ORIGINAL ARTICLE

Impact of care group participation on nutrition knowledge, behavior and practices

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Abstract

Background: Malnutrition is one of the most serious issues affecting the world and it remains a dominant concern in the health of the world's poorest nations. Community based approaches, such as the Care Group Model, are now recognized as one of the most established avenues for improving nutrition and reducing child mortality. **Aims:** This study investigated the impact of the Care Group Model approach on nutrition behavior change communication activities. **Methods:** A mixed methods approach using quantitative and qualitative data collection techniques was used. The linear probability model was used to estimate the determinants of participation in care groups and was determined with propensity score matching. The primary target of the care groups were women of child-bearing age and primary caregivers of children under the age of five years. **Results:** The study provided new evidence on the effect of the Care Group Model in nutrition-sensitive agricultural programs. The results presented in this paper showed positive associations between participation in care groups and nutrition knowledge, nutrition behavior, nutrition practices and dietary diversity. In particular, the results from Propensity Score Matching revealed that participation in care groups was associated with an increase in the knowledge of nutrition behaviors by 1.449 points and an increase in practicing of nutrition behaviors by 1.074 points at the 1% level of significance. **Conclusions:** The study revealed a positive impact of care group approach on nutrition behavior, knowledge and practices. We recommend the integration of the care group approach into all community-based nutrition program.

Article information

1 Introduction

Malnutrition is one of the most serious problems affecting the world and it remains a dominant issue in the health of the world's poorest nations [1]. Progress in reducing under-5 mortality is lagging in several countries, particularly in Africa [2]. Zimbabwe like many other emerging economies is facing the challenge of malnutrition (over and under) and cases of malnutrition continue to be a health concern. Results of the Micronutrient Survey conducted in 2012 revealed that Vitamin A deficiency in Zimbabwe affected 19% of under-fives, 23% of women (15-49 years of age) and 27% of rural women. The national prevalence of stunted children was 23.6%, 8.25% underweight and 37% of children aged 6-59 months were anemic. More so, anemia prevalence in adults aged 15-49 was 27% and 15% in women and men, respectively [3]. Furthermore, overweight and obesity figures compound the negative effects of under-nutrition, which are rising in Zimbabwe, and this contributes to an increase in the incidence of chronic and non-communicable diseases.

However, Zimbabwe has made great strides between 2014 and 2019 in improving the nutritional status of children, which saw a reduction in stunting, wasting, underweight and overweight, as indicated in the results of the Multiple Indicator Cluster Survey (MICS) 2019. This positive change could be attributed to the several initiatives, such as the promotion of nutrition-sensitive agriculture by the Government of Zimbabwe (GoZ) and development partners. Nutrition-sensitive agriculture is essential to addressing malnutrition in low- and medium-income countries such as Zimbabwe. This food-based approach aims to improve nutrition by strengthening agricultural systems to deliver more appropriate, nutritious foods to those needing them [4]. The concept considers not only yield, but also nutritional value of produce, sustainability of production, and ecological impact of agriculture [5]. Available evidence shows that nutrition education and behavior change communication is an essential catalyst for translating and strengthening the agriculture and nutrition linkages [6]. According to Perry *et al.* [7] community based approaches, such as the Care Group Model (CGM), are now recognized as one of the most important avenues for improving

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nutrition and reducing child mortality, particularly in high-mortality settings with weak health systems, scarce resources, and facilities that are difficult for most of the population to access.

It is against this background that this study sought to assess the nutrition impact of nutrition behavior change communication activities using the care group model in a FAO managed nutrition-sensitive agriculture program in Zimbabwe, the Livelihoods and Food Security program (LFSP). Specifically, the study sought to answer three objectives. Firstly, to find determinants of household participation in care groups. Secondly, to determine the impact of the CGM on positive nutrition behaviors and practices. Finally, the study sought to establish the impact of the CGM on one of the underlying causes of malnutrition dietary diversity, amongst households, women and children.

