

**EFFECTIVENESS OF THE WOMEN'S DEVELOPMENT TEAM LEADERS IN
DELIVERING NUTRITION EDUCATION ON PULSE SPROUTING IN
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ABSTRACT

Effectively implemented nutrition education can provide participants with the knowledge and skills to make healthy food choices in the context of their lifestyles and economic resources. In Ethiopia, the government equips health extension workers (HEWs) to provide nutrition education to communities by enabling HEWs to transfer knowledge to women's development team leaders (WDTLs) who in turn share the knowledge with the one-to-five network leaders (1-5NWL) and members. The objective of this study was to examine the effectiveness of WDTLs in delivering nutrition education to women as the intervention group (IG). This was compared to having trained HEWs educate women directly (the positive control group, PCG), and having women receive no specific education (negative control group, NCG). A cluster randomized trial design was used. Three kebeles (villages of 5000 people) were purposively selected from which the WDTLs were randomly selected and their respective 1-5NWL and members were participants. Nutrition education to teach pulse sprouting was provided every other week for 6 months to intervention and positive control groups. Focus group discussions and demonstrations were held to reinforce knowledge and skills. Knowledge, attitude and practice (KAP) of the women were evaluated pre and post-intervention. At baseline all three groups had similar low scores in KAP. After the education intervention, knowledge improved in IG compared to PCG ($p=0.009$), and both were greater than NCG ($p=0.001$). Attitude in IG improved more in PCG ($p=0.008$) and both increased compared to NCG ($p=0.001$). Practices improved, similarly, in IG and PCG ($p=0.084$) after intervention, and both were better than NCG ($p=0.001$). From this study, we conclude that nutrition education delivered through WDTLs, as is intended in communities in Ethiopia having HEWs, was more effective than delivery by HEWs alone. Nutrition education on pulse sprouting has the potential to bring positive changes on KAP of rural women who depend on this processing skill to provide nutritious foods for their families.

Key words: Ethiopia, Health Extension Workers, Pulse Sprouting, Nutrition Education



Abbreviations

1-5NW, One-to-five network

1-5NWL One-to-five network leader

FGD, Focus group discussion

HEW, Health extension worker

NCG, Negative control group,

PCG, Positive control group

WDT, Women's development team

WDTL, Women's development team leader

INTRODUCTION

The government of Ethiopia introduced the Health Extension Program (HEP) in 2003 [1], a free primary health care package with four components: disease prevention and control, family health, hygiene and environmental sanitation, and health education and communication [2]. The objectives of the HEP were to reach the poor and deliver preventive and basic curative high impact interventions to all of the Ethiopian population [3]. It involves highly trained Health Extension Workers (HEWs) transferring their knowledge to the Women's Development Team, who in a volunteer role leads groups of women organized as 1-in-5 Networks (1-5NW). The 1-5NW consists of a leader, who is the "1" chosen as she has demonstrated knowledge and application of health messages and is educated. She, in a volunteer role, recruits five other women to meet and learn from the WDT leaders (WDTL) [3]. Importantly, the WDTLs are volunteers who are trained by HEWs, and then teach, thus expanding the reach of HEWs who work in a kebele at a ratio of 1 to 2500 people, and who use WDTLs in order to reach each of the 1000 or so households [4]. While HEWs have been evaluated for teaching effectiveness [4,5], there have been no reports of examining effectiveness of WDTLs.

Research has shown that nutrition education can make a significant contribution to improved dietary practices such as appropriate complementary feeding if carefully designed and implemented [6]. Implementation of similar nutrition education methodology has been described previously [7,8]. Equally important, food-based strategies are key to addressing hunger and malnutrition, and the desired characteristics of foods include high nutrient density, low bulk property, as well as utilization of low cost and locally available crops [9]. However, foods such as pulses can have the problem of poor bioavailability. Application of food processing techniques such as sprouting (sometimes called germination) and fermentation both minimizes anti-nutritional factors and enhances nutrient intake and palatability of pulses [9].

