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# Association of Women Leading Land Use with Energy and Nutrient Intakes Among Children Aged 6 to 59 Months in Oromia, Ethiopia

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**To cite this article:**

Geleta Dereje. Association of Women Leading Land Use with Energy and Nutrient Intakes Among Children Aged 6 to 59 Months in Oromia, Ethiopia. *Journal of Food and Nutrition Sciences*. Vol. 11, No. 2, 2023, pp. 53-62. doi: 10.11648/j.jfns.20231102.14

**Received:** March 29, 2023; **Accepted:** April 19, 2023; **Published:** April 27, 2023

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**Abstract:** Nutrition-specific interventions alone will not help countries to end child malnutrition; nutrition-sensitive interventions such as women empowerment are also needed. Therefore, this cross sectional study was conducted to assess the association of women leading land use with nutrient intakes among children aged 6 to 59 months in Oromia, Ethiopia. Three hundred thirty-two caregivers participated in the study. A pretested questionnaire was used to collect data on background characteristics of child caregivers, women leading land use status, and caregivers' exposure to mass media. Dietary assessment for nutrients intake was collected using a 24-hour recall. The survey data was analyzed using SPSS software version 25. Descriptive statistics were presented in frequency and percentages and in the form of mean  $\pm$  SD. The nutrient intakes were compared with recommended dietary allowances to analyze the gap between the intakes and the recommendations were presented as percentages. Any difference in the variables was compared, based on women leading land use, using Chi square test and Mann Whitney u test, depending on the type of data. Results were considered statistically significant at  $P < 0.05$ . Starchy staples were consumed by more than 90% of the children; close to  $\frac{3}{4}$  of the children consumed legumes and nuts; animal source foods consumption was below 20% except dairy products (84%). Vitamin A rich fruits and vegetables were consumed by 33% of the children on average; and the minimum dietary diversity score was achieved by 48% of the children. The median energy intakes for children aged above a year and calcium intakes during the second half of the first year were more than 90%. On the other hand, the intakes of energy, at the stage of the second 6 months, fat, the calcium ( $>1$  year) and the ascorbic acid intake were below 90%. Intake of Fat and Ascorbic acid was very low. Interestingly, iron intake for the children of 6-12 months age was more than 100%. However, there was statistical difference ( $p < 0.05$ ) in the proportion children of women with land leading power and without land leading power who consumed starchy staples, legumes and nuts, dairy products as well as ascorbic acid. Women empowerment in deciding land use issues affect about their child feeding practices and ultimately nutritional outcome and therefore, Women empowerment should be ensured for better child feeding practices and nutrients intake.

**Keywords:** Women Leading Land Use, Nutrient Intake, Children

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## 1. Introduction

Infants and early children in Ethiopia typically eat grains and legumes as part of their diets, consuming just a little amount of nutrient-dense foods from animal sources, fruits, and vegetables [4]. The bioavailability of minerals like zinc (Zn) and iron (Fe) is low due to many bioactive anti-nutrient factors such as phytates and oxalates [9]. Children in Ethiopia, therefore, have insufficient amounts of calories and

micronutrients including vitamins A, C, and zinc in their diets [2]. In a similar vein, child-feeding practices are also poor in the nation [5, 20].

The causes of malnutrition are at different levels. Inadequate nutrient intake, which is immediate cause of malnutrition of children, hurts the country's development by raising healthcare costs, lowering productivity, and slowing economic growth, which can exacerbate the cycle of poverty and ill health [8]. In the most recent Global Hunger Index

(GHI, 2022), Ethiopia is rated 104th out of 121 countries, with a score of 27.6%, which is considered a serious problem. Malnutrition is predicted to cost the country 4.7 billion dollars yearly and has serious long-term socio-economic repercussions (African Union Commission, World Food Program, United Nations Economic Commission for Africa, 2012). According to the CSA, the rates of underweight, stunting, and wasting among children under the age of five are 21%, 37%, and 7%, respectively, in Ethiopia [5]. The Sustainable Development Goal (SDG) 5 targets on gender equality, in which women's empowerment is one indicator and SDG2 targets malnutrition. Women's empowerment has been identified as a powerful lever for good nutrition, and gender inequality has been acknowledged as a barrier to meeting the nutritional needs of vulnerable groups [13].