1.1 Livelihoods and Food Security Program (LFSP) in Zimbabwe

The LFSP has since inception in 2015, implemented several interventions to promote household food security and subsequently dietary diversity in all program households, and with a particular focus on women of child-bearing age and children aged 6 to 24 months. A three-pronged approach was adopted, focusing on (i) diversified crop and livestock production for improved year-round access to a wide range of foods, (ii) nutrition behavior change communication using the CGM and (iii) focusing primarily on vitamin A orange maize and high iron beans. These activities were expected to contribute towards the improvement of the nutrition status of women of child-bearing age and children under the age of five years in the program's target households. According to the program's theory of change, it was anticipated that diverse crop and livestock production and production and consumption of biofortified crops will result in improved households' access to a wide variety of foods required for healthy diets in program households. This, coupled with nutrition behavior change as a result of the CGM activities would result in improved dietary practices, better WASH practices and better care for women and children. All this would then contribute towards improved nutrition status of women and children in program households. While there are indications that these interventions are influencing food consumption patterns and other health seeking behaviors amongst program participants, no deliberate effort had been made to ascertain and quantify these claims prior to this study. It is within this context that this study was commissioned.

Care Group Model (CGM)

The CGM is the nutrition behavior approach implemented by the LFSP. The CGM is an internationally recognized strategy and set of social and behavior change interventions designed to reduce undernutrition and child mortality. The CGM was first developed in 1995 in the Guija and Mabalane districts of Gaza Province in Mozambique by World Relief during the implementation of a child survival project [7]. CGM is cost-effective as it has a multiplier effect of reaching an increased number of the target population, proving a convergence platform where both nutrition specific and sensitive interventions can be delivered to the community [8].

In the LFSP, the CGM structure was configured as follows: government district health staff – Nutritionist, District Nursing Officer and LFSP Nutrition program officers are the CGM Coordinators. These health staff members with Rural Health Centre nurses, Environmental Health Technicians, agriculture extension officers and ward Nutrition Coordinators as the CGM Supervisors. Under them are Village Health Workers who are the Promoters. These promoters work with volunteer women selected from communities as lead mothers. The lead mothers work in groups of 10 to 12, forming a care group under the leadership of a Promoter. Care Groups meet at least once every month and lead mothers are taught one behavior each month, using the program developed Care Group Counselling Cards.

Each lead mother will in turn lead a group of 10 to 12 neighbor women, who are groups of women in program communities, selected based on being of child-bearing age and or / primary caregivers of children under the age of five years. Neighbor women groups meet at least once a month during the agriculture season and more frequently off season. In both care groups and neighbor women meetings, care group counselling cards are used to conduct behavior change communication sessions. These counselling cards outline an eight-step approach to conducting a behavior change session. The steps include among other things a review of the previous session, the behavior of the month objectives, key points to note on the behavior, use of a song or drama to help with learning and ends with each lead mother taking a vow to go and attempt implementing the behavior at home. After the meeting, lead mothers conduct home visits to neighbor women to help check on progress and provide mentoring and support to promote behavior adoption. The LFSP is promoting eight carefully selected behaviors.

The current study was therefore designed to assess the nutritional impact of nutrition behavior change communication activities using the CGM approach in a FAO managed nutrition-sensitive agriculture program (LFSP) in rural Zimbabwe.

2 Methods

This article is based on secondary data generated in 2020 during a study of the LFSP in selected districts in Zimbabwe. The methodology used by FAO Zimbabwe during data collection is presented in this section.

2.1 Study design and setting

This analytical cross-sectional study is based on secondary data collected in 2020 during a study in 9 conveniently selected LFSP districts in Zimbabwe. The districts are Makoni, Mutare and Mutasa in Manicaland Province, Mt Darwin, Guruve and Bindura in Mashonaland Central, Gokwe South, Shurugwi and Kwekwe in the Midlands Province. An estimated 10% (21 wards) were selected across the 9 districts using the proportionate random sampling considering proportions of households in sampled wards. Using a total population size (200 000), 95% confidence interval and 5% margin of error, the calculated sample size was 426 beneficiaries. Factoring an anticipated 13% non-respondent rate sample size was found to be 481 households. Considering that the participation by mothers in the care groups was not randomized but was part of the routine

LFSP community recruitment led by Promoters (Village Health workers) and the lead mothers, propensity score matching based analysis was adopted to eliminate any selection biases.

