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Comparison of Nutritional Status of Pre-school Children from Households with Home Garden and Without Home Garden in Wondogenet Woreda, South Ethiopia

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Abstract

Objective: Malnutrition is a worldwide prevalent problem. Under-nutrition segment of the condition is common in the developing world. Under-nutrition, because of being the result of multiple interlinked factors it needs intervention from different angles. Agriculture, home garden production, is one of the ways to address under-nutrition through food-based approach. Pre-school children are risky for under-nutrition. Though they are expected to benefit from the home garden products, their nutritional status was not assessed in consideration of home garden practice of households where they reside. Therefore, this study was aimed to compare nutritional status of pre-school children from households with and without home garden in Wondogenat Woreda, South Ethiopia.

Patients and methods: Comparative community based cross-sectional study was conducted on a total of 430 pre-school children selected using simple random sampling technique. Z-score of anthropometric status was generated using WHO Anthro. Entire data was analyzed SPSS version 20. Frequencies and proportions of basic information were calculated. Independent sample t-test was used to compare z-score mean value of nutritional status of the pre-school children.

Results: From households with home garden 41% of the children were stunted, 28% were under-weight and 8% were wasted. From households without home garden 44% of the children were stunted, 30% were underweight and 8.8% were wasted. Mean of weight for age Z-score ($p<0.0001$), height for age Z-score ($p<0.026$) and weight for height Z-score ($p<0.0001$) of children from households with and without home garden was different.

: All forms of under-nutrition are prevalent both in households with and without home garden. Mean values of weight for height, height for age and weight for age Z-scores of pre-school children from households with and without home garden are different.

Keywords: Home garden; Nutritional status; Pre-school children

Introduction

Malnutrition is a global problem [1] happening because of multiple interlinked causes in need of multi-dimensioned nutrition sensitive and nutrition specific interventions [2,3]. Promotion of sustainable agricultural development through improved home gardening is among the different nutrition sensitive interventions to address malnutrition. Home gardening is the cultivation of small portion of land within walking distance from home [4]. It can also be described as the mixed cropping of fruits, vegetables, arable crops and shrubs that can serve as supplementary sources of food and income to the household [5].

Home garden practices have been documented as an important supplemental source contributing to food and nutritional security and livelihoods [6]. As an integral part of local food systems, in developing countries, home garden is intended to produce food items mainly for family consumption. However, it can be diversified to produce outputs that have multiple uses [7].

Body of evidences from the developing countries support that home garden food production played a role in improving household dietary intake and income earning, decreasing micronutrient deficiencies, lowering proportion of under-five under-nutrition and improving women's involvement in household decision making [8,9].

Despite the achievements in agricultural productivity, access to basic health services and education worldwide, the progress on under-nutrition reduction has been comparatively slow [10]. Globally about 750 million people estimated not to meet their daily calorie requirement and two billion are micronutrient deficient [11]. According to the mini 2014 Ethiopian Demographic and Health Survey, the prevalence of stunting, wasting and underweight among under-five children was 40%, 9% and 25% respectively [12].

Food-based approaches focus on the ability of people to gain access to nutritious foods, in which agriculture and agro-food value chains play a key role. Attempts to identify and act upon potential linkages between agriculture, nutrition and health were evident in the 1980s [7] and at the turn of the century reviews of multiple experiences of

linking agricultural interventions to nutritional outcomes were available [13].

More recently, development practitioners and researchers have reiterated the message that appreciable economic growth has sat alongside steadily high rates of under nutrition. Overall, improvements in agricultural productivity alone do not seem to translate into improvements in nutrition [14].

The agriculture sector is best placed to influence food production and the consumption of nutritious foods necessary for healthy and active lives. Even though the agricultural production is growing well, linking agricultural intervention with nutrition not yet strengthened in Ethiopia and most of the agricultural interventions are not nutrition sensitive. Studies [14,15] conducted to assess impact of home garden on the nutritional status reported mixed results. The impact of home gardening on nutritional status of children is not answered unequivocally in the Ethiopian context. Thus, this study was conducted to compare the nutritional status of preschool children from households with and without home garden in Wondogenat Woreda, South Ethiopia.