The primary aim of this research work was to assess of effectiveness of knowledge transfer by WDTLs of the use of sprouted pulses to rural women in three kebeles in Southern Ethiopia. Use of sprouting as a food processing technique is not widely practiced [10]. It was hypothesized that direct transfer of new knowledge by trained HEWs would be the ideal situation, and therefore this was deemed the positive control. The other two groups (IG, NCG) tested the effectiveness of women learning about pulse sprouting from WDTLs (the Intervention Group, IG) versus not having any specific education on the process (the Negative Control group, NCG) respectively

METHODOLOGY

Study area

Sidama zone is one of the 15 zones in the South Nation Nationalities and Peoples Region (SNNPR) Ethiopia, and Hawassa Zuria district is one of the 19 districts of Sidama zone. The district has a total population of 124,472 persons [11]. Three kebeles were invited to participate: Jara Gelelcha (population 7,748) with 1,581 households, 44 WDTs and 212 1-5NW; Lebu Koromo (population 9,997) having 2,427 households, 54 WDTs and



260 1-5NW; and Dore Bafano (population 8,962) with 2,240 households, 40 WDTs , and 200 1-5NW.

Study subjects

The study population consisted of all WDTLs that were in the selected three kebeles; and for the purpose of nutrition education delivery among them, only four WDTs from each kebele were randomly selected, and their respective one-to-five network leaders and their members were studied. Jara Gelelcha, Lebu Koromo, and Dore Bafano kebeles were randomly assigned as the intervention, positive control and negative control sites, respectively (Figure 1). The only inclusion criterion was membership in one of the randomly selected WDTs in each of the study kebeles. No one was excluded.

Study design

The research was carried out from May to October, 2017. This study used a cluster randomized trial design of three groups of mothers (Figure 1). One group received nutrition education program on pulse sprouting led by trained WDT leaders, the intervention group (IG). The second group received nutrition education from HEWs, the positive control group (PCG). A third group received no program, which was the negative control group (NCG). There were 41 WDTL from the IG, 52 from PCG and 30 from NCG, for a total of 123 leaders.

To determine final sample size of women in each group, an expected effect size of 3.33 from a study of HEWs [5] was applied to a sample size calculation where alpha was set at 0.05 and power at 80%. This gave a sample size of 88, to which a drop-out calculation of 15% would require 100 per group. As shown in Figure 1, final sample sizes exceeded this number.

Intervention

The nutrition education in the IG proceeded as follows: the principle investigator (PI) trained the HEWs who in turn taught WDTLs who then were responsible to teach their members in the 1-5NW. In the PCG, the PI also trained HEWs who then directly taught the study participants (women) in that kebele. The education was given every other week for six months. After endline collection was completed, the subjects in the NCG were given the intervention sessions by HEWs but in a shorter time frame.

The PI used simple and easily understandable education materials such as Amharic posters and written documents, which were based on a Training of Trainer (TOT) manual previously used to train HEWs on pulse processing [12]. The material in the manual as well as questionnaires was informed by the Health Belief Model. The nutrition education was presented by the PI to HEWs of both the IG and PCG kebeles along with handouts and posters that illustrated all essential information of pulse processing and sprouting. The PI taught HEWs every other week for six consecutive months and spent 1 hour to 1.5 hours per session with HEWs. An important part of the education was demonstration of the steps needed to be followed during preparation of pulses prior to consumption. These steps included: cleaning, soaking, sprouting and cooking.



Data collection

The primary data were collected through structured questionnaires and interviews with WDTLs, 1-5NWLs and NW members. Observation of teaching sessions and recipe demonstrations was made. Focus group discussions (FGDs) were conducted with 1-5NW members. The data were collected by enumerators who were well trained and fluent in the local language; observations were done by the PI, and FGDs were conducted by one moderator and two assistants under close supervision of the PI.

