Research article

Effectiveness of Food Provision Empowerment Training in Child Care Centers on Knowledge, Self-efficacy, Practice, and Quality of Food Provision

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Abstract

Human resources are important factors contributing to the quality of food provided in child care centers (CCCs). However, half of CCC cooks in Thailand have not received any nutrition training. This study examined the effectiveness of empowerment training on food provision in CCCs. A two-arm quasi-experimental study was carried out for 12 weeks. Cooks and CCC staff in 10 CCCs in Saraburi province received empowerment training (ET), while those in 11 CCCs in Ayutthaya province received traditional training (TT). Knowledge, self-efficacy, and practice related to CCC food provision were evaluated covering menu planning, food serving, and sanitation, while the quality of food provision was assessed, in terms of menu planning, nutrient content, and food sanitation. Changes in outcomes between ET and TT groups were compared using the Chi-square test and Mann Whitney U test. Findings indicated that changes in knowledge and self-efficacy scores were not significantly different between groups, though a greater increase in food provision practice scores was observed among ET cooks (p-value < 0.05). Overall quality of food provision was not significantly different between groups. However, a greater increase in the quality of food provision for menu planning and food sanitation was observed in the ET group (p-value < 0.05), but the nutrient content of the foods provided did not differ. This study revealed the effectiveness of integrated knowledge and empowerment training in improving the quality of CCC food provision for some aspects, as well as its potential to enhance the quality of food provision in other CCCs in Thailand.

Keywords: food provision, empowerment training, child care center

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บทความวิจัย

ประสิทธิผลของการอบรมเสริมพลังการจัดบริการอาหารในศูนย์พัฒนาเด็กเล็กต่อระดับความรู้ การรับรู้ความสามารถของตนเอง การปฏิบัติงาน และคุณภาพของการจัดบริการอาหาร

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บทคัดย่อ

ทรัพยากรบุคคลเป็นปัจจัยสำคัญต่อคุณภาพการจัดบริการอาหารในศูนย์พัฒนาเด็กเล็ก (ศพด.) แต่มีผู้ประกอบอาหาร ศพด. ครึ่งหนึ่งที่ไม่ได้รับการอบรมด้านโภชนาการ การศึกษานี้มีวัตถุประสงค์เพื่อประเมินประสิทธิผลของการอบรมเสริมพลังการจัดบริการอาหารในศพด. ดำเนินการวิจัยแบบกึ่งทดลอง 2 กลุ่ม เป็นเวลา 12 สัปดาห์ ผู้ประกอบอาหารและเจ้าหน้าที่จากศพด. จังหวัดสระบุรี 10 แห่ง ได้รับการอบรมเสริมพลังการจัดบริการอาหาร (กลุ่มศึกษา) และจังหวัดพระนครศรีอยุธยา 11 แห่ง ได้รับการอบรมการจัดบริการอาหารแบบดั้งเดิม (กลุ่มเปรียบเทียบ) ประเมินความรู้ การรับรู้ความสามารถของตนเอง การปฏิบัติหัวข้อการวางแผนเมนูอาหาร การตักเสิร์ฟ และสุขาภิบาล และคุณภาพในการจัดบริการอาหาร โดยประเมินการวางแผนเมนูอาหาร ปริมาณสารอาหาร และสุขาภิบาล วิเคราะห์การเปลี่ยนแปลงผลลัพธ์ระหว่างกลุ่มด้วย Chi-square test และ Mann Whitney U test พบคะแนนความรู้และความเชื่อมั่นในตนเองระหว่าง 2 กลุ่มเปลี่ยนแปลงไม่ต่างกัน คะแนนการปฏิบัติด้านการจัดบริการอาหารของผู้ประกอบอาหารในกลุ่มศึกษาเพิ่มสูงกว่า (p-value < 0.05) คุณภาพในการจัดบริการอาหารโดยรวมของ 2 กลุ่มไม่ต่างกัน คุณภาพด้านการวางแผนเมนูอาหารและสุขาภิบาลของกลุ่มศึกษาเพิ่มมากกว่ากลุ่มเปรียบเทียบ (p-value < 0.05) แต่ปริมาณสารอาหารไม่ต่างกัน การศึกษานี้แสดงถึงประสิทธิผลของการอบรมแบบบูรณาการความรู้และการเสริมพลังในการพัฒนาคุณภาพการจัดบริการอาหารในศพด. ในบางด้าน การอบรมเสริมพลังด้านการจัดบริการอาหารนี้อาจนำไปประยุกต์เพื่อส่งเสริมคุณภาพการจัดอาหารในศพด. อื่น ในประเทศไทยได้