Methods and Materials

Study setting, design and sampling

The study was conducted in Wondogenat Woreda, located about 24 km away from Hawassa (capital of the regional state) and about 294 km away from Addis Ababa (the capital of Ethiopia). After selecting kebeles (lowest administrative units) with and without home garden house to house census was done to obtain list of all preschool children for each kebele. Largest sample size, obtained with national proportion of stunting, was used. A community based comparative cross-sectional study was conducted from July-2014 to August-2014 on a total of 430, 215 from each, pre-school children from households with and without home garden selected using simple random sampling technique.

Data collection and analysis

Socio-demographic, socio-economic and household characteristics data collected by health extension workers using pre-tested questionnaire. The principal investigator following the standard procedures with the assistance of four health extension workers took height and weight measurements. Weight was measured using SECA scale and read to the nearest 0.1 kg. Height was measure with height measuring board and read to the nearest 0.5 cm.

Collected raw data entered to and cleaned using SPSS version 20. Descriptive statistics was computed to describe the participants. Z-scores of nutritional status indicators (wasting, underweight and stunting) were generated with WHO Anthro software. Independent sample t-test was used to compare mean z-score differences of anthropometric indices of the pre-school children from households with and without home garden.

Ethical consideration

Ethical clearance was obtained from Hawassa University institutional review board. Letter of cooperation written by School of Nutrition, Food Science and Technology-Hawassa University handed to the local authorities. Study units were voluntary participants. They were also with all rounded liberty to continue with or withdraw from the study.

Results

Socio-demographic characteristics of the study participants

About 55.3% of mothers from households with home garden and 51.6% of mothers from households without home garden were with no formal education. The mean (+SD) age of children was 36.6 (± 8.3) months in households without home garden and 39.8 (± 11.0) in households with home garden. Nearly all of the mothers in both (with=96.7% and without=100%) households were married. Mean (+SD) of family size was 7.02 (± 2.04) in households with home garden and 5.9 (± 1.8) in households without home garden. The majority of the households were male headed: 190 (88.4%) in households without home garden and 138 (64.2%) in households with home garden (Table 1).

Characteristics	Households with home garden N=215	Households without home garden N=215
Religion		
Muslim	16 (7.4%)	39 (18.1%)
Orthodox	29 (13.5%)	3 (1.4%)
Protestant	164 (76.3%)	173 (80.5%)
Catholic	6 (2.8%)	-
Ethnicity		
Sidama	130 (60.5%)	193 (89.9%)
Amhara	22 (10.2%)	2 (0.9%)
Oromo	16 (7.4%)	19 (8.8%)
Wolayta	26 (12.1%)	1 (0.5%)
Hadiya	16 (7.4%)	

Other	5 (2.3%)	
Maternal education		
No formal education	119 (55.3%)	111 (51.6%)
Primary and above	96 (44.7%)	104 (48.4%)
Sex of the child		
Male	122 (56.7%)	110 (51.2%)
Female	93 (43.3%)	105 (48.8%)
Head of household		
Female headed	77 (35.8%)	25 (11.6%)
Male headed	138 (64.2%)	190 (88.4%)
Marital status		
Married	208 (96.7%)	215 (100%)
Single	7 (3.3%)	-
Mean (SD) age in month	39.8 (± 11)	36.6 (± 8.3)
Mean family size (SD)	7.0 (± 2.0)	5.93 (± 1.8)
Mean number of children age 2-5 years (SD)	1.3 (± 0.5)	1.4 (± 0.5)

Table 1: Distribution of households by selected socio-demographic characteristics in Wondoganet woreda, South Ethiopia, 2015 (n=430).

Socio-economic characteristics of study participants

Majority of the mothers from both (with home garden-80.9% and without home garden-84.2%) categories are housewives by occupation. Average monthly income of most households was less than 250 Ethiopian birr in households with home garden and greater than 250 in households without home garden.

