

Research Article

Households Dietary Diversity and Associated Factors in Konso, South Ethiopia

Deykanto Urmale¹, Akalewold Alemayehu², Endrias Markos Woldesemayat^{2*}

¹South Nations Nationalities and Peoples Regional State, Segen Zone Health Department, Konso, Ethiopia

²Hawassa University, College of Medicine and Health Sciences, School of Public Health, Hawassa, Ethiopia

ABSTRACT

Background: Diversified diet promotes meeting the minimum requirement of essential nutrients. Households with non-diversified diet often face poor health status which results from nutrient deficiency. This is common problem in rural communities of southern Ethiopia.

Objective: To assess the prevalence and associated factors of household dietary diversity in Konso district South Ethiopia.

Methods: A community based cross-sectional study was conducted from January to February, 2018. Out of 40 Kebles in the district, 9 were randomly selected. Data were collected using a pre-tested questionnaire which was adapted from the World Food and Agricultural Organization. Data were entered in using Epi info version 7 and exported to SPSS version 20.0 for analysis. Frequencies were calculated. Odds ratio with the corresponding 95% confidence interval was calculated to identify risk factors of inadequate dietary diversity.

Result: A total of 423 households participated in the study. More than 9% of the households had high dietary diversity, while 48.5% had medium and 41.9% had low dietary diversity.

High proportion of the study households consumed vegetables (87.5%) and cereals (78.7%) while very low proportion of them consumed milk products; 16 (2.8%) and sea foods; 11 (1.9%). Rural residency [AOR 2.0, CI (1.2, 3.5)], female headed households [AOR 5.4, CI (1.5, 19.4)], lower educational level, lack of information on dietary diversity [AOR 1.8, CI (1.1, 2.9)] and low household wealth index [AOR 1.6, CI (1.0, 2.6)] increased the risk of inadequate household dietary diversity.

Conclusion: In this study, we found high prevalence of inadequate dietary diversity. The diets were mainly based on starchy staple (cereals and vegetable) with little animal products. A number of factors increased the risk of inadequate household dietary diversity.

Keywords: Household; Dietary diversity; Konso

List of Abbreviations: AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; DDS: Dietary Diversity Scores, SD: Standard Deviation; SPSS: Statistical Package for Social Science

Introduction

Dietary diversity refers to an increase in the variety of food intake across and within food groups [1]. It is a measure of food consumption that reflects households' access to a variety of food items [2]. Consumption of diversified food items is vital to meet the essential nutritional requirement of the body which promotes good health [1]. The more food groups included in daily diet the greater the likelihood of meeting nutrient requirements of the body, because all nutrients cannot be found within a single food item [3].

Low dietary diversity score (DDS) is related to a decrease in nutrient adequacy of the diet [2]. This may increase the risk of malnutrition [4]. Chronic protein energy deficiency and micronutrient deficiencies are among the top priority nutritional problems related to low households dietary diversity in countries like Ethiopia [5]. Risks for a range of micronutrient deficiencies are high when grain or tuber-based staple foods dominate and the diet lack vegetables, fruits and animal-source foods [6]. Pregnant women who were married before the age of eighteen, women from food insecure households and had low DDS were nearly two to four times more likely to be undernourished as compared to their counterparts [7].

In countries where resources are limited, lack of access to adequate and diversified diet has been identified as one of the challenges which may result in public health problems. Dietary factors are associated with an increased risk of chronic diseases and it is recommended to promote increased dietary diversity and limiting consumption of food items containing saturated fats, refined sugar and salt [4]. However, there are limited reports that describe the status of dietary diversity of households in low income countries [4]. Such countries face trouble with the 'triple burden of malnutrition' which encompasses the three dimensions of macronutrient under nutrition such as wasting, stunting & underweight; micronutrient deficiencies and over nutrition [4].

The Ethiopian socioeconomic survey in 2014 reported that cereals (rice, sorghum, barley, wheat) are the most consumed food items with 90% of households reported consumption of at least one of these items in any form in six of the last 7 days [8]. In the country, 60% of the households had low dietary diversity and 40% of households had medium diet diversity scores [9]. However, pocket studies that assessed household dietary diversity are limited in the country.