2.2 Data collection and tools

A mixed methods approach using quantitative and qualitative data collection techniques was used for purposes of triangulation. Quantitative data was collected utilizing an interviewer administered household questionnaire that solicited for information on household participation in care groups. Secondly, the questionnaire solicited for information on the impact of the CGM on positive nutrition behaviors and practices and on dietary diversity, amongst households, women and children.

Focus Group Discussions (FGDs)

Women participating in neighbor women groups of the CGM, were randomly selected to participate in focus group discussions (FGDs) by the Enumerators. Two FGDs (one with farmers and one with neighbor women groups) were conducted per district (FGD sites were conveniently selected by the enumerators). A total of 107 farmers participated in FGD 1 and 137 neighbor women or caregivers participated in FGD 2 meetings.

Key Informant Interviews (KIIs)

A total of 93 key informants were purposively selected and they included government officials (District nutritionist, Nutrition ward Coordinator, Agritex Officers, Village Health Woker), program officers (from World vision, Practical Action, Welthungerhilfe), as well as community leaders (village heads lead farmers and lead mothers).

2.3 Selection of households into care groups

Participation in CG in the LFSP was voluntary. The primary target of these care group were women of child-bearing age (15 to 49 years), and primary caregivers of children under the age of five years. However, due to observed influence of elderly women in child-care and feeding, many groups had elderly membership. In some cases, men were also involved for the same reason, but the numbers were minor. People were mobilized to participate via community meetings, conducted by village health workers and community leaders, explaining the objectives of the intervention and the required membership. During these meetings, volunteer lead mothers were selected as well as the neighbor women groups. In some instances, neighbor women groups were formed first and then the groups selected who they desire to be their leader and this becomes the lead mother.

2.4 Econometric estimation

2.4.1 Determinants of household participation in care groups

To address the first objective of this paper, which seeks to determine the determinants of participation in care groups, we employed binary response models as follows:

$$P_i = \alpha + X_i^{'}\beta + \varepsilon_i \quad \ldots\ldots..[1]$$

Where, P_i represents the household care group participation status in the CGM and it takes the value of 1 if the household participated in the care group, and 0 otherwise. X_i is a vector of the household background characteristics. We employed the linear probability model to estimate Equation 1.

2.4.2 Impact of care group participation

Objectives 2 and 3 of this paper are impact evaluation problems. The fundamental problem of causal inference using observational data as ours is that one cannot observe the counterfactual giving rise to the problem of self-selection bias in the comparison of means to estimate the average treatment effect. We tackled the self-selection problem by using the assumption of selection on observables, i.e., conditional on observable characteristics the difference between care group participants and non-participants is due to participation in care group support. We defined the household practicing of promoted behaviors as Y_i. The counterfactual problem is that for each household we can only observe either Y_{i0}, or Y_{i1} which is the household Practice of promoted behaviors when $P_i = 1$ and $P_i = 0$, respectively. Estimation of the average treatment effect on the treated (ATT) can be resolved through matching the treated units with untreated units that are as similar as possible in pre-treatment characteristics using propensity score matching as follows:

$$ATT = E\,(Y_{i1} \mid S_i = 1) - E\{E\,(Y_{i0} \mid S_i = 0,\, Pr\,(S_i =1|X) \mid S_i =1)\} \ \ldots.. [2]$$

2.5 Ethics and approvals

The study was conducted based on the ethical principles of respect, justice and confidentiality summarized in the 2013 Declaration of Helsinki [9]. Approval for data collection at provincial, district and community levels was obtained through a consultative engagement process with responsible authorities and community leadership. All participants gave written informed consent prior to data collection activities. The study was also granted an Ethical Approval (MUAST/EA/05-20) by the Research Ethics Committee at Marondera University of Agricultural Sciences and Technology.