Characteristic	Households without home-garden N=215	Households with home-garden N=215
Maternal occupation		
Housewife	174 (80.9%)	182 (84.2%)
Employed	9 (4.2%)	7 (3.3%)
Farmer	16 (7.4%)	13 (6%)
Other	16 (7.4%)	13 (6%)
Land size		
Below half hectare	14 (6.5%)	9 (4.2%)
1/2-1 hectare	51 (23.7%)	77 (35.8%)
1-2 hectare	97 (45.1)	83 (38.6%)
Above 2 hectare	53 (24.7%)	46 (21.4%)
Monthly income		
Less than 250	73 (34%)	114 (53%)

Greater than 250	142 (66%)	101 (47%)

Table 2: Distribution of households by selected socio-economic characteristics in Wondoganet Woreda, South Ethiopia, 2015 (n=430).

All of the participants (100%) reported they had access to farmland in both households with and without home garden. Though sorghum and teff are also harvested in the area, nearly all (93.8%) of the participants produce maize as their main staple diet. Teff (Eragrostis tef) is a small, gluten-free grain with a number of health benefits. It is a species of lovegrass native to Ethiopia. It is mentioned as a good source of fiber, iron and to some extent magnesium and calcium (Table 2).

Home garden production and consumption practice Kalle, avocado, carrot, cabbage and tomato are common products of home garden in the study area. Among those who practice home garden (n=215) 94.4% and 94% produce avocado and kale respectively. Nearly half of the households (47.7%) used half to one-hectare farmland for home garden production. In the study area, home garden practiced for mixed reason.

Nutritional status of children from households with home garden

About 41% of the children were stunted (Height-for-age <-2SD), 28% of them were underweight (Weight-for-age<-2SD) and 8% were wasted (Weight for height <-2 SD). The mean (SD) of HAZ, WAZ and WHZ scores were -1.55 (1.2), -1.3 (0.8) and -0.6 (0.9) respectively.

The prevalence of stunting were high (52%) among the younger children of aged 24-35 months as compared to the older children aged 36-47 and 48-59 which were 33.3% and 33% respectively. Similar trend was observed in underweight. The prevalence was high in 24-35 months old children (33%) (Table 3).

Mean ± SD of anthropometric measures and indices			
Anthropometric status	24-35.9 months	36-47.9 months	48-59.9 months
Weight in kg	12.8 ± 2.04	12.7 ± 1.9	12.2 ± 2.02
Height in cm	92.1 ± 7.04	91.97 ± 6.8	90.4 ± 7.2
Height-for- age Z score	-1.6 ± 1.03	-1.3 ± 1.3	-1.7 ± 1.1
Weight-for-age Z score	-1.3 ± 0.8	-1.156 ± 0.86	-1.52 ± .8
Weight-for-height Z score	-0.5 ± .90	-0.6 ± 1.02	-0.8 ± 0.9

Table 3: Anthropometric statuses of children from households with home garden in Wondoganet Woreda, South Ethiopia, 2015.

Nutritional status of from households without home garden

Nearly 44% of the children were stunted (Height-for-age<-2SD), 30% of them were underweight (Weight-for-age<-2SD) and 8.8% were wasted (Weight for height<-2 SD). The mean (SD) HAZ, WAZ and WHZ scores were -1.6 (1.2), -1.0 (0.9) and -0.1 (1.2) respectively.

The prevalence of stunting was high (46%) among the younger 24-35 months old children as compared to the 37% and 33% of 36-47 and 48-59 months old children respectively. The prevalence of underweight was high (38%) in age group 48-59 month old children and 36% in 24-35 months and 18% in 36-47 months age group. Similar trend was observed in wasting. In age group 48-59 (12%), 36-47 (8.2%), and 24-35 (8%) respectively (Table 4).

Mean ± SD of anthropometric measures and indices			
Anthropometric status	24-35	36-47	48-59
Weight in kg	12.7 ± 2.2	12.6 ± 1.9	12.5 ± 1.7
Height in cm	89.2 ± 6.1	90.3 ± 4.8	89.5 ± 5
Height-for- age Z score	-1.7 ± 1.1	-1.5 ± 1.3	-1.3 ± 1.4
Weight-for-age Z score	-1.0 ± 0.9	-1.1 ± 1.0	-0.9 ± 1.0
Weight-for-height Z score	-0.01 ± 1.2	-0.3 ± 1.2	-0.2 ± 1.3

Table 4: Anthropometric statuses of children from households without home garden in Wondoganet woreda, South Ethiopia, 2015.

