OPEN ACCESS Freely available online

Journal of Nutrition and Food Sciences

Research Article

Effect of Improved Poultry Husbandry Practice Together With Key Nutrition Message on Dietary Diversity and Nutritional Status of 6-23 Months Old Children in Hawassa Zuria Woreda, Sidama Region, Ethiopia

Kassu Arussa*, Fikadu Reta, Dereje Getahun

Department of Food Science and Technology, Hawassa University, Awasa, Ethiopia

ABSTRACT

There are limited studies in Ethiopian context about the magnitude of positive changes on the nutritional status and dietary diversity of children as a result of nutrition sensitive agriculture interventions. Therefore, the aim of this study was providing improved poultry husbandry together with key nutrition messages to assess its effect on dietary diversity and nutritional status of children of age 6–23 months. Quasi-experimental study design was employed on 246 mother-child pair respondents. Anthropometric measurements were taken at the baseline and end line. Data regarding socio-demographic, child and mother related characteristics were collected using semi-structured questionnaire. Dietary diversity data was collected using the WHO seven food groups. The result showed that attaining minimum dietary diversity was improved significantly ($P<0.05$) from 11% at the baseline to 71.5% at the end line: Egg consumption was significantly ($p<0.05$) increased from 19% at the baseline to 100% at the end line: Prevalence of stunting was reduced from 41.9% at the baseline to 40.7% at the end line: Underweight was reduced from 28.9% at the baseline to 27.6% at the end line: Wasting significantly ($p<0.05$) decreased from 14.2% at the baseline to 12.2% at the end line. It is concluded that providing improved poultry husbandry together with key nutrition messages could improve the dietary diversity and the nutritional status of the children. Collaboration of stakeholders on agriculture and food-based interventions were recommended to improve the dietary diversity and nutritional status of children.

Keywords: Improved poultry husbandry; Key nutrition messages; Dietary diversity; Nutritional status; Children of age 6–23 years old

INTRODUCTION

The widespread malnutrition leads to high incidence of diseases and deaths among children under five years of age. Malnutrition remains a serious problem in most developing countries, affecting particularly vulnerable groups, especially children under the age of five. It is directly or indirectly responsible for 45% of all child deaths worldwide [1]. Ethiopian Mini Demographic and Health Survey (EMDHS) of 2019 shows that 21% of all children are underweight (below-2 SD), and 6% are severely underweight (below -3 SD). Children in rural areas are more likely than those in urban areas to be underweight (23% versus 14 %) [2]. In the Mini-Survey, improving the quality of complementary food has been cited as one of the most cost effective strategies for improving health, reducing morbidity and mortality of young children. Nearly one third of child deaths could be prevented by optimal complementary feeding practices [3].

Nutritional status is the result of complex interactions between food consumption and the overall status of health and health care practices. Numerous socioeconomic and cultural factors influence patterns of feeding children and the nutritional status of women and children. The period from birth to the age of two years is especially important for optimal growth, health, and

Correspondence to: Kassu Arussa, Department of Food Science and Technology, Hawassa University, Awasa, Ethiopia, Tel: 0916158809; E-mail: kassuaru12@gmail.com ir

Received: 21-Apr-2022, Manuscript No. JNFS-22-15960; **Editor assigned:** 25-Apr-2022, PreQC No. JNFS-22-15960 (PQ); **Reviewed:** 09-May-2022, QC No. JNFS-22-15960; **Revised:** 17-June-2022, Manuscript No. JNFS-22-15960 (Q); **Published:** 25-June-2022, DOI: 10.35248/2155-9600.22.12.862

Citation: Arussa K, Reta F, Getahum D (2022) Effect of Improved Poultry Husbandry Practice Together With Key Nutrition Message on Dietary Diversity and Nutritional Status of 6-23 Months Old Children in Hawassa Zuria Woreda, Sidama Region, Ethiopia. J Nutr Food Sci. 12:862

development. Unfortunately, this period is often marked by micronutrient deficiencies that interfere with optimal growth [4].

