Original Research

A LOCAL BASED FOOD SECURITY INTERVENTION TARGETED GROUP COMMUNICATION ACTIVITIES TO IMPROVE NUTRITIONAL STATUS OF CHILDREN UNDER FIVE YEARS OLD IN LAO CAI PROVINCE, VIETNAM

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ABSTRACT

Aims: The study was conducted to (i) determine the effectiveness of the local-based food security intervention in improving the knowledge and practice of mothers in infant and young child feeding (IYCF) practices, and (ii) assess the effectiveness of the intervention in improving the nutritional status of children under five years in two communes in Lao Cai province.

Methods: The open community intervention was conducted from 2014 to 2016 on all children under five years old and their primary caregivers in Thao Chu Phin and Ban Pho commune, Lao Cai province. Care Group consisted of 10-12 mothers/primary caregivers, and Village Kitchen consisted of a group of women in the village, were established and met weekly to enhance rice powder production and peer communication activities in the communes. All 150 and 194 pairs of child-primary caregiver at baseline and the end of the intervention, respectively were assessed for children's weight and height, and primary caregivers' knowledge, attitude, and practices on IYCF.

Results: The prevalence of stunting significantly reduced at the conclusion of the intervention, from 59.3 to 43.5% in Ban Pho commune (p<0.01) and from 73.3% to 53.0% in Thao Chu Phin commune (p<0.001). Anthropometric indicators, except for weight, improved at the end of the study (all p<0.05). The proportion of primary caregivers who had correct knowledge about food diversity for complementary feeding significantly increased from 15.5% to 56.9% (p<0.001). More food was given to children for complementary feeding (all p<0.05).

Conclusions: The intervention of local-based food security and enhancing group communication was effective in improving the knowledge, attitude, and practice of primary caregivers on IYCF, anthropometric indicators, and in reducing childhood stunting.

Keywords: *food security, supplementary feeding, malnutrition, children, stunting*

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I. INTRODUCTION

Lao Cai, a Northern mountainous province, is one of the provinces with a high proportion of childhood malnutrition in Viet Nam [1]. Poor breastfeeding practices and inadequate consumption of locally available food in maternal and child health and nutrition care were existing public health issues in Lao Cai [2]. Limited understanding and skill of primary caregivers in health and nutrition care for children was thought to be a reason for this issue. Traditional customs in breastfeeding practices such as the early introduction of rice/chewed rice for infants in the first days after delivery and failure to provide diverse food for complementary feeding led to the inadequacy of energy and nutrients intake [3]. As a result, a large number of children were at risks of malnutrition.

Among malnutrition prevention activities, meal demonstration is an effective solution in the communities because local food and culturally traditional behaviours in meal preparation can be applied [4]. However, the current meal demonstration activities in Lao Cai province have limitations in terms of practicality and applicability. Because in many poor communes in the province, mothers fed their infants or young children with rice/chewed rice only as complementary food [3]. Meats, sea foods, egg, dairy products, or vegetables/fruits were rarely provided for complementary meals. Rice powder or porridge was not given to children as rice powder is not locally available and mothers were not aware of essential complementary feeding practices.

Therefore, Lao Cai Health Department with support from the United Nations Children's Fund (UNICEF) Vietnam and the National Institute of Nutrition developed a model named Village Kitchen that focused on group communication (Care Group) to promote the consumption of local food for supplementary meals; and increased food availability to improve the quality of supplementary meals (Village Kitchen to demonstrate supplementary meals preparation, provide rice powder to households, and organize direct communication activities). The model was proposed based on the body of evidence and understanding that improved food security positively associated with good infant feeding practices, particularly in low and middle income settings [5]. This model also targeted to improve the capacity of nutritional health workers, especially at the commune level in conducting nutrition communication and education activities, and infant and young child feeding (IYCF) supported programs in the community. Whether increased availability of rice powder and group communication to promote the consumption of local food improved the knowledge and practice of mothers in IYCF, and nutrition status of young children in the communes would be the evidence for further recommendations in the similar settings in Vietnam.