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Introduction

Infancy, toddlerhood, and preschool age are periods of high physical and psychological development[1]. Proper nutrition is one of many factors that support growth and development during these periods. Ensuring proper nutrition during these early periods and throughout the life cycle will benefit long-term nutrition, health, and cognitive outcomes[2]. All children who attend child care centers (CCCs) in Thailand receive free lunch and milk on weekdays. The budget for food provided to CCCs is allocated by local administrative organizations[3]. The cost of food provision in CCCs was set at 20 Baht/person/day from 2013 to 2021 and was increased to 21 Baht since November 2021. This budget provides a set lunch, including a main dish and fruit (or dessert), while the budget for milk provision is provided separately. Based on the Thai School Lunch Program (TSL) guideline, food provided at CCCs, including lunch and school milk, should meet 40% of each targeted nutrient based on the Dietary Reference intake for Thais (Thai-DRI)[4]. However, previous studies have reported inappropriate nutrient intakes from school lunch among preschool-aged children[5-6]. For example, fat and sugar were higher than requirements for children, but fruit and vegetables were inadequately provided[5-6]. Human resources are essential factors that contribute to the quality of food provision in CCCs, and CCC cooks, staff, and directors are pivotal in affecting the quality of meals served[7]. They are usually involved in all food provision steps, such as planning the menu cycle, cooking, serving food to children, and overall food provision management. Hence, they must have the same knowledge and understanding about food provision. Training can enhance this knowledge and understanding in order to achieve appropriate food provision practices[8]. However, half of CCC cooks in Thailand have not received any nutrition training[6]. Among those who have received training, they were trained using a traditional passive learning approach that focused mainly on increasing knowledge[9]. Passive learning is an educational approach whereby teachers provide knowledge to students. This approach, however, limits students' critical thinking and creativity, leading to a lack of engagement and motivation to learn[10]. In contrast, empowerment education is an approach for teaching and learning that provides students with tools and knowledge to increase creativity and engagement in the classroom. It emphasizes critical thinking, problem-solving, and collaboration, and encourages students to be active in their learning[10]. Empowerment education employs a participatory approach and is considered an effective way to enable people to address their problems, plan, and act on solutions, as well as reflect and revise their plans[9]. Participants are encouraged to perform critical thinking and apply knowledge from their learning to practice in order to solve their problems. Previous studies have applied the empowerment education approach and reported improvement in participants' self-efficacy, self-esteem, and behaviors in various areas[11-13]. The empowerment process applied to food provision training has the potential to increase the self-efficacy of CCC cooks and other staff and, consequently, may increase their food provision capacity. Consequently, this study provided food

provision training using the two approaches of empowerment training (ET) and traditional training (TT). Knowledge, self-efficacy, and food provision practices among CCC cooks and staff as well as the quality of CCC food provision (QF) were compared between these training approaches.

Material and methods

Study design and participants

A two-arm quasi-experimental study was conducted from February 2020-March 2021. One area of Thailand's Central Health Region that had the highest number of malnourished preschool-aged children was purposively selected as the study area[14]. Saraburi province in this region was randomly selected as the intervention province, whereas Ayutthaya province, which had similar demographic and socioeconomic characteristics to the intervention province, was purposively selected as the comparison province. One district in each province was selected based on its having district hospital nutritionists and public health officers who were responsible for maternal and child health, as well as possessing more than 13 CCCs. Thirteen CCCs in each province were selected based on common characteristics of most CCCs in Thailand in terms of: 1) being operated by a subdistrict administrative organization (SAO), 2) having a food provision contract with an outside vendor, and 3) having less than 100 children in attendance during a study year. CCCs that had participated in other nutrition interventions or had their own nutritionist were excluded. Sample size was calculated based on the t-test using mean self-efficacy scores at the post-intervention stage of the empowerment study (29.38 ± 0.76 for empowerment group [n = 37] and 25.97 ± 3.66 for comparison group [n = 34])[15], at a significance level at 0.05, and at a power of 80%. After adjusting for a dropout rate of 20%, the final sample size in each group was 13. A cook and two staff members from each CCC were included in the study. Participants who were not able to read and write and did not participate in the first training were excluded. Ethical approval for this study was obtained from Mahidol University Central Institutional Review Board (MU-CIRB), COA no. MU-CIRB 2019/175.2910.