Due to worsening of the global economic condition and climate change, food insecurity is increasing as a global threat

[10]. Moreover, Konso district is facing population increase and recurrent drought which may lead to low dietary diversity. However, baseline information on the status of dietary diversity and factors contributing to lack of dietary diversity is not available in the district. Therefore, we aimed to describe the magnitude of household dietary diversity and identify factors determining inadequate household dietary diversity.

Methods

Study setting and participants

A community based cross sectional study was conducted in Konso district, one of the districts in the Southern Nations, Nationalities' and Peoples' Regional State (SNNPRS). Currently, the district is upgraded to a Zonal level administration. The district comprises a population of 270,225 and 55,148 households in 40 Kebeles (the smallest administrative unit) of which 32 are rural kebeles, while 8 are urban Kebeles [11]. Karat is the capital town of Konso district located at about 595 km south west of Addis Ababa (the capital of Ethiopia). Over 82% of the district's population was subsistence farmers, depending heavily on rain for agriculture [12].

Poor socio-economic condition of the community, unreliable rainfall, recurrent drought, population increase, depletion of soil fertility and other natural resources, having narrow farming land, unimproved agricultural farming can be mentioned as factors that compelled Konso people to live in distressed livelihood. Maize, millet, cassava and beans are the main agricultural products cultivated in the area [13]. Cotton and coffee is among the cash crop plants in Konso [11].

Sampling

The sample size was calculated by using a single population proportion formula with the following assumptions. Prevalence of consuming diversified diet (34.3%) was taken from a previous research conducted in MirabAbaya, Gamo-Gofa Zone in southern Ethiopia [14]. We considered 95% confidence level, 5% margin of error and a 10% non-response rate which gave a sample size of 423 households. Out of 40 Keble's found in the district; 9 (22%) Keble's were selected using simple random sampling. Source population considered in this study was households located in the randomly selected nine kebeles of the district. The study households were selected using simple random sampling by applying proportional to population size for each of the selected Keble.

Measurements

The questionnaire was adopted from a document from Food and Nutrition Technical Assistance project, USAID. A scale of twelve food groups was used in assessing dietary diversity. The food groups considered were cereals, roots and tubers, vegetables, fruits, meat and poultry, eggs, fish and seafood, pulses-legumes-nuts, milk and milk products, oil-fat, sugar-honey and miscellaneous [15]. Adaptation of the food lists to reflect locally available foods was done. The English version of the questionnaire was prepared. It was translated in to Konso, the language commonly used in the study setting and then it was back translated in to English.

For data collection, 16 health extension workers were recruited from the sampled kebeles. The principal investigator delivered

training for the data collectors. We collected data from January 1 to February 30, 2018. Supervision of the data collection process had been done by the principal investigator. Through interview, data on household dietary diversity, socio-demographic characteristics of the household heads and other variables were collected from the household head. We involved person responsible for meal preparation for the households to collect data about all the food groups eaten by members of the household during the previous day before the interview. Food groups eaten outside the households were not considered. A single point was given to each of the food groups consumed over the reference period giving a maximum DDS of 12 points for each household.

The dependent variable considered in the study was household dietary diversity. It was categorized into inadequate or adequate dietary diversity for measuring the risk factors of dietary diversity. For the descriptive analysis and comparison purpose we classified it in to low dietary diversity, medium dietary diversity and high dietary diversity. Socio-demographic characteristics such as gender, age, religion, educational status, marital status of the household head were considered as independent variables. Moreover, household wealth index, residence, family size, owning of a farming land, source of food, daily eating frequency, knowledge on dietary diversity were also considered as additional explanatory characteristics. Knowledge on dietary diversity was assessed by asking a question if any member of the household got information on balanced diet during the past one year.

Definitions

Adequate dietary diversity refers to daily consumption of five or more food groups. Inadequate dietary diversity was defined as consuming four or less food groups per day. Low household DDS was considered when households consumed less than or equal to three food groups within 24 hours before the survey. Medium household DDS was assumed when households consumed four to six food groups within 24 hours before the survey. High household DDS was defined as when the households consumed seven or more food groups within 24 hours before the survey.

