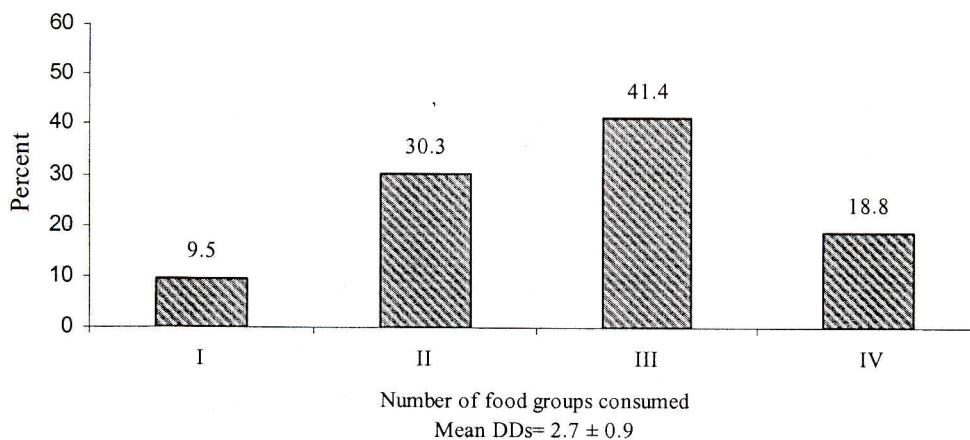


Figure 2. Number food groups consumed during the last one-month before the survey

DISCUSSION

Dietary diversity as measured by the number of different foods or food groups consumed over a given reference period is an attractive indicator of dietary quality as more varied

diet is a valid nutritional outcome measure (18). It has been documented by many studies that dietary diversity/variety and consumption of animal source foods are promising measurement tools in developing countries, and they are indicators of overall dietary quality (13-17). They can be useful indicators of household food security and nutritional status (18-20).

In this study, though over half of study subjects had diversified diet, consumption of animal source food was significantly low in female subjects as compared their male counterparts. It has been documented that a more diversified diet, either directly or indirectly through improved acquisition of micronutrients, is associated with a number of improved outcomes in areas such as birth weight (24), improved hemoglobin concentrations (25), reduced incidence of hypertension (21), reduced risk of mortality from cardiovascular disease and cancer (22). The finding that 39.7% of the study participants consumed non-diversified diet and 18.8% did not consume animal source foods implies the fact that they are at risk of developing different health problems related to dietary styles.

People tend to consume low quality diet due to a number of reasons, of which one could be lack of knowledge on the right diet or lack of access to the right kind of food due to overall food insecurity (17, 19, 26). In this study, consumption of both diversified diet and animal source foods were significantly ($P < 0.05$) higher among subjects with higher household income and those who had higher educational status. Consumption of animal source food was significantly ($P < 0.05$) associated with male gender, having a higher educational status and being merchant.

In the study area animal sources foods have higher costs and are usually signs of social prestige leading to their lower consumption by those individuals who have lower purchasing power and females who have lower social status. Studies elsewhere showed that animal source foods might be considered high-status foods and therefore made preferentially accessible to men. Other studies showed that males consistently consumed more calories and protein than females at all ages, even when nutrient requirements due to varying body weight, pregnancy, lactation, and activity levels were considered (26-28).

Household income could operate through increasing the purchasing power and overall access of the household to food, while education may influence consumption of diversified diet both through increasing awareness about the benefits having diversified diet and through increasing employment chances and gaining of income.

Overall dietary quality is one of the components of food security as food security is defined as accessibility of individuals to an adequate quantity and quality of food

all the time (8). In areas where there is food insecurity, higher proportion of individuals will have low quality diet (18, 29). Evidences from a multi-country analysis show that household-level dietary diversity is strongly associated with per capita consumption and energy availability, suggesting that dietary diversity could be a useful indicator of household food security (18, 20).

This study could not assess seasonal variation in the dietary quality as it was conducted during December, which is a harvest season and the cost of foods is lower during this season. The authors expect more proportion of the study participants to consume low quality diet during the cereal shortage season. This has been documented in Burkina Faso where large proportion of women had less diversified diet at the beginning of the cereal shortage season compared to the harvest season (30).

In conclusion, large proportion of the study participants had non-diversified diet, most particularly a fifth of the study participants did not consume animal source foods, which implies that they are nutritionally insecure and are at risk of developing micronutrient deficiencies and other chronic diet related diseases. Low consumption of animal source foods was more significant among those who are in the households with lower income, females and those who were less educated. Gender seem to play a great role in the consumption of animal source foods as significantly less number of females had animal source foods in their diet compared to males.

Food security interventions focusing on enhancing the income and purchasing power of the households and nutrition behavior change communication on the importance of having diversified diet and creating better access of females to animal source foods and enhancement of interventions that address improvement of the overall educational status of the community are recommended to improve the quality of diet in the study area.

ACKNOWLEDGEMENTS

The authors highly appreciate Jimma University Research and Publication Office for funding the study and the study participants for their cooperation in giving information.

REFERENCES

1. U.S. Department of Agriculture Human Nutrition Information Service Food Guide Pyramid: A Guide to Daily Food Choices. Home and Garden Bulletin. No. 249. U.S. Departments of Agriculture and Health and Human Resources, Washington DC, 1992.
2. WHO Preparation and Use of Food-Based Dietary Guidelines. WHO Technical Report, Series 880. Report of a Joint FAO/WHO Consultation. World Health Organization, Geneva, Switzerland, 1996.
3. Kant AK. Dietary patterns and health outcomes. *J Am Diet Assoc.* 2004; 104:615-35.