Three theoretical axes have been used to relate nutrition and women's empowerment in agriculture. This pathway examines how women's participation in agriculture affects resource allocation for nutrition-related purposes within households, the availability of time for childcare and child feeding gave the labor stress, as well as the health and nutritional status of women [23]. Household food production and agricultural revenue are the other two pathways that link agriculture with reduced malnutrition [22]. According to empirical data, women's empowerment improves nutrition for mothers, their children, and other family members. Agriculture can also be a hazard to family nutrition, particularly when women are required to labor at times and places that interfere with feeding their young children and babies. To increase human capital formation, especially in terms of child nutrition, health, and education, it is seen to be desirable to invest in women [24]. One of the five domains of women's empowerment in agriculture (WEAI) is access to and decision-making authority over productive resources. In particular, for nations like Ethiopia, the land is one of the most important resources. As more than Agriculture, which contributes 40% of the country's GDP and is practiced by more than 70% of the population, is essential to the economy [25]. Making decisions regarding land usage is seen as a sign of status and power [1]. In addition, having control over land use gives women more power over other productive resources that contribute to household well-being than when men do [8], reduces poverty, and ensures access to food and nutrition, gives them control over household decisions regarding healthcare, social interaction, investment, family planning, and household expenditure [7], and increases crop yields [9]. However, because women own only 2% of the world's land, there is a substantial gender gap in access to land, which is a critical issue for women whose economies depend on agriculture [10]. Women are the most marginalized group in Ethiopian society when it comes to accessing and controlling land because most of the customary practices do not take gender equality seriously when it comes to the leading of land, household agricultural product decision-making, and access to and control of productive resources [12, 21]. However, little research has been done on the relationship between women's land use and under-five children's energy and nutrient intake in Ethiopia. Therefore, taking women leading land use which is one form of nutrition sensitive intervention to

end malnutrition, the current study sought to examine the relationship between women leading use of land in Adea, Girar Jarso, and Sebeta Hawas woredas of Oromia with energy and nutrient intakes of children aged 6 to 59 months.

## 2. Materials and Methods

### 2.1. Description of Study Area

Oromia region is one of the eleven regions in FDRE with 353,690 km<sup>2</sup> of land area (32% of Ethiopian land), and is the largest regional state. Currently the region is organized into 21 Zones and 356 woredas. The study was conducted in three rural woredas of the region namely Sebeta Hawas, Girar Jarso and Adea from December 2020 to March 2021. Sebeta Hawas is one of the woredas in Finfinne Surrounding Oromia Special Zone while Girar Jarso and Adea woredas are parts of North and East Shoa zone, respectively. Yet, all of the study areas are located in central Ethiopia within a distance of 20 kilometers (Sebeta Hawas), 50 kilometers (Adea) and 100 kilometers (Girar Jarso) from Addis Ababa. The three study woredas were selected because of the highly fertile land that is suitable for production of cereals, pulses and other crops, and because of its better access to infrastructure and market compared to other woredas of the region.

### 2.2. Study Design, Subjects and Sample Size

The study was conducted using population based cross sectional design. The study subjects were, caregivers of children aged 6 to 59 months. The sample size was calculated using online sample size calculator for comparing two proportions, assuming 95% confidence level, 80% power, assuming calcium intake among women without land ownership 59%, and expecting the proportion among women with land ownership as 70%. Assuming 15% non-response rate the total sample size became 338. Then, subjects were randomly selected from the three woredas using health center registration book as a sampling frame. The number of subjects to be taken from each woreda was based on probability proportional to population size. Complete data was not collected from six subjects then the total subjects included in the study was 332.

### 2.3. Inclusion Criteria

Caregivers whose livelihood depends on agriculture, had children aged 6 to 59 months, healthy and volunteer to participate in the study were included.

### 2.4. Exclusion Criteria

Sick children during the time of the survey, and those who were not permanent residents in the study area were excluded from the study.

### 2.5. Data Collection Procedures and Quality Control

Questionnaires were prepared by reviewing different literatures. The questionnaire was prepared in English and

was translated to the local language (Afan Oromo). The questionnaire has six sections, the first section included questions related to background characteristics of the women in the study areas. The second section contained questions related to access to mass Media. The third and the fourth sections included questions related with land and health, and nutrition of the mothers and the children respectively. The fifth and sixth sections correspondingly included questionnaire about child nutrient intakes and household dietary diversity. The questionnaire was pre tested on similar but non-study population. Experienced data collectors were recruited and were provided refresher training on how to collect the data. Data was collected when there was no special occasion both for the Christians, Muslims and other religion followers. The pretested questionnaire was administered to the women after having consent from them.