The intervention was conducted to (i) determine the effectiveness of the local-based food security intervention in improving the knowledge and practice of mothers in IYCF practices in two communes in Lao Cai province, and (ii) assess the effectiveness of the local-based food security intervention in improving the nutritional status of children under five years in two communes in Lao Cai province.

II. METHODS

2.1. Study design and participants

The opened community intervention, with pre-and post-intervention evaluation, was conducted from January 2014 to December 2016 in Ban Pho commune, Bac Ha district, and Thao Chu Phin commune, Si Ma Cai district, Lao Cai province. Participants were children under five years of age and their mothers in the two communes.

2.2. Sample size and sampling

Ban Pho and Thao Chu Phin communes which were in the intervened areas for enhancing IYCF of UNICEF Vietnam were intentionally selected. All children under 5 years old in the two communes and their mothers/primary caregivers were invited to participate in the study. At the baseline survey, 150 pairs of children under 5 years old and primary caregivers consented to take part in the research. Throughout the intervention, all mothers/primary caregivers with child(ren) under five in the two communes were admitted to the Village Kitchens and Care Groups. At the end of the intervention, 195 pairs of child-mothers consented to participate in the post-intervention survey.

The cross-sectional study consisted of 2.676 participants aged 40-64 years (2171 normoglycemic, 409 prediabetes, and 96 T2D cases). They were randomly recruited from a general population in Ha Nam province located in the Red River Delta region, Vietnam. The details of the study were reported previously [3]. In summary, all participants were interviewed by trained surveyors to collect data on social-economic status (age, sex, residence, marital status, occupation, education, income level, family history of diabetes) and lifestyle patterns (smoking and drinking comsumptions, leisure time spent sitting, siesta, and watching television). Clinical parameters were measured including body fat percentage, systolic blood pressures (SBP), glycemic status, and lipid profile.

Selection criteria

Children under 5 years old and their mothers/primary caregivers in all villages of the communes. If a mother had more than one child under five years old, all of her children would be eligible to participate in the intervention and the number of child-mother pairs would be counted based on the number of children registered for the research.

Exclusion Criteria

Children and their mothers/primary caregivers were excluded if the child(ren) had anthropometric abnormalities (e.g. severe scoliosis which would not allow for the correct determination of height); or mothers/primary caregivers had an intellectual impairment that would prevent them from understanding the aims of this research; or the households' members did not provide their verbal consent to participate the intervention.

2.3. Intervention

All health care providers at the provincial, district, commune and village level were trained by the National Institute of Nutrition staff for operational procedure, and technical and equity issues prior to the intervention. Local health workers, especially village health workers, returned to establish Village

Kitchens and Care Groups in their locations. The intervention was conducted from January 2014 to December 2016.

Each commune health station was supported to establish Care Groups as much as the commune health station could. Each Care Group took care of 10-12 mothers/primary caregivers of children under 5 years old or women of reproductive age. In each Care Group, one group leader was voted by the group members and technically supported by village health collaborators or commune health workers. The responsibilities of the group leader were established and agreed with all group members.

The main tasks of Care Group were to:

- Organize monthly group meetings to exchange experience in complementary feeding using the program's powder and available foods in households, update knowledge and skills in nutrition care for children, educate and communicate for child and maternal health and nutrition care.
- Support Village Kitchens in supplying and exchanging rice powder for children. The mothers/caregivers who were unable to go to the Village Kitchens to exchange powder within 2 weeks would be supported by Care Group members to exchange rice powder directly at the household.
- Collaborate with Village Kitchens in conducting communication activities, meal demonstration, and household visits.