2.6 Patient and Public Involvement

No patients or the public were involved in the study design, setting the research questions, interpretation or writing up of results, or reporting of the research. The public was only involved as respondents during interviews and focus group discussions.

3   Results

3.1 Background characteristics by care group participation and determinants of participation in care groups

Table 1 displays marked differences in the background characteristics of participants and those of non-participants in care groups before controlling for observed confounders. The results showed that the participants in care groups tend to be younger and less likely to come from nuclear families than their counterparts who did not participate in care groups. Specifically, participants were on average 6.96 years younger than non-participants at the 1% level of significance before controlling for confounding variables. This age group difference could be

attributed to participants selecting their age mates to join the care groups. Table 1 also shows that the probability of the participants to reside in a nuclear family was 57.7% versus 66.7% for non-participants. In relation to the livelihood sources of the household, participants in care groups were more likely to be formally employed than their counterparts who did not participate in care groups before controlling for observed confounders (Table 1). The difference in proportion between the two groups of 5.1% is statistically valid at the 5% level of significance.

Table 1: Background Characteristics for Participants Interviewed on Participation in Care Groups (n=477).

Parameters	Household participated in care group?				D.M [Y – N]
	Yes [Y]		No [N]		
	M	S.D	M	S. D	
Observations # (%)	302	(63.3%)	175	(36.7%)	
Household head is female [1 if Yes, 0 if No]	0.13	0.34	0.21	0.41	-0.08**
Household head age [Years]	43.53	12.53	50.49	14.76	-6.96***
Household head is married [1 if Yes, 0 if No]	0.86	0.35	0.79	0.41	0.07*
Education of household head					
None	0.02	0.13	0.04	0.20	-0.02
Primary	0.19	0.39	0.31	0.46	-0.12***
Secondary	0.76	0.43	0.62	0.49	0.14***
Tertiary	0.03	0.17	0.02	0.15	0.005
Family composition					
Nuclear	0.58	0.49	0.67	0.47	-0.09**
Polygamous	0.03	0.18	0.03	0.18	-0.001
Extended	0.39	0.49	0.30	0.46	0.09**
Source of livelihood					
Employed	0.08	0.27	0.03	0.17	0.05**
Farmer	0.68	0.47	0.75	0.43	-0.07*
Casual Labor	0.09	0.29	0.15	0.39	-0.06*
Gold Panning	0.02	0.14	0.01	0.08	0.01
Vending	0.08	0.27	0.04	0.19	0.04*
Government/Donor Aid	0.003	0.06	0.01	0.11	-0.008
Other	0.05	0.21	0.01	0.11	0.04**
District					
Mutare	0.16	0.37	0.09	0.28	0.08**
Makoni	0.14	0.35	0.06	0.24	0.08***
Mutasa	0.13	0.34	0.13	0.34	0.001
Shurugwi	0.000	0.000	0.18	0.38	-0.18***
Kwekwe	0.06	0.24	0.11	0.31	-0.05*
Gokwe South	0.02	0.14	0.30	0.46	-0.28***
Bindura	0.12	0.33	0.02	0.15	0.09***
Guruve	0.16	0.37	0.07	0.25	0.09***
Mt Darwin	0.21	0.41	0.04	0.19	0.17***

Notes: Total sample size is 477. The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance. D.M: difference in means

The Ordinary Least Squares (OLS) estimates of the determinants of household participation in the care groups displayed in Table 2 shows that at the 5% level of significance, an increase in the age of the household head by one year decreases the household probability of participating in care groups by 0.379% ceteris paribus. Furthermore, consistent with the results on background characteristics, Table 2 shows that nuclear households are 9.34%

less likely to participate in care groups at the 5% level of significance. In addition, Table 2 shows significant differences in the livelihood sources of the households by participation status. At the 5% level of significance, households that are reliant on casual labor are 26% less likely to attend care groups than their counterparts who are reliant on other livelihood sources after controlling for observed confounders.