Training programs

Empowerment training was applied using a three-stage process, namely, generate group theme, pose problems, and act-reflect-act[9]. The intervention lasted for 12 weeks, and the intervention group received three ET training sessions at weeks 1, 2, and 9. In the first session (stages of generating group theme and posing problem), participants analyzed the food provision problems in their CCCs and created planned solutions to solve these problems. Solution plans were carried out by participants during the period between each training session. In the following session (act-reflect-act stage), they were requested to reflect on successes, obstacles, and additional solutions, if needed. The first two sessions were conducted via an in-person meeting at the district hospital, while the last session was conducted via video conference due to the COVID-19 pandemic. Knowledge on menu planning, food serving, and food sanitation was provided to improve execution of action plans. The comparison group received TT (referred to as TT group) which was conducted once during the first week after baseline data

collection. Participants were provided the same knowledge as ET groups but using lecture, demonstration, and practice methods.

Assessment of knowledge, self-efficacy, food provision practice, and food provision quality

Data were collected before training and after completing the 12-week training program. Knowledge and self-efficacy related to CCC food provision were assessed using a questionnaire covering three aspects: menu planning, food serving, and food sanitation. Menu planning questions evaluated whether planned menus included recommended food groups with their corresponding frequencies and showed an understanding of food exchange based on the TSL guideline[16]. Food serving questions focused on determining appropriate portion sizes for children[16]. Food sanitation questions addressed desirable behaviors for maintaining proper food hygiene[17]. The total knowledge score on food provision was 30 points as generated from 30 questions. A correct answer was scored as 1, while an incorrect or "not sure" answer was scored as 0. Self-efficacy of CCC cooks was assessed based on 17 questions on their confidence in exhibiting desirable behaviors related to menu planning, food preparation and cooking, food serving, and food sanitation. In addition, the self-efficacy of CCC staff members was assessed using 12 questions, which included the same questions as on the questionnaire for CCC cooks but did not include those related to food preparation and cooking. Participants were instructed to rate their level of self-efficacy on a scale of 0 to 10 (cannot do at all to highly certain can do). Rating scores from all questions were summed. Total scores were 170 points for cooks and 120 points for CCC staff. Food provision practices of cooks were assessed based on three aspects: menu planning, food serving, and food sanitation (15 items). A researcher observed and recorded each item as "Yes" and "No" when a cook did or did not conduct a practice during the period of assessment. A record of "Yes" was scored as 1, while a record of "No" was scored as 0. The total score was 15. The quality of food provision (QF) was assessed for three aspects: menu planning, nutrient contents of foods served, and food sanitation. An assessment form for menu planning was developed based on the standard of food provision for children aged 3-5 years in Thailand[16]. The form consisted of frequency of food groups and menu combination that were served in a week (20 items). These data were assessed from the menu planning of each CCC and recorded by a trained researcher. Frequency that met the target frequency was recorded as "Met" and was scored as 1. Otherwise, it was recorded as "Not met" and was scored as 0. The total score was 20, and CCCs that did not have any menu planning had a total score of 0. The second aspect of QF involved recording menus, ingredients, and quantities of food served during lunchtime for 5 consecutive days. On each of these days, three trays of food, which were prepared similar to food served at each CCC, were collected at baseline (week 0) and post-intervention (week 13) for both TT and ET groups. Using a digital food scale, the foods were weighed and their weights were recorded in grams. Energy (kcal), carbohydrate (g), protein (g), fat (g), dietary fiber (g), vitamin A (RE), vitamin B1 (mg), vitamin