### 2.6. Dietary Intake Assessment

Dietary intake assessment was carried out using 24-hour dietary recall method. On behalf of the child, primary child caregivers participated in the dietary recall. Portion size estimation was done through direct weighing of the food and drinks taken during the recall period and using salted replica of the food. The participants also estimate the portion size of a leftover if any. The estimation was done twice for each food and the average measurements was taken for analysis. The estimated portion size was weighed and converted in to gram after weighing.

Food composition tables of Ethiopia part 3 and 4 were used to convert food consumption data into energy and nutrient intakes using Nutrisurvey 2007. The nutrient composition of thin gruel made from the flour of mixture of different cereals and legumes was calculated from the flour in Ethiopian FCT [26].

### 2.7. Statistical Analysis

The normality of data was checked and SPSS version 25 was used for data analysis. Comparison of each variable was done using based on women leading land use. The result was presented in the form of frequency counts for categorical variables and in the form of mean  $\pm$  SD for continuous variables. The estimated nutrient intakes were compared with RDA and the gap between the intakes and the recommendations were presented as percentages. Then, any difference in the variables, based on women-land ownership, was compared using Chi square test and Mann whitney u test depending on the type of data.

### 2.8. Ethical Clearance

The study was conducted after obtaining ethical approval for the protocol from Addis Ababa University College of Natural and Computational Sciences Institutional Review Boards and Oromia Health Bearue. The overall objective of the study and the possible risks and benefits of the study to the participating volunteers were clearly presented. When the participants were willing to take part in the study, verbal consent was obtained from the household. The data from the participant were obtained using oral interview. All the information collected from participants was kept confidential, in such a way that personal information was not disclosed.

## 3. Results

### 3.1. Background Characteristics of the Respondents

The mean age of the mothers was thirty-one ( $30.9 \pm 4.9$ ) and sixty percent (59.9%) of them were married while the remaining were either divorced or widowed (40%). More than half of the caregivers received formal education (53.2%). The average family size of the households was 6 ( $6.3 \pm 2$ ) but close to 80% of the households with the children were having more than five family members. Sixty-eight percent of the caregivers were Orthodox Christians and majority of them were farmers (79.2%). Majority of the caregivers received nutrition education (65.9%) through the health extension services (Table 1) that included practices of hygiene, sanitation and child feeding. Nevertheless, those who received it through the media were only 13%. More than  $\frac{3}{4}$  (78%) of the women received pre-natal or post-natal care from a health center while pregnant with the study child. Mothers were the decision makers about family wellbeing in forty percent of the households; however, most of the children's caregivers were both parents (59.9%). On the otherhand, the mean age of the children was 38 months ( $38 \pm 20$ ). But a little bit higher than half of the children were between 13-36 months of age while the remaining 10% and almost 40% of the children were between the months of 6-12 and 37-60 respectively (Table 1). The proportion of male (52%) and female (48) children in the study were almost equal and majority of them ever got vaccinated (87.7%).

The proportion of married women among those women who own land were lower than those who do not own land. Similarly, higher proportion of women without land received education at the level of secondary and above. Although, less than 15% of the households practice pastoral/agro pastoral activities, relatively more number of women with land ownership practice it.

**Table 1.** Background characteristics of 6 to 59 children and their caregivers in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

Variable	Mean $\pm$ SD/ Frequency (%) (332)	Mothers of children With land ownership (143)	Without land ownership (189)	P Value
Mother's age	30.9 $\pm$ 4.9	30.84 $\pm$ 4.86	30.06 $\pm$ 4.86	0.15
Marital status:				
Married	199 (59.9)	69 (48.25)	130 (68.78)	0.00
Divorced/ widowed	133 (40.1)	74 (51.75)	59 (31.22)	