Table 2: Ordinary Least Squares (OLS) Estimates of Determinants of Household Participation in Care Group Program (n=442)

Parameters	OLS Estimate
Household head is female [1 if Yes, 0 if No]	-0.04 (0.125)
Household head age [Years]	-0.004** (0.002)
Household head is married [1 if Yes, 0 if No]	-0.002 (0.12)
Education of household head [base is Tertiary]	
None	-0.04 (0.13)
Primary	-0.15 (0.12)
Secondary	-0.09 (0.12)
Family composition [base is Extended]	
Nuclear	-0.09** (0.04)
Polygamous	-0.17 (0.12)
Source of livelihood [base is Other]	
Employed	-0.07 (0.14)
Farmer	-0.08 (0.11)
Casual labor	-0.26** (0.13)
Gold Panning	-0.02 (0.15)
Vending	-0.03 (0.13)
Government/Donor Aid	-0.45 (0.34)
Constant	1.29*** (0.21)
Observations	442
R-squared	0.43

Notes: Regression results control for district dummies. Robust standard errors in parentheses. ***, **, and * indicate the 1, 5, and 10 percent levels of significance.

3.2 Knowledge and practice of nutrition behaviors by care group participation status

Table 3 shows that participant households had more knowledge and practice nutrition behaviors more than non-participant households. In terms of knowledge of nutrition behaviors, participant households scored 6.089 versus 5.091 for the non-participants. Moreover, participant households Practice 2.72

nutrition behaviors versus 1.97 for the non-participant households.

Table 3: Knowledge and Practice of Nutrition Behaviors of Participants Interviewed on Participation in Care Groups (n=477)

Parameters	Household participated in care group?				D.M [Y – N]
	Yes [Y]		No [N]		
	Mean	S. D	Mean	S. D	
Knowledge of nutrition behaviors [0 to 8]	6.09	2.34	5.09	2.78	0.99***
Practicing of nutrition behaviors [0 to 4]	2.72	1.23	1.97	1.32	0.76***
Child dietary diversity score[0 to 8]	3.48	1.81	2.69	2.07	0.79***

Notes: Total sample size is 477. The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance. D.M: difference in means

Propensity Score Matching (PSM) results exhibited in Columns (I) and (II) of Table 4 reveal that participation in CG is associated with an increase in the knowledge of nutrition behaviors of 1.449 points and an increase in practicing of nutrition behaviors by 1.074 points at the 1% level of significance. In particular, Column (III) of Table 4 shows that at the 5% level of significance, participation in care groups increases the household dietary diversity score for under 5 children by 0.628 points.

Table 4: Propensity Score Matching Estimates of Treatment Effects of Care Group Support on Knowledge and Practice of Nutrition Behaviors (n=442)

VARIABLES	Knowledge of nutrition behaviors [0 to 8] (I)	Practice nutrition behaviors [0 to 4] (II)	Child DDS (III)
Average treatment effect of participating in care group	1.45*** (0.27)	1.08*** (0.15)	0.63** (0.25)
Observations	442	442	358

Robust standard errors in parentheses. ***, **, and * indicate the 1, 5, and 10 percent levels of significance. DDS: dietary diversity score

Table 5 shows the eight-nutrition behaviors promoted by the LFSP program. The results show significant differences in knowledge of four of the promoted nutrition behaviors between care group participating and non-participating households at the 1% significance level. Interestingly, these four-nutrition behaviors are related to child feeding practices and household consumption practices.