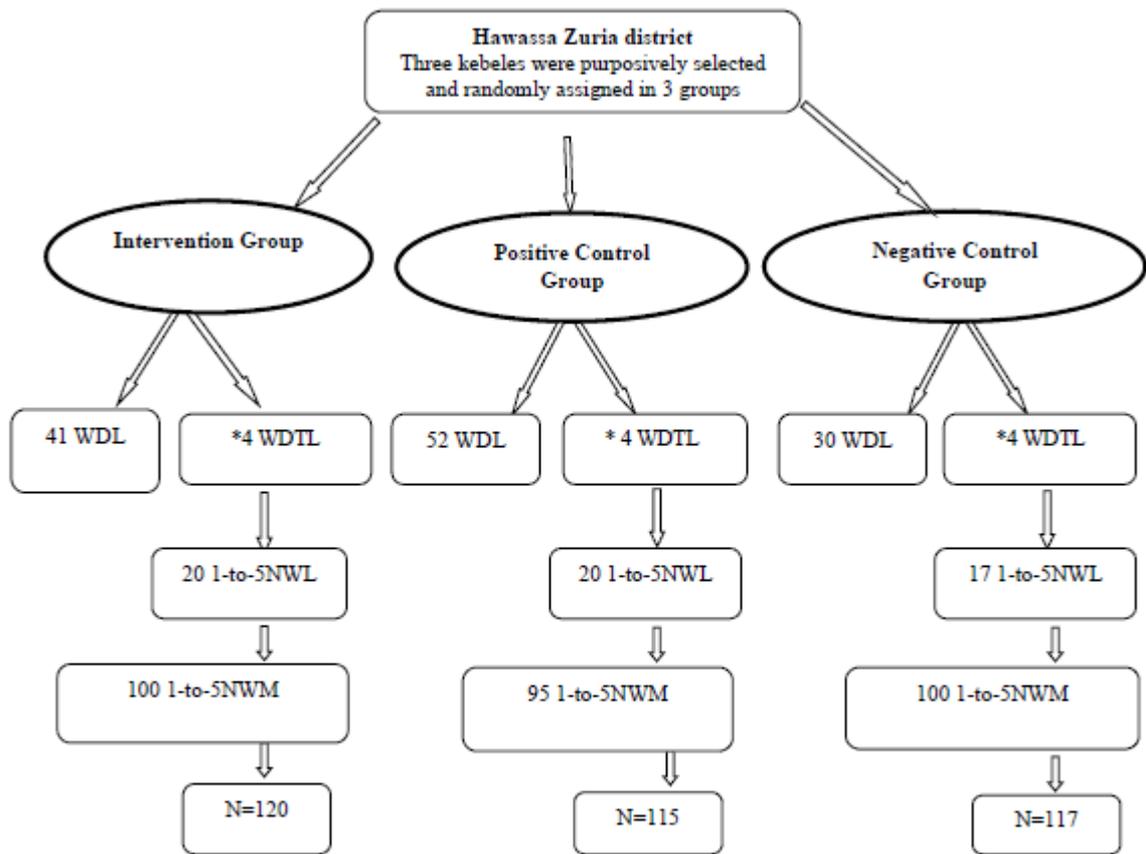


Figure 1: Flow chart of the sampling technique. WDTL (Women Development Team Leader), 1-to-5NW (1-to-5 Network), NWL (Network Leader); NWM (Network Member). * WDTL chosen to train women in each kebele.

The FGDs consisted of four groups; two from IG and the other two from PCG. To keep homogeneity of the participants, one group was from leaders and the other group was from members from each kebele. Each group had 10 to 12 participants. The discussions were recorded in both written and audio form by the assistants (recorder and note-taker). The time taken for discussions ranged from 60 to 90 minutes.

Quality Assurance

The questionnaires were prepared in English and translated to Amharic and then re-translated back to English to ensure the translation was accurate. Data collectors received two-days of training. Prior to the actual data collection, 10% of the questionnaire was pre-tested in a non-study group to check the functionality and reliability of the tools and performance of data collectors. At the end of each data collection day completeness and cleanliness of the data were checked by the PI.

Data analysis

Quantitative data were cleaned and then analyzed using SPSS (version 20.0). The KAP data were calculated as scores: the maximum score for knowledge was 15; for attitude, 25; and for practice was 8.

Continuous data were checked for normality using the Kolmogorov-Smirnov test. Comparison of change in means within the group and between groups done using analysis of variance (ANOVA) and significant means were separated using Tukey multiple comparison test at 5% probability. The qualitative data from FGD and observations were analysed and interpreted using narration.

Ethics

Ethical approval was obtained from the Institutional Review Board of Hawassa University. District Office of Health sent formal letters of cooperation to the selected kebeles. Individual consent from the study subjects was obtained. Respondents' rights in relation to privacy and confidentiality were respected.