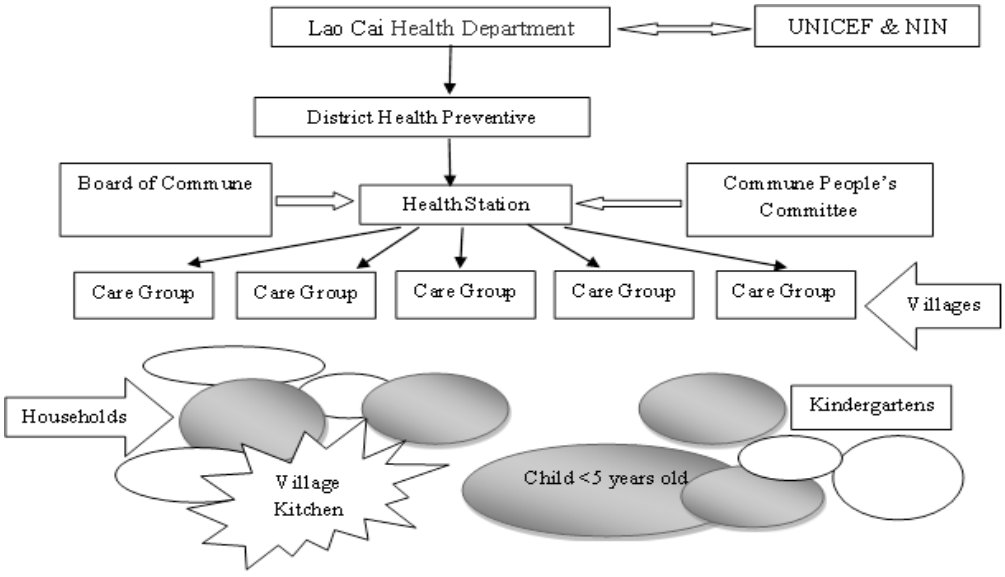

Figure 1. *Model of intervention in community.UNICEF,* United Nations Children's Fund; NIN, National Institute of Nutrition, Vietnam

Each commune had at least one Village Kitchen. Village Kitchen consists of a group of women in the village led by a village health collaborator, located at the commune health station or home of the village health collaborator or leader of the village. Essential material to produce rice powder (rice powders, rice-soybean powders, rice-green bean powders) and conduct meal demonstration was fully equipped for Village Kitchens by UNICEF.

The main tasks of Village Kitchens were to:

- Monitor the growth of children under 5 years old of Kitchen's members.
- Manufacture and exchange powder: ensure that rice powder was always available at Village Kitchens. The mother/caregivers brought their rice/legumes to the Village Kitchens to make rice powder or exchange for powder.
- Instruct Kitchen's members to prepare complementary meals using the powder made and locally available. The instruction was provided during the powder exchanging by village collaborators or Village Kitchen's members.
- Visit households to monitor and provide the necessary support for mothers in complementary feeding.

Health care providers at all levels were trained prior the intervention and supported throughout the intervention duration.

2.4. Data collection

The baseline survey was conducted in January 2014 to collect data on the knowledge, attitude, and practice (KAP) of primary caregivers of children under five years old; the weight and height of children under five years old, and the availability of local food by seasons. Children were measured in light clothes without shoes or napkins with calibrated electronic body scales (TANITA BC-543, TANITA Corporation, Tokyo, Japan) to the nearest 0.1kg of their body weight. Length of children under two years old and height of children aged 2-5 years was measured by UNICEF wooden stadiometer according to the standardized procedure to the nearest 0.1cm [6].

KAP data on IYCF and reproductive health care was collected by constructed questionnaires validated for language before applying to data collection. The questionnaire was designed by Vietnamese language first and was used to interview 30 ethnic women (mainly Mong ethnic minority) to check the accuracy of the translation from Vietnamese to Mong language. Revision was made and the questionnaire checked again by local health staff before finalizing. The food availability questionnaire was validated with the local agriculture section to investigate the availability of local food in households by season. The post-intervention assessment was conducted in December 2016 repeating the baseline survey procedure.

Children were assessed as underweight if their weight-for-age z-score (WAZ) <-2SD, stunting if height-for-age z-score (HAZ) <-2SD and wasting if weight-for-height z-score (WHZ) <-2SD.