Data processing and analysis

Data were checked for completeness and entered twice (double entry) into Epi info version 7 statistical software. Then the dataset was cleaned. A household wealth index was constructed using a principal component analysis (PCA). Construction of the index was based on a list of assets and other housing characteristics that reflects household's economic status. The variables included in the analysis were ownership of livestock, ownership of farming land, source of light, ownership of mobile phone, having motorbike or car, television, sanitation facility, availability of bank account, housing wall characteristics and number of rooms in the house. Binary variables were used directly but, variables with more than two categories were dichotomized. Among the three factor scores generated, the first factor score was used for classification of a household wealth index. Two wealth categories were created based on the median factor score. Age of the household head was grouped in to two age groups (17 – 32 and > 32 years) based on the median age. Educational status of the household head was grouped in to three; namely illiterate, grade 1 to 8 and high school and above. Family size of the households was categorized in to two groups considering the median family size of the households.

Daily eating frequency was categorized in to three groups; namely 1-2 times per day, 3 times per day and at least 4 times.

Data analysis was done using SPSS version 20 statistical software. Descriptive analysis was used to characterize respondents using different variables. Bivariate logistic regression analysis was undertaken for each explanatory variable with the outcome variable. Variables with p -value below 0.2 in the bivariate analysis were transferred in to the final model; multivariate analysis. Odds Ratio (OR) with the 95% confidence interval was described.

Ethical consideration

Ethical clearance was obtained from Hawassa University Institutional Review Board. Letter of support and permission was obtained from Konso district health offices. Verbal consent was obtained from the respondent's after explaining the purpose and the procedures of the study. We collected data using anonymous questionnaire. Study participants were informed that they have full right not to participate in the study if they are not willing.

Results

Socio-demographic characteristics

All eligible households in the communities participated in the survey. High proportion of the respondents, 328 (77.5) were rural dwellers. The mean (SD) age of household heads was 33.8 (9.4). Majority, 391 (92.4%) of the respondents were male. Two hundred and sixty four (62.4%) household heads were illiterate. Concerning marital status, 390 (92.2%) respondents were married (Table 1).

Dietary diversity and related characteristics

Majority of the respondents, 306 (72.3%) owned farming land. Concerning knowledge on dietary diversity, 174 (41.1%) of the respondents had good knowledge. One hundred seventy eight (42%) households had reported low household dietary diversity, while 206 (48.7) and 39 (9.2%) households had medium and high dietary diversity, respectively. High proportion, 274 (64.8%) of the households had inadequate dietary diversity (Table 2).

Among our study population, food items like cereals, vegetables and legumes (pulses or legumes or nuts) were universally consumed. Vegetables were consumed by 503 (87.5%) of the households, cereals were consumed by 453 (78.7%), miscellaneous food items were consumed by 381 (66.2%) and

(pulses or legumes or nuts) were consumed by 332 (57.7%) of the households (Figure 1).

Table 1: Socio demographic characteristics of the study participants.

Variable	Category	Frequency	Percent
Residence	Urban	95	22.5
	Rural	328	77.5
Gender*	Male	391	92.4
	Female	32	7.6
Religion*	Protestant	262	61.9
	Orthodox	86	20.3
	Other	75	17.7
Age in years*	17–32	222	52.5
	>32	201	47.5
Family size	2–6	244	57.7
	>6	179	42.3
Education*	Illiterate	264	62.4
	Grade 1-8	84	19.9
	High school and above	75	17.7
Marital status*	Single	21	5.0
	Married	390	92.2
	Widowed	12	2.8

* =for the household head

Table 2: Dietary diversity and other related characteristics of the study participants.

Variables	Category	Frequency	Percent
Owning of a farming land	Yes	306	72.3
	No	34	8.0
Yesterday's source of food	Prepared in the house	264	62.4
	Purchased	13	3.1
	Both	146	34.5
Eating frequency per day	≤ Two times	153	36.2
	Three times	250	59.1
	≥ Four times	20	4.7
Knowledge on dietary diversity	Yes	174	41.1
	No	249	58.9
Having live stocks	No	224	53.0
	Yes	199	47.0
Dietary diversity	Low	178	42.1
	Medium	206	48.7
	High	39	9.2
Dietary diversity	Adequate	149	35.2
	Inadequate	274	64.8