Dietary quality is typically determined by diversity of the consumed diet. Foods with similar nutritional qualities are first grouped together and dietary diversity is measured by the number of different food groups consumed in a certain time interval. Recent analysis of the timing of growth faltering of young children suggests that poor complementary feeding practices, including poor dietary quality is an important risk factor for stunting in Ethiopia [5].

There is renewed interest in poultry production as a means of improving nutrition among young children and women and increasing income. Though poultry meat is also a nutritious Animal Source Food (ASF), eggs are considered particularly promising from a nutrition standpoint [6]. In relation to international development activities, a range of approaches has been employed to promote improved poultry production, including egg production, with varying degrees of success. Sustainability of small scale layer chicken projects has met with mixed results in per-urban areas and proved largely elusive beyond the end of external support in rural areas, frequently due to inadequate access to essential and affordable inputs [7].

However, there is evidence gap about magnitude of change on nutritional status of children due to nutrition sensitive interventions such as poultry production promotion and nutrition education. In the study area, chicken production is very low and so is egg consumption. The households think that chicken production is labor-intensive. Due to this, the possibility of children to consume egg is very low. The benefits of egg consumption for children are not well known. Therefore, this study aimed to assess the effect of providing genetically improved chicken together with key nutrition message on nutritional status and dietary diversity of the children of age 6–23 months.

MATERIALS AND METHODS

Study area: The study was conducted in Jara Hinesa kebele, Hawasa Zuria Woreda, Sidama region, Ethiopia. It is found at a distance of 294 Km South of the capital city, Addis Ababa. Hawasa zuria woreda has 27 kebeles administrations. Among these 25 of them are 3 urban kebeles and 22 are rural kebeles. The total population of Hawasa Zuria woreda was estimated to be 170,130. Among these 85,270 were females and the rest 84,860 were males. The total number of households in the world were estimated to be 21881 households with an average family size of 5 persons per household. There was no adequate and reliable meteorological data to describe the climatic condition of Hawasa zuria Woreda. However, some data revealed the climatic zone in the study area was temperate (qola and woynadega). Mean annual rainfall was estimated to 700 mm. The average altitude of the woreda was 1500 to 2100 meters above sea level. The area had two cropping seasons: These were belg, usually known as the small rainy season (starting from February to May) and meher also known as the major rainy season (starting from June to September).

Study design: Quasi-experimental study design was employed. Data was collected twice; at base line and end line (having given nutrition education and 2 chickens per a household).

Study population and sampling: All randomly selected mothers/caregivers who had children of age 6–23 months and who lived at least for six months in the study area. The data was collected from September 2020–December 2020.

Sample size was determined using the single population formula. It was calculated by using a previous prevalence of 80% [8] with a margin of error of 0.05 and a confidence level of 95%. Accordingly, 246 was the maximum sample size used for the study.

All voluntary mothers/caregivers who had children of age 6-23 months were respondents whereas mothers/caregivers whose child was sick during data collection or sick mother/caregiver or unable to respond during the data collection or children who did not consume egg were excluded.

Data collection: Semi-structured questionnaire was used to collect the data. The questionnaire was prepared primarily in English and then translated to the Sidaama afo (local language of the community) and cross checked the appropriateness of the translation. The questionnaire was tested on 5% of the sample size in one of the non-adjacent kebeles' to the study area.

A 24 hour dietary recall was conducted to obtain information on subjects' dietary diversity and food intake. Dietary diversity score was used to assess the dietary diversity of children. The dietary diversity was assessed by asking mothers/caregivers to recall all food groups consumed by children in previous 24 hour prior to the interview. The WHO 7 food groups that were used for calculation of diet diversity score were :1) Grain, root and tubers 2) Legumes and nuts; 3) Dairy products (milk, Yogurt, cheese 4) flesh foods (meat, fish, poultry and liver/organ meats 5) Eggs; 6) Vitamins A rich fruits and vegetables and 7) Other fruit and vegetables. Food groups were assigned "1" for those who consumed the food item and "0" for those who did not consume the food item over past 24 hour.