B2 (mg), vitamin C (mg), calcium (mg), and iron (mg), percentage of estimated energy requirement (EER), and energy distribution were calculated using the INMUCAL-Nutrients V 4.0. Nutrient contents were also assessed in terms of whether or not each target nutrient met the criteria of 40% as stated in the Thai-DRI[16]. An acceptable level for each nutrient was considered when food provision achieved 75-125% of target for energy and fat, 75-166% of target for protein, 75-100% of target for carbohydrate, and more than 58% of target for micronutrients. Acceptable macronutrient distribution ranges were 55-60%, 10-15%, and 25-30% of total energy from carbohydrate, protein, and fat, respectively. The nutrient quantity and energy distribution of food served at an acceptable level were scored as 1, and those served at less than or more than the acceptable level were scored as 0. The total score was 12. The third QF aspect covered assessment of food sanitation and used the food sanitation survey for cafeterias form developed by Thailand's Department of Health, Ministry of Public Health[17]. A researcher recorded "Yes" or "No" for each item that a CCC did or did not perform during the period of assessment. A "Yes" answer was scored as 1, and a "No" answer was scored as 0. The total score was 27. Items related to ice, seasoning, and kitchen cupboards were excluded, because these are not usually provided to or used at CCCs. All data were adjusted to a total score of 100 and reported as percentages of 0-100. Percent scores for menu planning, nutrient contents of food served, and food sanitation were summed and averaged to represent QF. QF scores were classified into three levels: 80-100 points, good quality; 60-79 points, moderate quality; and less than 60 points, poor quality[18]. All assessment tools except for food sanitation assessment and the QF assessment form were validated by 6 nutrition and health education experts. Content validity index for item (I-CVI) for all assessment tools ranged from 0.8 to 1.0 and content validity index for scale ranged from 0.96 to 1.0.

Data analysis

All statistical analyses were performed using SPSS Statistics for Windows, Version 18[19]. The significance level of all statistical tests was set at 0.05. Nominal or ordinal scale data were reported as frequency and percentage. All interval or ratio scale data were tested for normality by using the Shapiro Wilk test. Chi-square or Fisher's exact test was used to test differences of nominal or ordinal characteristics within and between groups. Wilcoxon matched-pairs sign rank test was used to test differences in menu planning scores, amount of food served, nutrient content of food served, food sanitation scores, knowledge scores, self-efficacy scores, and practice scores between baseline and post-intervention. Mann Whitney U test was used to test the differences of changes in menu planning scores, amount of food served, nutrient content of food served, food sanitation scores, knowledge scores, and self-efficacy scores between groups.

Results

At baseline, 13 CCCs participated in each ET group and TT group. However, 10 CCCs in the ET group and 11 CCCs in the TT group completed the study. Total numbers of cooks and CCC staff

were 26 and 52 at baseline, respectively, while 21 cooks (10 for ET group and 11 for TT group) and 41 CCC staff (22 for ET group and 19 for TT group) completed the study. Cooks in the ET group had less experience (4.0 [2.0, 5.0] years) compared to cooks in the TT group (10 [6.0, 12.0] years; p-value < 0.001). Their characteristics are shown in **Table 1.**

Changes in knowledge, self-efficacy, and practices

At post-intervention, the knowledge scores of all participants in both groups increased (p-value < 0.05), but changes were not significantly different between groups **Table 2**. Moreover, self-efficacy scores of all participants in both groups did not change (p-value > 0.05), and changes for both groups were not different (p-value > 0.05). At baseline, practice scores of cooks in the ET group were higher than those in the TT group (p-value = 0.007). While the practice scores of cooks in both groups increased, increment in practice scores of the ET group was higher than for the TT group (+20.0 [18.3, 26.7] points for ET group and +6.7 [0, 13.3] points for TT group, p-value = 0.007).

Quality of food provision

Percent scores for QF are presented in **Table 3**. Although the ET group had a significant increase in the QF score at post-intervention, changes did not differ between groups. When considering QF for each aspect, increments for menu planning and food sanitation scores of the ET group were better than for those of the TT group (p-value = 0.047 and < 0.001, respectively). A higher average percent score for the menu planning aspect reflected that more food groups met recommended weekly frequency, while the higher average percent score for the food sanitation aspect reflected that more items regarding sanitation were performed according to the guideline. At baseline, the nutrient scores of the ET group were significantly more than for those of the TT group. Changes in nutrient scores between groups, on the other hand, were not different (p-value = 0.105). The higher average percent score for nutrient content reflected that more nutrients met requirements. QF scores were also classified into three levels: good, moderate, and poor. **Figure 1** presents the percentage of CCC changes in the QF level. Results showed that 60% of CCCs in the ET group had at least one QF level that increased, compared to 36.4% of CCCs in TT group. No CCCs in the ET group had at least one QF level that declined, but 9.1% of CCCs in the TT group had at least one QF level decline. However, there was no significant difference in the percentage of CCCs showing a change in the QF level between groups. When considering improvement in QF scores for each aspect, percentages of CCCs in the ET group increased in terms of menu planning and food sanitation scores and were greater than for those of CCCs in the TT group as shown in **Figure 2**. The percentage of CCCs in the TT group increased in terms of nutrient content scores and was more than that of CCCs in the ET group. However, there was a significant difference between groups only in terms of food sanitation scores.