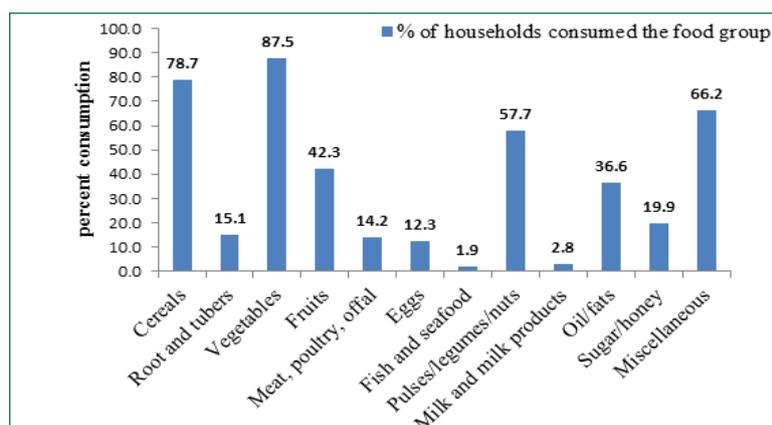


Figure 1: Proportion of food groups consumed by the households in 24 hour before the survey.

Table 3: Risk factors of inadequate household dietary diversity in the study area.

Variables	Dietary diversity		Logistic regression		
	Inadequate	Adequate	COR (95% CI)	AOR (95% CI)	
Residence	Urban	53	42		
	Rural	221	107	1.6 (1.0, 2.6)	2.0 (1.2, 3.5)
Gender of household head	Male	246	145		
	Female	28	4	4.1 (1.4, 12.0)	5.4 (1.5, 19.4)
Education	Illiterate	213	51	18.2 (9.4, 35.1)	17.1 (8.5, 34.6)
	Grade 1–8	47	37	5.5 (2.7, 11.4)	5.2 (2.4, 11.2)
	High school and above	14	61		
Household size	2–6	145	99		
	>6	129	50	1.8 (1.2, 2.6)	1.5 (0.9, 2.3)
Heard about dietary diversity	Yes	98	76		
	No	176	73	1.9 (1.3, 2.8)	1.8 (1.1, 2.9)
Wealth index	Low	157	57	2.2 (1.4, 3.3)	1.6 (1.0, 2.6)
	High	117	92		

COR: crude odds ratio, AOR: adjusted odds ratio, CI: confidence interval

Risk factors of household dietary diversity

Risk factors for inadequate dietary diversity are described in Table 3. In a multivariate logistic regression analysis; living in rural settings [AOR 2.0, CI (1.2, 3.5)], female headed households [AOR 5.4, CI (1.5, 19.4)], lower educational level of the household head, lack of information about dietary diversity [AOR 1.8, CI(1.1, 2.9)] and low household wealth index [AOR 1.6, CI(1.0, 2.6)] increased the risk of inadequate household dietary diversity.

Discussion

In this community based cross-sectional study, we found high prevalence of inadequate household dietary diversity. Among the studied households, consumption of vegetables and cereals was high. However, very low proportion of the study households consumed milk products and sea foods. Rural residency, female headed households, lower educational level of the household head, not getting information about dietary diversity and a low household wealth index predicted inadequate household dietary diversity.

A previous study conducted in Addis Ababa, Ethiopia reported that 5.9%, 60.4% and 33.7% of the households had low, medium and high DDS, respectively [16]. Another study from Finoteselam town, north-west Ethiopia reported prevalence of low, medium and high DDS of 11.8%, 67.2% and 21%, respectively [9]. Misker D and Ayele G [14] in their study reported that 65.7% and 34.3% of the households had low and high DDS in Mirab Abaya district, South Ethiopia. In Gondar, northern Ethiopia, about 83.8% of participants had inadequate household dietary diversity [17]. The proportion of low dietary diversity is higher among our study population than among the reports from Addis Ababa, Finoteselam town and Gondar [9,16,17]. However, the finding in the current study is lower compared to the report from Mirab Abaya district, South Ethiopia [14]. The difference might be due to variations by geographical location and seasons.

Vegetables and cereals were consumed by large proportion of our study households. In agreement to our finding, the study report

by A. Workicho and his colleagues [18] and by Labadarios D and et al. [3] reported that, cereals were the most commonly (96%) consumed food groups. Certain study conducted in North Ethiopia also reported a similar result [9], in which cereals were consumed by 88.6% of the households and vegetables were consumed by 78.9 % of their households. The least consumed food groups among our study participants were milk products and sea foods and this is in agreement with other reports [9,18]. For a healthy life, in addition to cereals and vegetables, it is important to eat animal source food groups.