Anthropometric measurements were taken using standardized (calibrated) instruments. Height, weight and age of the children were recorded. The data was collected twice, *i.e.,* during baseline and end line. The data was collected by 10 HEWs who took a two days' training.

Nutrition key message delivery strategies for promotion of poultry and egg consumption. Nutrition education and promotion of homestead poultry was the key elements of the intervention implemented in this study. It was conducted as mass key nutrition message as well as individual counseling at kebele and the household level for 5 days. The major actors involved were HEWs, the research assistant (nutritionist) and the principal investigator. Behavioral Change Communication (BCC) materials were developed to support the key nutrition message and poultry promotion activity. The BCC material was a poster conveying nutrition and poultry production key messages written boldly and supported by illustrative pictures.

The improved poultry varieties (chickens) which were provided to the households are able give egg at their 6 months of age.

They were given to the households while they were at their fourth month of age at the end of September 2020. The AEWs and HEWs, were gathering information about when the hens begin giving eggs. It was known that the hens started giving egg at the end of November 2020.

Data analysis: WHO Anthro v 3.2.2 was used for calculation of anthropometric indices of z-scores of length for age (LAZ, also called HAZ when a child was measured in standing position), WAZ and Weight for Height (WHZ). Stunting, underweight, and wasting were defined as LAZ, WAZ, and WHZ less than -2 Standard Deviations (SD) below median values respectively. The effect of improved poultry husbandry together with key nutrition message on the dietary diversity and nutritional status of the children was measured using logistic regression. P-value<0.05 was considered significant. SPSS software (IBM SPSS Statistics, Version 20) was used for analysis.

Ethical consideration: An ethical clearance was obtained from the Institution Review Board of Hawassa University. Support letter was written to the study worked health bureau from the School of Nutrition, Food Science and Technology. An oral or written consent was obtained from the mothers or care givers to confirm permission to participate in the study.

RESULTS

Socio-demographic characteristics of the study respondents: A total of 246 respondents of pairs of mothers and children of age between 6–23 months were participated in this study with response rate of 100%. About 38% of the mothers were older than 30 years of age, about 97% of the mothers were married and about 52% of the mothers went to primary school, as shown in Table 1.

Diet diversity of the children at the baseline and end line: Grains, roots and tubers consumed daily, as the respondents response showed in Table 2. Egg consumption was about 19% during the baseline survey whereas it became 100% during the end line survey.

Nutritional status of the children at the baseline and end line: Anthropometric measurements were performed to assess the nutritional status of the children before and after intervention. Accordingly, about 42% of the children were stunted during the baseline survey where as it was improved by about 1% during the end line survey. About 35% and 30% of the children were wasted at the baseline and end line, as shown in the Table 3.

DISCUSSION

The baseline survey result of dietary diversity manifested that only 19% of the children obtained egg-incorporated complementary food in the past 24 hours during the survey. This was basically due to limited availability and accessibility of egg. This finding is consistent with the 2016 Ethiopian Demographic and Health Survey [9] in which out of 2607 children only 17% were obtained egg-incorporated complementary food during the day and night before the interview. Our result is also in agreement with the study done in Aleta Wondo District, Southern Ethiopia, where out of 502 the same target group, only 21.5% obtained egg-incorporated complementary food [10]. In contrast, slightly higher (26.2%) egg-incorporated complementary food consumption was recorded in the study conducted in Robe Town, Bale Zone, Ethiopia [11]. The possible reason may be due to the study area, which is urban area when compared with the current study.

On the other hand, the end line result revealed that all (100%) of the children consumed egg-incorporated complementary food 24 hours before the interview, which is statistically significant difference ($p<0.05$). This shows that the availability and accessibility showed down the households not to incorporate egg to their children's complementary foods. The provision of improved species of hen accompanied with key nutrition message regarding the nutritional benefits of eggs to children made the households to provide eggs to their children. The findings of this study is similar to the result of randomized trial in Ghana, in which prevalence of consuming eggs in the previous 24 hour was higher in the intervention than control group [12]. The same study also demonstrated that integrated agricultural interventions that increase access to high-quality foods, women's income-generating activities, and women's nutrition knowledge can improve child dietary diversity and nutritional status.