Table 5: Individual Components of Knowledge of Nutrition Behaviors for Participants Interviewed on Participation in Care Groups (N=477)

Parameters	Household participated in care group?				DM [Y-N]
	Yes [Y]		No [N]		
	Mean	S. D	Mean	S. D	
Knowledge of nutrition behaviors [0 to 8]	6.09	2.34	5.09	2.78	0.99***
1. Safe household processing, preparation, preservation and storage of food.	0.77	0.42	0.71	0.45	0.06
2. Exclusive Breastfeeding for children from birth to 6 months	0.80	0.39	0.66	0.48	0.14***
3. Offer children aged 6-24months, timely, adequate and diverse complementary feeding with continued breastfeeding up to 2yrs and beyond.	0.79	0.40	0.61	0.49	0.19***
4. Good nutrition for women of childbearing age	0.68	0.47	0.59	0.49	0.09*
5. Household production and consumption of diverse nutritious foods including Neglected Underutilized Foods, iron-rich and Vitamin A rich foods all year round.	0.74	0.44	0.54	0.50	0.20***
6. Household production and consumption of bio-fortified crops	0.79	0.41	0.62	0.49	0.18***
7. Handwashing at the five critical times for all household members	0.86	0.35	0.79	0.41	0.07*
8. Practice household hygiene for the whole family – proper waste disposal, use improved toilets and use pot racks	0.89	0.32	0.79	0.41	0.09**

Notes: Total sample size is 477. The final column shows the results of two-tailed t-test for the difference in the means. ***, **, and * indicate the 1, 5, and 10 percent levels of significance. D.M: difference in means

4   Discussion

The results presented in this paper revealed that participation in care groups is non-random but rather dependent on the background characteristics of the household, thereby introducing self-selection bias in treatment evaluation. According to Shams *et al.* [10] inclusivity of all age groups and social classes in care groups can play an important role in social development and enhancement of their self-confidence. The relatively high score on knowledge of the nutritional behaviors by non-participating households observed in this study could be attributed to the spillover effects of the care groups trainings and general awareness of promoted behaviors amongst all farmers participating in the program. Several studies [2,11-13] provide evidence on positive interhousehold spillover effects on the nutritional status of non-targeted young children in the community. For example, Dillon *et al.* [13] found a significant impact and knowledge spillover effects

of an nutrition-sensitive agriculture intervention program on improving child nutrition in Burkina Faso.

The impact of the care group model, as presented in the result section, is also identical to that found in Cambodia, Mozambique, Malawi, Kenya and Rwanda, which showed an increased dietary diversity, decline in malnutrition mortality for children below 5 years and improved outcomes for key maternal, infant and young child health indicators [2,14,15]. Furthermore, the results of the current study corroborate previous findings [16-19] which revealed that the care group model has positive influence on key nutrition behaviors and associated indicators and do succeed in improving uptake of the behaviors promoted (e.g. breastfeeding, underweight, complementary feeding practices). For example, the care groups in Sofala province, Mozambique, achieved 78% increase in early breast feeding and a 37% reduction in children classified as underweight [18]. Care groups have been linked to improved nutritional status, and the most notable finding was fewer cases of severe malnutrition in children under two years of age due to increased exclusive breastfeeding for 6 months and general awareness of better breastfeeding practices [20].

The results presented in this paper indicate significant differences in practicing promoted nutrition behaviors between care group participating households and non-participating households. This is a welcome development as evidence suggests that sustained behavior change requires more than simply increasing knowledge and awareness of good nutrition practices but ensuring that households are practicing the imparted knowledge [21]. These results corroborate those from a study by Edwards *et al.* [21] on the impact of the care group approach on social and behavior change communication on nutrition intervention programs. A study by George *et al.* [22] revealed that behavioral change in hand washing with soap was reported more than double in participating households than in non-participating households.

5   Conclusion

The study has shown that the care group model is an effective tool for behavior change communication. Positive associations were observed between participation in CG and positive nutrition knowledge, behavior, practices and dietary diversity. The findings provide new evidence on the effect of the care group model in nutrition-sensitive agricultural programs and these results could be used to inform and improve nutrition behavior change communication activities using the CGM approach in nutrition-sensitive agriculture intervention programs. We recommend the integration of the CGM approach into community-based nutrition programs in order to improve household nutrition status.

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