In the current study, rural residency increased the risk of inadequate dietary diversity. This finding is in agreement with the reports from other settings [16,18]. Another study also reported that urban residence was positively associated with higher DDS [18]. The socioeconomic status of rural people is low, in developing countries like Ethiopia [19]. Due to poverty, people in rural households are not consuming the food items they produced but they sale it at markets to be consumed by urban dwellers. In addition to this, urban residents have higher income, so that they have higher access to markets that makes them to buy and consume variety of food groups. Socioeconomic factors may be the reason for rural dwellers to have a higher proportion and increased risk of low DDS. Health education and socioeconomic improvement may help alleviating this problem.

In the current study, the odd of having inadequate dietary diversity was 3.6 times higher among women headed families than men headed families. Our finding is in agreement with the report from Finoteselam town, northwest Ethiopia [9] and another report [18]. It is common in many low and middle income countries that men are household decision makers and the sole source of income. Besides this, women primarily use their income for their households use, including buying food items. We suggest the importance of empowering women and establish gender equity with regards to income and household decision making to minimize the risk of inadequate dietary diversity.

In the current study, households which did not hear about the importance of dietary diversity had an increased risk of inadequate

dietary diversity. Moreover, educational status of the household head predicted having of inadequate household dietary diversity. This finding is in agreement with other reports [18,20,21]. When people obtain basic education they can easily understand the benefits of dietary diversity and apply it in their households. Moreover, teachings they could help to improve their knowledge on the importance of household dietary diversity. Therefore, we suggest the importance increasing access to basic education to minimize the risk of inadequate dietary diversity. Moreover, providing health education to the society on the importance of dietary diversity could help in reducing the risk of inadequate dietary diversity and its effects.

There were significant differences in DDS by Living Standards Mean analysis [3,18]. Other studies also reported a positive influence of income, on high dietary diversity [18,21]. Other reports from Ethiopia and central Mozambique also showed the chance of having inadequate dietary diversity increased with decreasing economic status [17,22]. In agreement to these reports, in the current study having low household wealth index predicted inadequate dietary diversity. In the presence of increasing food prices, higher income of the households enhances the capacity to purchase various food items thereby they will have access to consume a diversified and quality diet. Purchasing food items from market adds food groups that are scarce at home. However, many farmers in the study area were unable to buy food items from the market due to low economic capacity. As a result of this, they may face inadequate dietary diversity. Therefore it is important addressing this problem by implementing appropriate socio-economic interventions.

The limitation of this study is related to the analysis used in the study was based on data from a cross-sectional survey. Thus, the statistical findings do not provide confirmatory evidence of a cause and effect relationship between household dietary diversity and the determinant variables used in the study.

Conclusion

The prevalence of inadequate household dietary diversity is high in Konso. Commonly consumed foods groups in the district were vegetables and cereals. For a healthy life, in addition to consumption of food groups like cereals and vegetables it is important to consume food groups from animal source like milk products and sea foods. Our analysis showed that place of residence, household's head, educational level of the household head, obtaining information about dietary diversity and household wealth index were characteristics significantly associated with inadequate household dietary diversity. Improving the socioeconomic status of rural dwellers, women empowerment and establishing gender equality with regards to income generation and decision making power, improving access to basic education and providing health education, implementing socio-economic interventions may help reducing the burden of inadequate dietary diversity. Government policies and intervention programs targeting the above characteristics may improve rural household dietary diversity and household food security in Konso and other districts in southern Ethiopia region and the country at large.

Acknowledgements

We would like to thank Hawassa University for funding the study. We thank data collectors and the study participants. Our gratitude extends to Mr. Petros Oltisha for his support in translating questionnaire from English to Konsigna, the local language.

Authors Contributions

DU designed the study, supervised data collection, performed data analysis, and interpretation, and drafted the manuscript. AA involved in designing the study and reviewing the manuscript. EMW assisted in the design, data analysis and interpretation, and reviewed the manuscript. All authors read and approved the final manuscript.