During the baseline, the minimum dietary diversity was 11%. . This finding is similar to the national minimum dietary diversity, which was 12.1%, as shown in EDHS 2016. In addition, a finding from the study conducted in Aleta Wondo agrees with our finding, on which minimum dietary diversity was 12%. In contrast, better minimum dietary diversity (23%) was recorded in the study conducted in Robe Town. As we stated above, this may be due to the study setting was in urban area. Another study conducted in Addis Ababa showed that about 60% of the study subjects received minimum dietary diversity [13]. Here also, the study setting may be the reason for high proportion of children to receive the minimum dietary diversity.

In our study, the food groups mainly consumed were grains, roots and tubers followed by legumes and nuts and then milk and milk products. The food group which comprises meat, poultry and fish was the food group to which less children (21.5%), but higher than children who consumed egg (19.1%) were privileged to consume. Many studies show that grains, roots and tubers were those consumed the most [13]. This is because grains, roots and tubers are staple foods of the country.

The end line dietary diversity result showed that the consumption of minimum dietary diversity was improved significantly ($p<0.05$) from 11% to 71.5%, which means the provision of improved poultry husbandry together with key nutrition messages influenced the households positively. This result is in agreement with a randomized controlled trial in rural Malawi in which 660 children aged 6 to 9 months were provided an egg a day for 6 months or assigned to a control group; the result showed that minimum dietary diversity was attained in the intervention group. There was ample improvements in the consumption of some of the food groups (incorporation of legumes and nuts to the children's complementary foods improved from 70% to 87%, the improvement is also statistically

significant, p<0.05; the same is true for food groups Vitamin A-rich fruits and vegetables, and other fruits and vegetables). Improvements were observed on food groups namely milk and milk products and meat, poultry and fish, but the improvements were not statistically significant.

The nutritional status, which is the other focus of this research, discussed as follows. During the baseline, the prevalence of stunting, wasting and underweight were about 42%, 14% and 29%. All the figures show higher prevalence than the national figure, which were 38%, 10% and 24%. It was also higher than the SNNPR prevalence, which was 38.6%, 6% and 21.1% [9]. As a reason, the food insecurity status of the study area could be stated. Four kebeles of Hawassa zuria woreda were categorized as food insecure keels. Among them, Jara hinesa, our study kebele is one of them.

The end line result showed that there were improvements in all the nutritional indices. Stunting was decreased to 41%, wasting was decreased to 12% and underweight was decreased to 28%. The declining of the prevalence of wasting was also statistically significant (p<0.05). Since stunting is a long term effect, it is not expected to be improved within 3 months intervention. But there were improvements in the children's length. This may be due to the children were between 6 and 23 months old so that this period is part of the 'windows of opportunity', they grow physically as well as mentally if there is favorable condition. Consumption of egg could enhance these growths.

This is because eggs are an important source of nutrients essential for healthy growth and brain development, such as choline, riboflavin, vitamins B_6 and B_{12}, foliate, zinc, protein, and DHA [14]. Another randomized trial in Ecuador provided 1 egg per day for 6 months to young children during the early complementary feeding period and found that compared with children who did not receive eggs, the intervention group showed significantly higher linear growth [15].