Primary caregivers were assessed for having correct breastfeeding practice if their infants were started complementary feeding after 6 months of age and continued to breastfeed until at least 2 years old [7]. At least 4 out of 7 food groups given for complementary feeding was defined as food diversity [7].

2.5. Data analysis

The characteristics of children participating in the intervention at the baseline and post-intervention surveys are described as percentages (for nominal and binary variables) or mean and standard deviation (for continuous variables). The differences in the percentages or the means between the

two surveys were tested by χ^2 test or unpaired t-test, respectively with a statistical significance of $p < 0.05$**.** Data analysis was performed with STATA 14.0 (StataCorp LP, TX, USA).

2.6. Ethical issues

The intervention was approved by the Lao Cai Health Department with support from UNICEF Vietnam and the National Institute of Nutrition. All health workers involved in this research at provincial, district, commune, and village were informed and explained about the objectives and methods of the intervention. The rights and responsibilities of each researcher and participant as well as methods to prevent possible risks arising during the implementation of activities in the community were discussed and agreed upon. All researchers were trained for implementing the intervention and utilizing data collection tools. Investigators who do not speak ethnic minority languages were accompanied by interpreters. Participants could withdraw from the study at any time.

Requests for participants and agreements between the people involved in rice powder supplying were strictly regulated and implemented under the support and supervision of UNICEF and provincial health staff. The rights and benefits were the same for all participants and no exceptions or preferences were given if having no agreements among all members. Monitoring activities were conducted regularly to ensure the equity and accessibility of all targeted members. Any violation detected during monitoring and supervision activities was reviewed and adjusted.

III. RESULTS

3.1. Operation indicators

- 3 Village Kitchens and 40 Care Groups (2 groups in each village) were established in two communes.
- Village Kitchens covered > 80% of children under 5 years old and Care Groups covered >80% of caregivers of children under 5 years old and women from 15-49 years old in 2 communes.
- Provided 100% communication materials for mothers/caregivers and training materials for health workers and collaborators on IYCF.
- Meetings in Care Groups were held at least once a month.

3.2. Characteristics of primary caregivers and children participating in the research in two communes

According to Table 1, boys and girls participated in the study were similar at the baseline and post-intervention survey. The percentage of mothers with primary education at baseline was significant higher than at post-intervention survey while it was opposite for the prevalence of mothers with high school education level. Monthly expenditure of households for food was significant higher in 2016 compared with the figure for 2014 survey.

Table 1. *Characteristics of children under 5 years old and their primary caregivers in two communes participating in the study*

Variable		Baseline (*n*=150)	Post-intervention (*n*=195)
Gender	Boy	81 (54.0)	100 (51.6)
	Girl	69 (46.0)	94 (48.4)
Age (month)		11.6±0.6	12.0±0.4
Primary care givers' education level	Primary School	55 (36.9)*	20 (14.2)*
	Secondary School	66 (44.3)	67 (47.5)
	High School	28 (18.7)*	54 (38.3)*
Primary care givers' occupation	Officer	0 (0.0)	15 (7.9)
	Housewife	13 (8.7)	4 (2.1)
	Farmer	136 (91.3)	171 (90.0)
Monthly expenditure for food (million VND) (mean±SD)		1.55±0.19**	2.45±0.12**

Data are in n (%) exept for monthly expenditure for food .
** p <0.05* by χ^2 test. *** p < 0.05* by Student's *t*-test.

3.3. Effectiveness of the local based food security intervention in improving the knowledge and practice of mothers in IYCF practices in two communes in Lao Cai province

Table 2. *Percentage of primary care givers who had correct knowledge about food diversity for complementary feeding*

	Baseline (*n*=148)	Post-intervention (*n*=116)	*p*-value by χ^2 test
Incorrect (<4 food groups)*	125 (84.5)	50 (43.1)	<0.05
Correct (≥4 food groups)*	23 (15.5)	66 (56.9)	

Data are in n (%)

Table 3. *Food used for complementary feeding (for children who are supplemented with powder or chewed/chewed rice)*