Conflict of Interests: None

References

1. Arimond M, Ruel MT (2004) Dietary diversity is associated with child nutritional status: evidence from 11 demographic and health surveys. *J Nutr* 134 (10): 2579-85.
2. FAO, Guidelines for measuring household and individual dietary diversity (2011) Food and Agriculture Organization of the United Nations: Rome, Italy.
3. Labadarios D, Steyn NP, Nel J (2011) How diverse is the diet of adult South Africans?. *Nutrition Journal* 10(33).
4. Torlesse H, Kiess L, Bloem MW (2003) Association of household rice expenditure with child nutritional status indicates a role for macroeconomic food policy in combating malnutrition. *J Nutr* 133:1320-5.
5. Kemunto ML (2013) Dietary diversity and nutritional status of pregnant women aged 15-49 years attending Kapenguria district hospital west pokot country, Kenya, in Departmen of Food, Nuriion and Dieeica. Kenya University: Kenya.
6. Hoddinott J, Yohannes Y (2002) Dietary diversity as a food security indicator: Technical appendix, in Food and Nutrition Technical Assistance. USAID: Academy for Educational Development: Washington D.C.
7. Nigatu M, Gebrehiwot TT, Gemedha DH (2018) Household food insecurity, low dietary diversity and early marriage were predictors for undernutrition among pregnant women residing in Gambella, Ethiopia. *Advances in Public Health*.
8. Goshu D, Kassa B, Ketema M (2013) Measuring diet quantity and quality dimensions of food security in rural Ethiopia. *J Dev Agric Econ* 5(5): 174-85.
9. Mekuria G, Wubneh Y, Tewabe T (2017) Household dietary diversity and associated factors among residents of Finote Selam town, North-west Ethiopia: A cross sectional study. *BMC Nutr* 3(1): 28.
10. FAO, IFAD, WFP (2013) The State of Food Insecurity in the World. The multiple dimensions of food security. FAO: Rome, Italy.
11. Kaddura M (2013) Encyclopedia Britannica, in Encyclopedia Britannica Online. Encyclopedia Britannica Inc.

12. CSA (2007) Population and Housing Census Results. Federal Democratic Republic of Ethiopia: Addis Ababa.
 13. Shinn DH, Ofcansky TP, Prouty C (2004) Historical Dictionary of Ethiopia. Konso people and language. Scarecrow Press.
 14. Misker D, Misker B, Ayele G (2016) Household dietary diversity and associated factors in Mirab Abaya wereda southern Ethiopia, a community based cross-sectional study. *Divers Equal Health Care* 13(4): 293-6.
 15. Swindale A, Bilinsky P (2006) Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide. FANTA Project USAID.
 16. Hassen ZN (2013) Determinants of household dietary diversity and nutritional status of women in reproductive age group: The case of Addis Ababa, in Department of Food Science, Nutrition and echnoogy. University of Nairobi.
 17. Nega G, Melkie E, Degnet T, Amanuel N, W/Michael R, et al. (2015) Dietary diversity and associated factors among rural households in South Gondar Zone, Northwest Ethiopia, in Feed the Future.
 18. Workicho A, Belachew T, Feyissa GT, Wondafrash B, Lachat C, et al. (2016) Household dietary diversity and animal source food consumption in Ethiopia: Evidence from the 2011 welfare monitoring survey. *BMC Public Health* 16(1): 1192.
 19. Shahar S, Divya V, Arimi Fitri ML, Devinder Kaur AS, Hamid TA, et al. (2019) Factors associated with poor socioeconomic status among Malaysian older adults: an analysis according to urban and rural settings. *BMC Public Health* 19(4): 549.
 20. Mengesha AA (2018) Derminants of rural househod dietary diversity: The case of Bambasi disRICT, Benishangu Gumuz region, Ethiopia. Haramaya University: Haramaya.
 21. Taruvunga A, Muchenje V, Mushunje A (2013) Determinants of rural household dietary diversity: The case of Amatole and Nyandeni districts, South Africa. *International Journal of Development and Sustainability* 2(4): 2233-47.
 22. FAO (2008) Report on use of the household food insecurity access scale and household dietary diversity score in two survey rounds in Manica and Sofala provinces, Mozambique, 2006-2007.
- Address of Correspondence:** Endrias Markos Woldesemayat, Hawassa University, College of Medicine and Health Sciences, School of Public Health, Hawassa, Ethiopia, Tel: +25192304840; Email: endromark@yahoo.com
- Submitted: June 13, 2019; Accepted: July 25, 2020; Published: July 31, 2020*