Variable	Mean ± SD/ Frequency (%) (332)	Mothers of children With land ownership (143)	Without land ownership (189)	P Value
Educational status:				
No formal education	155 (46.7)	73 (51.05)	82 (43.39)	0.003
Primary	120 (36.1)	57 (39.86)	63 (33.33)	
Secondary and above	57 (17.1)	13 (9.09)	44 (23.28)	
Religion:				
Muslim	66 (19.9)	28 (19.58)	38 (20.11)	0.69
Orthodox Christian	227 (68.4)	101 (70.63)	127 (67.20)	
Other	39 (11.7)	14 (9.79)	24 (12.70)	
Family size:				
≤ 5	71 (21.4)	37 (25.87)	36 (19.05)	0.14
>5	261 (78.6)	106 (74.13)	153 (80.95)	
Livelihood system:				
Pastoral/ agro pastoral	47 (14.16)	13 (9.09)	34 (18.00)	0.03
Farmer	263 (79.22)	124 (86.71)	139 (73.54)	
Government/private employee	1 (0.30)	0	1 (0.53)	
Other	21 (6.33)	6 (4.20)	15 (7.93)	
Received ante natal /post-natal care				
Yes	259 (78)	108 (75.52)	153 (80.95)	0.23
No	71 (21.4)	35 (24.48)	36 (19.05)	
Received nutrition education				
Yes	218 (65.66)	89 (62.24)	129 (68.25)	0.52
No	114 (34.34)	54 (37.76)	60 (31.74)	
Received health & nutrition related information from media				
Yes	44 (13.25)	17 (11.89)	27 (14.29)	0.25
No	288 (86.75)	126 (88.11)	162 (85.71)	
Decision maker about family wellbeing:				
Mother and father	194 (58.4)	86 (60.14)	107 (56.61)	0.52
Mother only	138 (41.6)	57 (39.86)	82 (43.39)	
Child characteristics				
Child sex:				
Male	173 (52)	73 (51.05)	93 (49.21)	.074
Female	159 (48)	70 (48.95)	96 (50.79)	
Child age (months)				
6-12	33 (9.9)	16 (11.2)	28 (14.8)	0.61
13-36	170 (51.1)	67 (48.6)	85 (45)	
37-60	129 (38.9)	60 (42)	75 (39.7)	
Child caregiver				
Both parents	199 (59.9)	109 (76)	80 (42)	0.04
Single mom	133 (40.1)	34 (24)	109 (58)	
Child ever vaccinated				
Yes	291 (87.7)	116 (81.12)	175 (92.59)	0.002
No	41 (12.3)	27 (18.88)	14 (7.41)	

### 3.2. Properties Owned by Caregivers of Under-Five Children

Domestic animals such as goats, sheep, cows, chickens were owned by 80% of the respondents. Close to 40%, 26.2% and 37% of the respondents had access to radio, television and mobile phone respectively. However, the proportion of

women who own radio and mobile phone were higher among women without land. From the total women only 45.2% had independent income source and almost half (49.4) of them have access to credit services from credit providing institutions such as government and bank institutions. Majority (80.1%) of the households are members of one or more associations such as Ikub and Idir (Table 2).

**Table 2.** Properties owned by caregivers of under-five children with and without women land ownership, Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

Property name	Frequency (Percent)	Women with land 143	Women without land 189	P Value
Own livestock				
Yes	266 (80.1)	122 (85.31)	146 (77.25)	0.06
No	66 (19.9)	21 (14.68)	43 (22.75)	
Own radio				
Yes	131 (39.5)	47 (32.8)	84 (44.4)	0.03
No	198 (59.6)	96 (67.1)	105 (55.5)	
Own television				
Yes	87 (26.2)	39 (27.27)	48 (28.40)	0.7
No	245 (73.8)	104 (72.72)	141 (74.60)	

Property name	Frequency (Percent)	Women with land 143	Women without land 189	P Value
Own mobile phone				
Yes	123 (37)	44 (30.7)	79 (41.7)	0.039
No	209 (63)	99 (69.2)	110 (58)	
Women with independent income source				
Yes	150 (45.2)	58 (40.56)	96 (50.79)	0.6
No	181 (54.5)	85 (59.44)	93 (46.21)	
Access to credit service				
Yes	164 (49.4)	71 (49.65)	100 (52.91)	0.56
No	166 (50)	72 (50.35)	89 (47.10)	
Member of one or more associations				
Yes	266 (80.1)	115 (80.42)	151 (79.89)	0.9
No	66 (19.9)	28 (19.58)	38 (20.10)	

### 3.3. Women Land Ownership and Land Use Related Information of Caregivers of Under-Five Children

All participants do have land to use (Table 3); however, 31% of the participants owned the land through rent while (9.9%) owned it through other form of land ownership (9.9%). The land size of close to 95% of the participants was less than 2ha and the women land ownership was 43.1% (Table 3). However, 31.9% of the women reported that traditionally there are barriers that prevent women's equal access and

utilization of land with men. More than half (56.9%) of the land ownership was by fathers, sons or jointly by fathers and mothers (Table 3).