Comparing of nutritional status of children from households with and without home garden

The results revealed that there were significant mean Z-score values difference in weight for age (WAZ) ($p<0.0001$), height for age (HAZ) ($p<0.026$) and weight for height (WHZ) ($p<0.0001$) of children from households with home garden and without home garden (Table 5).

Anthropometric Statuses	Mean ± (SD)[1]	Mean ± (SD)[2]	p-value
Height for Age Z-score (HAZ)	-1.3 ±0.8	-1.6 ± 1.2	<0.026
Weight for Age Z-score (WAZ)	-1.3 ± 0.8	-1 ± 0.9	<0.0001
Weight for Height Z-score (WHZ)	-0.6 ±1	-1.3 ± 0.8	<0.0001
[1]Households with home garden; [2]Households without home garden			

Table 5: Comparison of mean Z-score values of anthropometric statuses of children from households with and without home garden in Wondoganet Woreda, South Ethiopia, 2015.

Discussion

Agricultural practices and food and nutrition security are too related [7]. Anthropometric status is the result of complex interactions between food consumption, majorly product of agricultural practices, and the overall health status and health care practices [16]. Considering that, better agriculture productivity can contribute to the betterment of human livelihood including food consumption. This study was aimed to compare nutritional status of preschool children from households with and without home garden in Wondoganet Woreda, South Ethiopia.

The overall prevalence of stunting in pre-school children was 40.9% in households with home garden and 43.7% in households without home garden. The finding of this study was nearly similar to the 2014 Ethiopian Demographic and Health Survey report (40%) [12] and a study conducted in Sidama zone, Ethiopia [17]. However, this finding is too lower than finding from a study conducted in Brazil (11.6%)

[18]. As compared to study done to compare prevalence of stunting in root and cereal crop producing areas [19] prevalence of stunting found with this study was relatively similar with cereal crop producing area (47%) and much lower than root crop producing area (87%).

Nearly equivalent proportions of pre-school children were found to be wasted (7.9% and 8.8%) and under-weight (28% and 30%) as compared to the Ethiopian national report (9% and 25%) [12]. A study conducted in Botswana reported less prevalence of wasting (5.5%) and underweight (15.6%) and this might be because of study setting and feeding practice difference [20].

According to the result of this study, the prevalence of stunting decreased as age increased. The finding is consistent with EDHS report of pre-school children's nutritional status; where stunting decreased as age increased [12]. In contrast, study from Tigray-north Ethiopia showed malnutrition increased as the children get older [21]. Study conducted on Indian pre-school children showed that the prevalence of stunting increased as the age of the child increased. However, the study done in SNNPR and Tigray pre-school children showed that the problem was so quit high (56%) and in a similar manner the prevalence of stunting decreased as the age of the children increased [22].

This study showed home garden production and consumption as one factor that affects the nutritional status of children. Kalle, avocado, carrot, cabbage and tomato were mainly produced in the study area. From these, 94.4% and 94% of respondents produce avocado and kalle respectively. Majority of the households practice home garden for mixed purpose.

The Z-score mean value difference of anthropometric indices (WAZ, HAZ and WHZ) of children in households with and without home garden was statistically significant. Similar report in Zimbabwe [9] showed home garden had significant association with nutritional status of children. A study done in northern Ethiopia [22] is in contrast with this study finding that it showed no significant association between home garden and nutritional status of the children. In agreement to finding of the current study, finding from south Africa [16] discussed that home garden do in fact have a significant positive impact on children's nutrition.

Conclusion

Stunting, underweight and wasting are highly prevalent both in households with home garden and in households without home garden. Generally, preschool children's under-nutrition is a public health concern both for households with home garden and for households without home garden. The prevalence of chronic form of under-nutrition, stunting, decreases as the age of the child increases: children within age range of 24-35 months were more exposed to stunting both in households with home garden and in households without home garden. This study also found that there is statistically significant difference in statistical Z-scores mean values of children nutritional status/physical growth indicators (weight for age Z-score, height for age Z-score and weight for height Z-score) between households with home garden and households without home garden.

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Competing Interest

The authors declare that they have no competing interests.

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