RESULTS AND DISCUSSION

A total of 355 women were eligible and 352 women participated (Table 1). Almost all the women ($\geq 94\%$) attended WDT or 1-5NW meetings regularly. Socio-demographic and economic characteristics of the community were assessed. The mean (SD) age of women was 32.4 (9.7) years. Most of the study participants were married, and majority were Protestants. Family size did not vary among groups. The majority ($> 90\%$) were housewives. Almost all 348 (98.9%) of the study participants had their own farmland and most families used their land for cultivating pulses specially haricot bean (data not shown).

Assessment of KAP

There were no differences in Knowledge among the three groups at baseline. After six months' nutrition education, the IG's score was significantly higher than the PCG; both of these groups' scores were well above the low scores of the NCG that received no nutrition education. There were no differences in attitude scores among the three groups



at baseline. After six months' nutrition education, the IG's score was significantly higher than the PCG; both of these groups' scores were well above the low scores of the NCG that had no nutrition education. There were no differences in Practices among the three groups at baseline. After six months' nutrition education, the IG's score was similar to the PCG ($M=10.43$); both of these groups' scores were well above the low scores of the NCG that had no nutrition education (Table 2).

Knowledge, Attitude and Practices

At baseline, women in all the study groups had very little regarding knowledge of benefits of pulse sprouting, had negative attitudes towards it, and it was rare that anyone practiced this food processing technique (Table 2). The 6-months' education program showed significant improvements in all three elements – knowledge, attitudes and practices - of women in the IG and PCG on the importance of pulse sprouting. Knowledge scores were three-fold higher in IG and PCG, while attitude improved by about 50%. Importantly, practices also improved, with a doubling of reported use of sprouting. All of these trends showed significant ($P < 0.05$) differences of education vs no education on sprouting. There were some differences between IG and PCG. Knowledge and attitudes were significantly higher in IG compared to PCG; however, the score differences were very modest. No difference in practice by IG vs. PCG was observed, in agreement with the slight differences in knowledge and attitude between these groups. Those not receiving any education (NCG) did not improve in any aspect of KAP.

Focus group discussions

In answer to the question “Who in particular has influenced your nutrition habits?” respondents from the leaders group replied that it was the HEWs, while respondents from the members group replied that they spent most of their time with WDTLs. One woman said "after our discussion with the WDTL we further discuss on the matter in our neighborhood [one-to-five network] when we drink coffee together every day, when come together to help some works for our neighbor...”. The second question presented was "What are the pros and cons of learning pulse sprouting?" Respondents from both groups answered that they did not have any idea and it was the first time to hear about this topic. The final question was “Do you think that these meetings [WDTs and 1-5NWs] have brought change in health and nutrition improvement for your family and the community?” Respondents of both groups had no reservations to say that in their own opinion WDTs and 1-5NW had brought great change in health and nutrition and visible improvements in their family and the community as well.

Effectiveness of WDTLs

Previous studies had used HEWs and researchers in leading nutrition education [7,13] and found improvement in KAP on using pulses, which included practices such as soaking. However, there were no studies on effectiveness of WDTLs, which is why the Health Education Program of Ethiopia is important for knowledge and skill dissemination [4]. Thus, the results of this study provide evidence for effectiveness of WDTLs and 1-5NWLs in the HEP, which has not been assessed before.



A study conducted at West Gojam, Ethiopia stated that effectiveness of nutrition education programs depends on many factors including the knowledge and knowledge-sharing effectiveness of health extension workers, maternal knowledge acquisition, and the resources available to enable mothers to apply the recommendations [5]. However, a study done by Worsley [14] clarified that the status and explanatory role of nutrition knowledge is uncertain in public health nutrition. Much of the uncertainty about this area has been generated by conceptual confusion about the nature of knowledge and behaviors, and nutrition knowledge and food behaviors in particular. The main argument is that ‘nutrition knowledge’ is a necessary but not sufficient factor for changes in consumers’ food behaviors [14].

This study revealed that nutrition education showed considerable improvements in pulse sprouting practices by women in IG and PCG. After six months’ nutrition education on the importance of pulse sprouting, women increased this practice from 4.2% to 62.5% for IG and from 6.1% to 62.6% for PCG ($P < 0.05$). Other studies where nutrition education was used in Ethiopia [7,8,15] also showed it can be a useful strategy for behavior change.