Most of the farmers produced either fruits or vegetables in addition to cereals and pulses. However, more than 1/3 (34.6%) of the households produce only cereals and pulses. Intercropping method of agricultural production was used by 19.6% of the participants; however, less than 10% (7.8%) of the households used irrigation facility for production of agricultural commodities.

**Table 3.** Women land ownership and land use related information of caregivers of under-five children in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

Property name	Frequency (Percent)	Women with land 143	Women without land 189	P value
Have land to use				
Yes	100	143 (43.10)	189 (56.93)	0.012
Form of land ownership				
Own land	197 (59.3)	84 (58.7)	112 (59.3)	0.99
Rented	102 (30.7)	45 (31.4)	58 (30.6)	
Other	33 (9.9)	14 (9.8)	19 (10.0)	
Land size				
< 2 hectare	312 (94)	138 (96.5)	174 (92)	0.092
≥ 2 hectares	20 (6)	5 (3.5)	15 (7.9)	
Practice intercropping				
Yes	65 (19.6)	28 (19.6)	36 (19)	0.90
No	267 (80.4)	115 (80.4)	153 (80.9)	
Irrigation facility				
Yes	26 (7.8)	10 (7.0)	16 (8.5)	0.62
No	305 (91.9)	133 (93)	173 (91.5)	
Commonly produced crops:				
Cereals and pulses only	115 (34.6)	53 (37.1)	62 (32.8)	0.22
Fruits and vegetables only	37 (11.1)	20 (14.0)	18 (9.5)	
Cereals, pulses, fruits, vegetables	179 (53.9)	70 (49)	109 (57.7)	
Barriers exist to women land ownership				
Yes	106 (31.9)	45 (31.5)	61 (32.3)	0.88
No	226 (68.1)	98 (68.5)	128 (67.7)	

### 3.4. Women Mass Media Use

Only 1% of the women read newspaper and only a little bit higher than a quarter of the women watch television and listen radio at least three times a week; however there was no

significant difference in the proportion of women who use mass media based on women land ownership. Even though it was not statistically significant more number of women without land listen radio (Table 4).

**Table 4.** Caregivers of under-five children that use mass media at least three times a week categorized on women land ownership in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

Type of media	All n (%) (332)	Women with land (143)	Women without land (189)	P Value
Read newspaper				
Yes	4 (1.2)	2 (1.4)	2 (1.1)	0.94
No	11 (3.3)	5 (3.5)	6 (3.2)	

Type of media	All n (%) (332)	Women with land (143)	Women without land (189)	P Value
Watch TV				
Yes	91 (27.4)	40 (28)	51 (27)	0.19
No	6 (1.8)	1 (0.7)	5 (2.6)	
Listen radio				
Yes	95 (28.6)	35 (24.5)	60 (31.7)	0.56
No	35 (10.5)	11 (7.7)	24 (12.7)	

### 3.5. Number of Food Groups Consumed by the Children in Sebeta Hawas, Girar Jarso and Adea, Oromia

Starchy staples were consumed by more than 90% of the children and close to a  $\frac{3}{4}$  of the women consumed legumes and nuts. However, children who consumed flesh foods and eggs were below 20%. On the other hand, children who consumed dairy products were 84% (Figure 1). Vitamin A rich fruits and vegetables and other fruits and vegetables were consumed only by less than forty

percent of the children. The minimum dietary diversity score was achieved only by 46% of the children (Figure 2). The proportion of children of women, who own land, that consumed starchy staples and dairy products were 95.1% and 89.5% respectively and it was higher than the proportion of children of women without land who consumed the foods (87.8%) and (79.3%). On the other hand, the proportion of children of women without land, who consumed legumes and nuts were (78.3) higher than those children of women with land (64.3) ( $P < 0.05$ ).