Wasting in children is a symptom of acute under nutrition, usually as a consequence of insufficient food intake or a high incidence of infectious diseases, especially diarrhea [16]. It is a short–term effect, meaning if the children obtain sufficient food they could be relieved from the problem. This is, in a view of the researchers, the reason to observe a significant difference between the baseline and end line prevalence of wasting. Provision of improved poultry together with a key nutrition message brought a change within three months. This is a good implication to actors in the agricultural and health sectors. An agricultural-based intervention has the potential to diminish nutrition disparities as it typically targets a rural population affected by poverty and low educational opportunities. There are several pathways by which such interventions may work. Meeker and Haddad suggested that agricultural practices influence nutrition *via* (a) food availability, (b) income for food purchases, (c) food prices, (d) women's social status and empowerment, (e) women's time, and (f) women's health. Surprisingly, there was limited evidence that agricultural interventions lead to improved child nutritional status, but our finding is good evidence that agricultural interventions could improve the livelihoods of the poor households and boost the nutritional status of the children (Tables 1-3).

Table 1: Socio-demographic characteristics of the study participants (n=246), Hawassa zuriya woreda, Sidama Region, Ethiopia, 2020.

Socio-demographic variables	Frequency (n)	**Percentage** (%)
Age of the mother in years		
15–19	12	4.9
20–24	57	23.2
25–29	83	33.7
>30	94	38.2
Marital status of the mother		
Married	239	97.2
Widowed	7	2.8
Educational level of the mother		
No formal education	31	12.6
Read and write	69	28.1
Primary school	127	51.6
Secondary school	19	7.7
Occupation of the mother		
House wife	202	82.1
Merchant	37	15.1
Farmer	7	2.8

Table 2: Diet diversity of the children at the baseline and end line survey (n=246), Hawassa zuriya woreda, Sidama Region, Ethiopia, 2020.

	Baseline		End line	Crude OR (95%CI)	Adjusted OR (95% CI)	P value	
Food groups	Frequency (n)	Percentage (%)	Frequency (n)				Percentage (%)
Grains, roots and tubers	246	100	246	100	1	1	-
Legumes and nuts	172	69.9	218	88.6	0.60 (0.36,1.02)	0.46 (0.24,0.88)	0.019
Milk and milk products	106	43.1	118	48	1.09 (0.73,1.64)	0.87 (0.51,1.48)	0.622
Meat, poultry and fish	53	21.5	62	25.2	0.50 (0.29,0.86)	0.65 (0.32,1.35)	0.257
Eggs	47	19.1	246	100	0.51 (0.34,0.76)	0.47 (0.28,0.78)	0.011
Vitamin A-rich fruits and vegetables	98	39.8	149	60.6	0.39 (0.23,0.68)	0.40 (0.20,0.77)	0.017
Other fruits and Vegetables	105	42.7	186	75.6	0.61 (0.43,0.88)	0.55 (0.37,0.82)	0.014
Minimum DD	27	11	176	71.5	0.71 (0.50,1.00)	0.60 (0.37,0.96)	0.035

Table 3: Nutritional status of the children at the baseline and end line survey (n=246), Hawassa zuriya woreda, Sidama Region, Ethiopia, 2020.

Characteristics	Baseline	End line	Crude OR (95% CI)	Adjusted OR (95% CI)	P value
LAZ (mean + SD)	-1.6 (1.36)	-1.5 (1.29)	0.07 (–0.02, 0.16)	0.08 (–0.01, 0.16)	0.062
Stunting, n (%)	103 (41.9)	100 (40.7)	0.06 (–0.04, 0.17)	0.06 (–0.04, 0.16)	0.111
WLZ	-0.7 (1.26)	-0.6(1.21)	0.18 (0.01, 0.34)	0.12 (0.03, 0.21)	0.01
Wasting, n (%)	35 (14.2)	30(12.2)	0.11 (0.06, 0.23)	0.21 (0.09, 0.31)	0.04
WAZ	-1.4 (1.43)	-1.3 (1.15)	0.74 (0.40, 1.36)	0.84 (0.49, 1.42)	0.222
Underweight, n (%)	71 (28.9)	68 (27.6)	0.07 (–0.01, 0.15)	0.07 (–0.01, 0.14)	0.072

CONCLUSION

Improved poultry husbandry provided together with key nutrition messages improved the dietary diversity of the children. The prevalence of stunting, wasting and underweight were decreased during the end line when compared with the baseline.