Leaders and members of WDT and 1-5NW, respectively, were generally very satisfied with their groups. They expressed confidence in the effectiveness of key messages in improving health of the community. Majority of the participants preferred the current structure to the previous one that was education only through HEW. This implies that the community sees benefits of the current government structure for HEP. This may be due to effectiveness of peer communication among neighbors. In a model of community-based nutrition programs, “facilitators” such as HEWs required “mobilizers” such as WDTL for a successful outcome at the family level [16].

Limitations in this study included the fact that the practice of using sprouting was self-declared. As well, there was expressed inability to assess whether the 1-in-5 network leader was a factor in the effectiveness of teaching sprouting to the women.

CONCLUSION

The findings in this study show that nutrition education improved knowledge, attitude and practice of women towards pulse sprouting, whether information came directly from Health Extension Workers or through the Women’s Development Team Leaders. This is the first study to evaluate the effectiveness of peer community volunteers in Ethiopia’s Health Education Program. The success of this program relies on having this peer-teaching model. It was also found that without education on pulse sprouting, there was little practice of this important home processing step for consumption of pulse-based foods. This reinforces the need to have training on necessary but complex issues such as pulse processing.

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Table 1: Socio-demographic characteristics of participants in each experimental group (N= 352) in Hawassa Zuria district of Sidama, Ethiopia. October 2017

Variable	IG (n=120)		PCG (n=115)		NCG (n=117)		P-value
	N	%	N	%	N	%	
Age							
18-30y	61	50.8	62	53.9	49	41.9	0.162
≥ 31y	59	49.2	53	46.1	68	58.1	
Marital status							
Married	90	75.0	107	93.0	114	97.4	0.273
Not married	30	25.0	8	7.0	3	2.6	
Religion							
Protestant	105	87.5	78	67.8	110	94.0	0.241
Others	15	12.5	37	32.2	7	6.0	
Education							
≥ Grade 9	6	5.0	6	5.2	8	6.8	0.114
Primary school	59	49.2	38	33.0	65	55.6	
Illiterate	54	45.0	70	60.9	41	35.0	
Family Size							
2-5	69	57.5	61	53.0	82	70.1	0.128
≥ 6	51	42.5	54	47.0	35	29.9	
Ethnicity							
Sidama	119	99.2	114	99.1	115	98.3	0.278
Wolayita	0	0	0	0	2	1.7	
Amhara	0	0	1	0.9	0	0	

Note: IG= Intervention group; PCG=Positive control group; NCG= Negative control group

Table 2: Knowledge, attitude and practice (KAP) scores of the women in each experimental group regarding pulse sprouting before and after 6 months of nutrition education intervention (n=352), in Hawassa Zuria district of Sidama, Ethiopia. October 2017

KAP	Group	Baseline	Endline
Knowledge	Intervention (IG)	2.83(3.02) ^{xa}	11.33(2.03) ^{yb}
	Positive Control (PCG)	3.10(3.09) ^{xa}	10.43(2.12) ^{yc}
	Negative Control (NCG)	3.76(3.15) ^{xa}	5.00(2.72) ^{xa}
Attitude	Intervention (IG)	13.62(1.89) ^{xa}	19.58(1.98) ^{yb}
	Positive Control (PCG)	14.04(1.72) ^{xa}	19.10(1.99) ^{yc}
	Negative Control NCG)	13.90(1.85) ^{xa}	13.92(2.18) ^{xa}
Practice	Intervention (IG)	2.35(0.90) ^{xa}	6.13(1.96) ^{yb}
	Positive Control (PCG)	2.37(1.17) ^{xa}	5.63(2.28) ^{yb}
	Negative Control (NCG)	2.53(1.41) ^{xa}	2.21(0.76) ^{xa}

The maximum score for knowledge is 15, for attitude 25, and practice is 8

Attitude questions were computed using a Likert scale (5 pts each)

Values in rows with "x" are significantly different ($p < .05$) from values with "y"

Values in columns with "a" are significantly different ($p < .05$) from values with "b" and with "c" for each KAP value

IG = women taught by the Women's Development Team and 1-in-5 network (n = 120)

PCG = women taught by Health Extension Workers (n = 115)

NCG = no specific teaching on use of sprouting (n = 117)



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