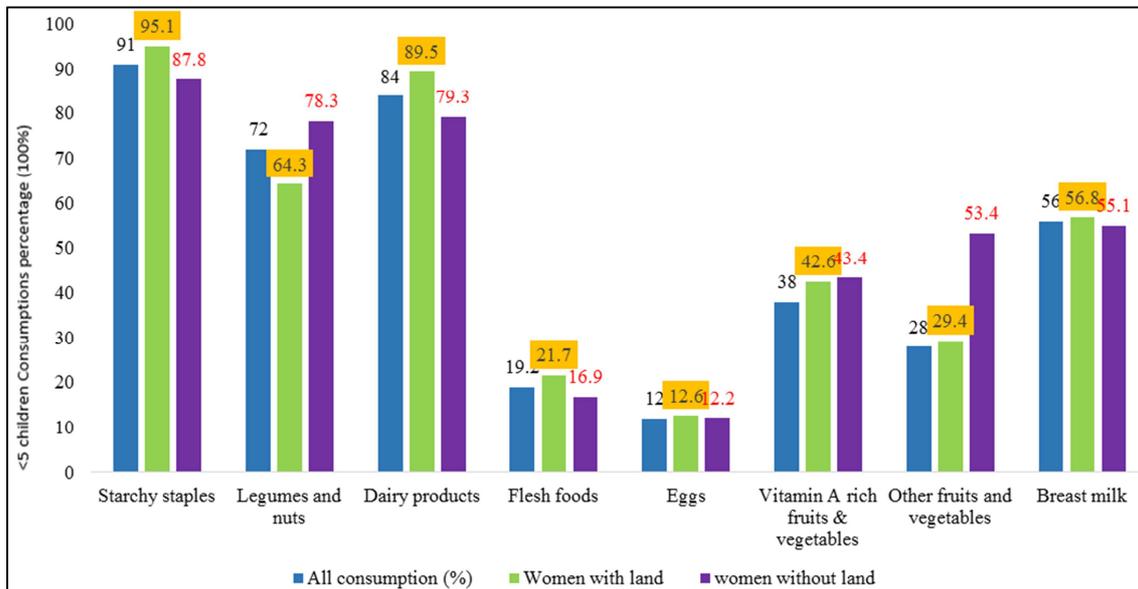


Figure 1. Food groups consumed by children aged 6 to 59 months with respect to leading land usage in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

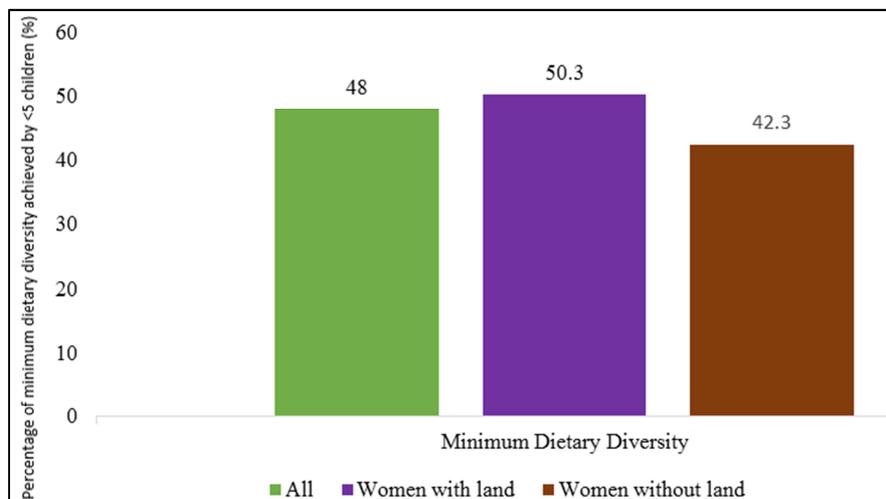


Figure 2. Minimum diet diversity consumption of children aged 6 to 59 months with respect to landownership in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

### 3.6. Energy and Nutrient Intakes of the Children

The median energy intakes was more than 90% of the recommended intakes for children aged above a year. However, the median intakes of the children at the stage of the second 6 months was below 90%. On the other hand, the average protein intakes was close to 90%. However, the fat intake was almost 50% of the recommendation on the average. The calcium intakes was above 90% of the

recommended amount during the second half of the first year. Conversely, the calcium intakes of those above one year was only 66% of the recommendation. Similarly, the iron intakes of the children of 6-12 months age was 109%, however, it is 93% for children of above one year. (Table 5). Though the ascorbic acid intake was below 20%, the intakes of children of women without land was significantly higher than those children of women who own land ( $P < 0.05$ ).