4. Speedy AW. Global production and consumption of animal source foods. ... American Journal of Clinical Nutrition 2003; 78(Suppl. 3):526S-32S.
5. Popkin, B. M. The nutrition transition in low-income countries: an emerging crisis. *Nutr. Rev.* 1994; 52: 285–298.
6. Layrisse M, Martinez-Torres C, Mendez-Costellaro, et al. Relationship between iron bioavailability from diets and the prevalence of iron deficiency. *Food and Nutr Bulle* 1990; 12:301–9.
7. Bender A. Meat and meat products in human nutrition in developing countries. *FAO Food and Nutrition Paper #53, Food Policy and Nutrition Division of FAO, 1992; 2:1–88*
8. Ruel MT. Supplement: Animal Source Foods to Improve Micronutrient Nutrition in Developing Countries, Operationalizing Dietary Diversity: A Review of Measurement Issues and Research Priorities. *J. Nutr.* November 2003; 133:3911S-3926S,.
9. Krebs-Smith, S., Smiciklas-Wright, H., Guthrie, H. & Krebs-Smith, J. The effects of variety in food choices on dietary quality. *J. Am. Diet. Assoc.* 1987; 87: 897–903.
10. Löwik, M., Hulshof, K. & Brussaard, J. Food-based dietary guidelines: some assumptions tested for The Netherlands. *Br. J. Nutr.* 1999; 81: S143–S149.
11. Guthrie, H. & Scheer, J. Validity of a dietary score for assessing nutrient adequacy. *J. Am. Diet. Assoc.* 1981; 78: 240–245.
12. Hudson G. Food intake in a West African village: Estimation of food intake from a shared bowl. *Br J Nutr.* 1995; 73:551–69.
13. Neumann C, Harris DM, Rogers LM. Contribution of animal source foods in improving diet quality and function in children in the developing world. *Nutrition Research, 2002; 22: 193–220*
14. Torheim LE, Ouattara F, Diarra MM, et al. Nutrient adequacy and dietary diversity in rural Mali: association and determinants. *Eur J Clin Nutr.* 2004; 58:594–604.
15. Rose D, Tschirley D. Predicting dietary intakes with simple food recall information: a case study from rural Mozambique. *Eur J Clin Nutr.* 2003; 57:1212–21.
16. Ogle BM, Hung PH, Tuyet HT. Significance of wild vegetables in micronutrient intakes of women in Vietnam: an analysis of food variety. *Asia Pac J Clin Nutr.* 2001; 10(1): 21–30. Erratum in: *Asia Pac J Clin Nutr* 2001; 10(3): 249.
17. Azadbakht L, Mirmiran P, Azizi F. Variety scores of food groups contribute to the specific nutrient adequacy in Tehranian men. *Eur J Clin Nutr.* 2005; 59:1233–40.
18. Hoddinott J, Yohannes Y. Dietary diversity as a household food security indicator. Washington, D.C.: FANTA Project, Academy for Educational Development; 2002.
19. Savy M, Martin-Prevel Y, Sawadogo P, Kameli Y, Delpeuch F. Use of variety/diversity scores for diet quality measurement: relation with nutritional status of women in a rural area in Burkina Faso. *Eur J Clin Nutr.* 2005; 59:703–16.
20. Ruel MT. Is dietary diversity an indicator of food Security or dietary quality? A review of Measurement issues and research needs, International Food Policy Research Institute, FCND discussion paper no. 140, November 2002.
21. Kant, A., A. Schatzkin, and R. Ziegler. Dietary diversity and subsequent causespecific mortality in the NHANES I epidemiologic follow-up study. *Journal of the American College of Nutritionists,* 1995; 14: 233-238.
22. WHO. Diet, nutrition and the prevention of chronic diseases, WHO, technical Report series 916, Geneva, 2003.
23. Central Statistics Authority (CSA). The 1994 population and housing Census of Ethiopia, Results for the Oromia region, Addis Ababa, 1996; 1(4).
24. Rao, S., C. S. Yajnik, A. Kanade et al. Intake of micronutrient-rich foods in rural Indian mothers are associated with the size of their babies at birth: Pune maternal nutrition study. *Journal of Nutrition,* 2001; 131 (4): 1217-1224.
25. Bhargava, A., H. Bouis, and N. Scrimshaw. Dietary intakes and socioeconomic factors are associated with the hemoglobin concentration of Bangladeshi women. *Journal of Nutrition,* 2001; 131 (3): 758-764.
26. Ahn BC, Engelhardt K, Joung H. Diet Variety is Associated With Socio-economic Factors. *Ecology of food and nutrition,* December 2006; 45(6): 417 – 430.
27. Chen LC, Huq E, D'Souza S. Sex Bias in the Family Allocation of Food and Health Care in Rural Bangladesh. *Population and Development Review,* Mar 1981; 7(1): 55-70.
28. Westenhoefer J. Age and Gender Dependent Profile of Food Choice, Elmadfa I (ed): *Diet Diversification and Health Promotion.* Forum Nutr. Basel, Karger, 2005, 57: 44–51.
29. FAO. Rome Declaration on World Food Security and World Food Summit Plan of Action. World food submits, November 1996; 13-17, Rome.
30. Savy M. Martin-Pre'vel Y, Traissac P, Eymard-Duvernay S, Delpeuch F. Dietary Diversity Scores and Nutritional Status of Women Change during the Seasonal Food Shortage in Rural Burkina Faso1, *J. Nutr.* 136: 2625–2632, 2006.