	Thao Chu Phin		Ban Pho	
	Baseline (*n*=58)	Post-intervention (*n*=84)	Baseline (*n*=92)	Post-intervention (*n*=111)
Pork meat*	40.0	100.0	46.4	88.7
Poultry*	24.0	88.2	17.8	76.1
Egg*	20.0	96.6	17.9	78.0
Salt*	4.0	75.0	10.7	62.8
Sesame, peanuts*	0.0	78.6	10.7	38.1
Vegetable*	24.0	96.0	32.1	72.3
Only Rice*	56.0	0.0	53.6	7.4

**p < 0.01 by χ^2 test.*

The results from Table 2 show that the percentage of mothers who had correct knowledge of minimum food diversity for their children's complementary feeding significant increased at post-intervention survey (p <0.001).

The proportion of primary care givers fed their children with pork, poultry, egg, sesame, peanuts, vegetable significant rose at the post-intervention survey while the practice of feeding rice only for complementary meals dropped sharply (Table 3).

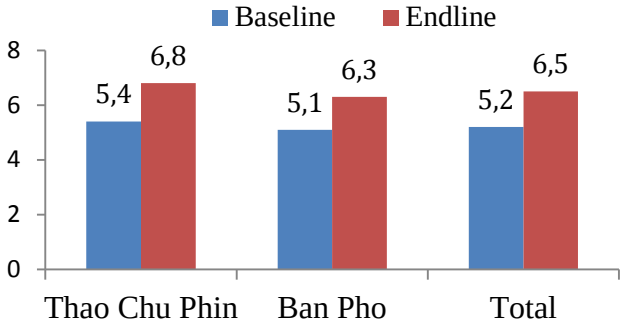

Figure 2. *Average age (months) of children receiving complementary feeding (p>0.05)*

According to Figure 2, the mean age of children introduced complementary feeding increased in both communes at post-intervention assessment, from 5.4 months to 6.8 months in Thao Chu Phin commune and from 5.1 months to 6.3 months in Ban Pho commune.

Table 4 shows that, except for weight, height, WAZ, HAZ, and WHZ all significantly increased at the end of the intervention. The intervention had effects on reducing stunting prevalence in both communes.

3.4 Effectiveness of the local based food security intervention in improving the nutritional status of children under five years in two communes in Lao Cai province

Table 4: *Prevalence of malnutrition among children under <5yrs in two communes*

Variable		Baseline (n=150)	Post-intervention (n=195)	p-value
Weight (mean±SE), kg		8.2±0.1	8.1±0.1	> 0.05
Height (mean±SE), cm		75.0±6.0	68.6±0.7	< 0.001
Weight-for-age z-score		-1.23±0.10	-0.91±0.09	< 0.001
Height-for-age z-score		-2.19±0.13	-1.77±0.12	< 0.001
Weight-for-height z-score		-0.08±0.10	0.23±0.08	< 0.001
Underweight	Ban Pho	20.7	13.6	> 0.05
	Thao Chu Phin	29.2	20.5	> 0.05
Stunting	Ban Pho	59.2	43.5	<0.01
	Thao Chu Phin	73.3	53.0	<0.01
Wasting	Ban Pho	2.6	0.9	>0.05
	Thao Chu Phin	2.1	4.8	>0.05

**: unpaired t-test; **: χ^2 test*

IV. DISCUSSION

The intervention was conducted with intensive communication activities through the meetings at Village Kitchens and within the Care Groups. The primary caregivers' knowledge of complementary feeding had been improved leading to the improvement in complementary feeding practice. Nutrition education and home food production were determined as an important factor of the improved nutritional knowledge and household food security [8]. Indeed, mothers' knowledge, attitudes, and practice in nutrition care are critical for childhood malnutrition prevention [9]. Researchers found that child dietary diversity was improved in the participatory community-based nutrition education, even in areas with food insecurity [10]. The improved food diversity, increased frequency of feeding children with high-quality food (meat, egg, and beans), and delayed introduction of complementary meals to above 6 months of age proved the improvement in KAP indicators. These results were consistent with the body of research on this circumstance [5, 8-11]. The significant improvement in the KAP indicators suggests considering to replicate the intervention in other ethnic communities in Lao Cai province as well as other provinces in Vietnam.