**Table 5.** Energy and nutrient intakes of children aged 6 to 59 months relative to the recommended intake and women land ownership in Sebeta Hawas, Adea, and Girar Jarso woredas of Oromia.

Nutrients	Child age	Recommendation		Child intake		Children of mothers		P value
		Males (M)	Females (F)	All Median	Percent recommended (M, F)	With land	without land	
Energy (K/calorie) (EER)	6-12	743	676	604	(81, 89)	1073	1055	0.09
	13-36	1046	992	987	(94, 99)			
	37-59	1742	1642	1602	(92, 98)			
Protein (g) RDA	6-12	11		10	(91)	14	15	0.83
	13-36	13		12	(92)			
	37-60	19		17	(89)			
Fat (g) (AI)	6-12	30		15	(50)	22	21	0.51
	13-36	35		21	(60)			
	37-60	58		26	(45)			
Iron (mg) (AI)	6-12	11		12	(109)	9.6	9	0.67
	13-36	7		6.5	(93)			
	37-60	10		9.4	(94)			
Calcium (mg) AI	6-12	260	270	254	(98, 94)	362	372	0.33
	13-36	500		354	(71)			
	37-60	800		493	(62)			
Ascorbic acid	6-12	50		2.34	(4.6)	2.3	3.8	0.02*
	13-36	15		2.65	(18)			
	37-60	25		2.59	(10)			

## 4. Discussion

The key to ending malnutrition in all its forms requires scaling up proven nutrition interventions [6]. In cognizant of this, the present study unpacked energy and nutrient intakes of children 6 to 59 months of age. Close to one third of the women watch TV and listen to radio at least three times a week on average. However, those women who received health & nutrition related information through mass media were less than 15%. This indicates that the mass media is underutilized with regard to conveying information related to health and nutrition. The proportion of participants who produce cereal and pulses and fruits and vegetables only were close to 50% this might be related to the small land size they own. However, starchy staples and legumes, and nuts were consumed commonly among the children. Regrettably, this was combined with the low consumption of animal source foods, except dairy products. Fruits and vegetables consumption was also very low. As a result, the minimum dietary diversity (MDD) score was achieved by less than 50% of the children. This low MDD is common in sub-Saharan African countries [19]. According to previous reports, low MDD was associated with child stunting [17]. Therefore, the prevalence of stunting in the study area is possibly high as a result of the low MDD. More diversified diet is highly

correlated with adequate energy and protein, micronutrients, and animal-source food [15].

In the present study, the intake of energy, fat, calcium, iron and ascorbic acid among the children was below the recommendation, which is possibly associated with the low MDD. This is in line with the nutrition collaborative research support program report that indicated that low animal-source food consumption is associated with low intakes of nutrients such as calcium, zinc, riboflavin etc. [3] all of which are considered vital for healthy body development, muscle growth, and nervous system function, and are recommended to be consumed on a regular basis [18].

The proportion of women leading land usage was less than 50% this is unfortunate given that the proportion was not in line with the Federal Democratic Republic of Ethiopia (FDRE) constitution, which recognizes gender equality [11]. Above all, the low women leading land usage will have significant impact on children intake of nutrients and it was expressed in this study through high consumption of dairy products among children of women with leading land usage ( $p=0.013$ ). The high consumption of dairy products among the children was without the presence significant difference in the proportion of women who own livestock among the two groups of women. In this study large proportion of women with land were single moms that will enable them to have decision making power on child feeding. This women's

autonomy allows them to choose the right or wrong thing on child feeding according to Jennings (2015) which have positive contribution on both long and short-term nutritional status of children [14].

Approximately a third of the women reported the existence of barriers to leading land usage in the area. This result is in line with the report from Wolaita that indicated challenges to women's right to and control over rural land because of pessimistic attitude of the community towards women and lack of legal awareness on the extent of their right to the rural land. Besides, there is resource limitation and lack of an effective legal aid system to women that challenges them in enforcing their right through the trial scheme that has a lengthy procedure from the lowest administrative unit to the federal court of cassation [27].

A large proportion of children of women leading land usage got their child vaccinated ( $p < 0.05$ ). This is a good news because it is known that vaccination is associated with good nutrition. The possibility of large vaccination uptake among children of women without leading land usage could be the better educational status ( $P < 0.05$ ) among the women. In addition, working in other sectors than farming ( $p = 0.03$ ), having radio ( $p < 0.05$ ) and mobile phone ( $p < 0.05$ ) would give them access to information related to the benefits of child vaccination.