DATA AVAILABILITY

All the data are included in the manuscript.

ADDITIONAL POINTS

Regional, zonal and district agricultural bureaus have to work together to improve the dietary diversity and nutritional status of children. Nutrition focal persons at the regional, zonal and district levels have to work together with agricultural bureaus at each level by providing key nutrition messages regarding the importance of dietary diversity. Households have to be aware about the importance of diversifying their diet using what they have at their home and garden.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

ACKNOWLEDGMENTS

The authors would like to acknowledge the respondents who were voluntary to provide the required information during data collection.

REFERENCES

1. Black RE, Victora Walker SP, Bhutta Z, Christian P, Onis M, Ezzati M. Maternal and child under-nutrition and overweight in low-income and middle-income countries. Lancet. 2013;382(9890): 427-451.

2. Ethiopian Public Health Institute (EPHI) [Ethiopia] and ICF. Ethiopia Mini Demographic and Health Survey 2019: Key Indicators. Rockville, Maryland, USA: EPHI and ICF, 2019.
3. Carlo A, Tamas D, Fewtrel M, Goulet O, Kolacek S, Koletzko. Complementary feeding: commentary by European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. J Pediatr Gastroenterol Nutr. 2008;46(1):99-110.
4. United Nations Children's Fund. The state of World's children 2009. Special edition: celebrating 20 years of the conception on the right of the child. New York: United Nations Children's Fund, 2009.
5. Derek Headey, Kalle Hirvonen, John Hoddinott. Animal Sourced Foods and Child Stunting. Amer J Agr Econ. 2018;100(5):1302–1319.
6. Iannotti LL, Lutter CK, Bunn DA, Stewart CP. Eggs: the uncracked potential for improving maternal and young child nutrition among the world's poor. Nutr Rev. 2014;72(6):355-368.
7. Ahlers C, Alders R, Bagnol B, Cambaza AB, Harun M, Mgomezulu R. Improving village chicken production: a manual for field workers and trainers. Canberra,(ACIAR), 2009.
8. Lutter CK, Caswell BL, Arnold CD. Impacts of an egg complementary feeding trial on energy intake and dietary diversity in Malawi. Matern Child Nutr. 2020.
9. Central Statistical Agency [Ethiopia] and the DHS Program, Ethiopia: Demographic and Health Survey 2016, CSA and ICF, Addis Ababa, Ethiopia, Rockville, Maryland, USA: CSA and ICF. 2017.
10. Karisa Dafursa, Samson Gebremedhin. Dietary diversity among children aged 6–23 months in Aleta Wondo District, Southern Ethiopia. J Nutr Metab. 2019.
11. Shumi Bedada Damtie, Tomas Benti Tefera, Mekonnen Tegegne Haile. Dietary diversity practice and associated factors among children aged 6–23 Months in Robe Town, Bale Zone. J Nutr Metab. 2020.
12. Marquis GS, Colecraft EK, Sakyi-Dawson O, Lartey A, Ahunu BK, Birks KA, et al. An integrated microcredit, entrepreneurial training, and nutrition education intervention is associated with better growth among preschool-aged children in rural Ghana. J Nutr. 2015;145:335–343.
13. Dagmawit S, Zewdie A, Teketo KT. Minimum dietary diversity and associated factors among children aged 6–23 months in Addis Ababa, Ethiopia. Int J Equity Health. 2017;16:181.
14. Cusick SE, Georgieff MK. The role of nutrition in brain development: the golden opportunity of the "First 1000 Days". J Pediatr. 2016;175:16–21.
15. Iannotti LL, Lutter CK, Waters WF, Gallegos Riofrio CA, Malo C. Eggs early in complementary feeding increase choline pathway biomarkers and DHA: a randomized controlled trial in Ecuador. Am J Clin Nutr. 2017;106(6):1482–1489.
16. World Health Organization (WHO). Indicators for assessing infant and young child feeding practices part 2: measurement. Geneva: The World Health Organization, 2010.