Increasing the availability of local food along with promoting peer nutrition communication has also shown a significant improvement in the nutritional status of children under five years old. Although the average height of children at the end of the intervention was significantly lower than those of children at baseline, the intervention still had effectiveness in stunting reduction. Improved maternal education and household food security were determined as a protective factor of stunting and undernutrition in young children [11]. Household food security was found to be positively associate with child dietary diversity and anthropometry [11]. The statically significant improvement of majority anthropometry indices such as height, WAZ, HAZ, and WHZ is consistent with this statement. These results suggest that enhancing food availability combined with enhanced maternal group communication is an effective intervention for childhood malnutrition control.

To our knowledge, this research was the first intervention that combined food security through increasing the availability of local food and group communication focused on ethnic minorities. The open community intervention enabled all eligible women in the communes to participate in the research, securing the community's equity. The research was conducted with full participation and commitment of the health care system from the national to communal levels that provided timely support for the health staff at the grassroots level to effectively implement the intervention. However, we did not have control groups and could not perform randomization to control for socioeconomic status. This was a weakness of our study and might affect the findings. Nevertheless, positive improvement of children's nutrition status and knowledge and practice of primary caregivers in IYCF suggested the potential of the interventions in similar areas in Vietnam.

V. CONCLUSION

The intervention of local-based food security and enhancing group communication was effective in improving the knowledge, attitude, and practice of primary caregivers on IYCF, anthropometric indicators, and in reducing childhood stunting.

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References

1. National Institute of Nutrition. *Data on children malnutrition annually*. Updated 2016. Accessed 14/3/2018 http://viendinhduong.vn/news/vi/106/61/a/so-lieu-thong-ke-ve-tinh-trang-dinh-duong-tre-em-qua-cac-nam.aspx.
2. Long TV, Phuong HN. Complementary feeding practices for children 6-23 months and assocaited factors in two communes Ban Pho and Thao Chu Phin, Lao Cai province in 2014. *Journal of Practical Medicine*. 2015; 971(7): 50-54.
3. Tuyen LD, Ngan HTD. Food security of households with children under two years old in Ban Pho and Thao Chu Phin commune in Lao Cai province. *Journal of Food and Nutrition Science.* 2016;12(2):3-9.
4. National Institute of Nutrition. Report on summary of 10 years implementing the Protein Energy Malnutrition Control and strategies for the period of 2010-2020. Protein Energy Malnutrition Control: Hanoi, Vietnam: 2010.
5. Macharia TN, Ochola S. Association between household food security and infant feeding practices in urban informal settlements in Nairobi, Kenya. *Journal of Developmental Origins of Health and Disease*. 2018; 9(1):20-29.
6. National Center for Health Statistics. NHANES: Anthropometry procedures manual. Revised. 2004
7. WHO. Indicators for assessing infant and young child feeding practices. Part 1 definitions. Washington DC: 2008
8. Zebsyn S, Akheruzzaman M. Nutrition education and homestead food production ensures household food security: an experimental study. *Journal of Science and Technology*. 2018; 8(1&2):89-96.
9. Sangra S and Nowreen N. Knowledge, attitude, and practice of mothers regarding nutrition of under-five children: a cross-sectional study in rural settings. *International Journal of Medical Science and Public Health*. 2019; 8(5):392-394.
10. Kuchenbecker J, Reinbott A. Nutrition education improves dietary diversity of children 6-23 months at community-level: Results from a cluster randomized controlled trial in Malawi. *PLOS ONE*. 2017; 12(4):e0175216.
11. Ali NB, Tahsina T. (2019). Association of food security and other socio-economic factors with dietary diversity and nutritional statuses of children aged 6-59 months in rural Bangladesh. *PLOS ONE*. 2019; 14(8): e0221929.