The consumption of starchy staples by significant proportion ( $p < 0.05$ ) of children of women with leading land usage and the high consumption of legumes and nuts ( $p = 0.005$ ) among children of women without leading land usage could be because of the presence and absence of male support among women without land and with land respectively. The ascorbic acid intake of children of women with leading land usage was substantially lower than women of children without leading land usage; this might be related to the higher proportion of children of women without leading land usage who consumed other fruits and vegetables.

Less than 50% of the children met the minimum diet diversity and there was no association between land ownership and diet diversity this result disagrees with the report from rural Ethiopia that indicated association between land ownership and high diet diversity [16]. Women landownership was partially associated with child-feeding practices and nutrient intake. Nevertheless, it was known that women's empowerment facilitates the IYCF practices. However, child-feeding practices has multiple dimensions therefore in addition to empowering women their workload should be limited so they still have time to provide optimal IYCF practices to their children. However, in this study, substantial proportion of women with landownership were single moms who did not get male support.

## 5. Conclusion

Starchy staples, legume, and nuts were consumed widely among the children. However, consumption of animal-source source foods was very low except dairy products. Likewise, the intake of Vitamin A-rich fruits and vegetables and other

fruits and vegetables was small. A little number of children achieved the minimum dietary diversity.

Energy and iron intake among the children aged above a year for all ages are almost adequate (close to 100% of the recommendation) but not for more than a year. However, the median fat intake fulfilled only half of the recommendation for all the children on average. However, calcium intakes of the children 13 to 59 months of age was below 70% of the recommended amount. Similarly, the median intakes of ascorbic acid were very low. In general, consumption of starchy staples, legumes and nuts and dairy products as well as ascorbic acid intake was associated with land ownership. Therefore, Women empowerment in deciding land use issues affect about their child feeding practices and ultimately nutritional outcome.

## 6. Recommendations

Production and consumption of diversified diets should be promoted and it is also necessary to strengthen the role of women and their landownership, so that they will be more confident in performing appropriate feeding of their children and the children will be well nourished. The society residing in the rural areas should be encouraged to utilize information obtained from different sources such as mass media for better child-feeding behavior. Extension service has to be further enhanced and strengthened to promote optimal infant and young child feeding practices through the promotion of consumption of diversified diet by including animal source food. Ensuring equal access and use of assets for both males and females in home can bring positive impact on children nutrient intake. The farmers should be encouraged to produce and consume commodities such as fruits and vegetables for the sake of dietary diversity by practicing home gardening, irrigation and others. Similarly, the promotion of small animal rearing for household consumption may also bring significant improvement in the consumption of animal source. Further research is also needed to study child nutritional status and to identify the effect of seasonal variation on nutrient intake and feeding practice.

## 7. Limitations and Strength of the Study

This study investigated the association between women leading land usage with nutrient and Energy intake but it did not study the direction of the association. In addition, the study design cross-sectional; and it has no data on child nutritional status. However, the study unpacked association of women leading land usage with nutrients intakes, which can fill the huge information void in the country on the topic.

## Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the Geleta Dereje up on reasonable request.

## Declarations

### *Ethics Approval and Consent to Participate*

Ethical approval for the protocol was obtained from Addis Ababa University College of Natural and Computational Sciences Institutional Review Boards and Oromia Health Bureau. From all of the study participant's and their legal guardians/parents verbal consent were taken after informing the study protocol to all individuals before taking part in the study and the Ethics Committee of Addis Ababa University approves this method. All methods were performed in accordance with the relevant guidelines and regulations.

### *Competing Interests*

The authors declare that there is no competing interests.

### *Consent for Publication*

Not applicable.

### *Funding*

Oromia Agricultural Research Institute.

### *Authors' Contributions*

Study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

## Acknowledgements

First, I would like to thank the Almighty God. Next, I would like to express my gratitude to Zeweter Abebe (PhD) and Aynadis Tamene (PhD), Addis Ababa University, Center of Food Science and Nutrition, Oromia Regional Health Bureau, woreda administrative staff of Sebeta Hawas, Girar Jarso and Adea, Oromia Agricultural Research Institute, health extension workers in the study area and my respondents for their genuine participation in the study, families especially Fekadu Dereje (PhD) and friends.

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