Table 1. Participant characteristics

Characteristics	Cooks			CCC staff		
	Total (n = 21)	ET group (n = 10)	TT group (n = 11)	Total (n = 41)	ET group (n = 22)	TT group (n = 19)
Sex (n, %)						
Male	1 (4.8)	1 (10.0)	0 (0.0)	2 (4.9)	1 (4.5)	1 (5.3)
Female	20 (95.2)	9 (90.0)	11 (100.0)	39 (95.1)	21 (95.5)	18 (94.7)
Age (years)†	56.0 (40.5, 61.0)	53.5 (38.5, 60.5)	58.0 (41.0, 64.0)	42.0 (34.0, 47.5)	41.5 (34.0, 46.3)	42.0 (29.0, 51.0)
Education (n, %)						
Lower than high school	15 (71.5)	6 (60.0)	9 (81.8)	1 (2.4)	0 (0.0)	1 (5.3)
High school	5 (23.8)	4 (40.0)	1 (9.1)	8 (19.5)	3 (13.6)	5 (26.3)
Bachelor degree	1 (4.8)	0 (0.0)	1 (9.1)	23 (56.1)	12 (54.5)	11 (57.9)
Higher than bachelor degree	0 (0.0)	0 (0.0)	0 (0.0)	9 (22.0)	7 (31.8)	2 (10.5)
Experience (years)†	5.0 (4.0, 10.0)	4.0 (2.0, 5.0)‡	10 (6.0, 12.0)‡	10.0 (5.5, 16.0)	10.0 (9.0, 14.0)	9.0 (2.0,18.0)
Received previous training (n, %)						
School lunch	4 (19.0)	1 (10.0)	3 (27.3)	9 (22.0)	4 (18.2)	5 (26.3)
Food sanitation	1 (4.8)	0 (0.0)	1 (9.1)	2 (4.9)	0 (0.0)	2 (10.5)

NOTE: ET= Empowerment training. TT= Traditional training.

†median (P25, P75). ‡Significant difference between groups based on Mann-Whitney U test; p-value < 0.05.

Table 2. Percent scores for knowledge, self-efficacy, and practice on food provision†

Measurements	ET group			TT group			p-value‡
	Pre-test	Post-test	Change	Pre-test	Post-test	Change	
All participants (n = 32, 30)							
Knowledge	66.7 (57.5, 70.0)	75.0 (70.8, 80.0)§	8.3 (3.3, 19.2)	66.7 (55.8, 70.0)	76.7 (72.5, 77.5)§	10.0 (3.3, 17.5)	0.707
Self-efficacy	92.5 (79.8, 99.2)	93.8 (88.0, 97.9)	-0.1 (-6.2, 10.4)	93.8 (81.5, 98.3)	95.0 (86.32, 98.3)	0 (-2.6, 9.3)	0.757
Cooks (n = 10, 11)							
Knowledge	65.0 (50.8, 70.0)	75.0 (70.0, 80.0)§	6.7 (2.5, 25.0)	70.0 (60.0, 70.0)	76.7 (70.0, 76.7)§	6.7 (3.3, 16.7)	0.887
Self-efficacy	95.3 (76.2, 100.0)	90.3 (80.1, 95.3)	-3.2 (-12.4, 7.4)	98.2 (95.9, 100.0)	97.1 (89.4, 98.2)	0 (-4.1, 0.6)	0.751
Practice	73.3 (71.7, 73.3)	93.3 (90.0, 95.0)§	20.0 (18.3, 26.7)	60.0 (53.3, 66.7)	66.7 (53.3, 66.7)§	6.7 (0, 13.3)	0.007
CCC staff (n = 22, 19)							
Knowledge	66.7 (60.0, 70.0)	75.0 (72.5, 83.3)§	10.0 (2.5, 19.2)	63.3 (53.3, 70.0)	76.7 (73.3, 80.0)§	10.0 (3.3, 23.3)	0.571
Self-efficacy	91.3 (84.6, 99.2)	94.2 (87.9, 98.5)	2.1 (-2.7, 11.0)	86.7 (75.8, 94.2)	92.5 (84.2, 98.3)	2.5 (-1.7, 1.7)	0.610

NOTE: ET= Empowerment training. TT= Traditional training

†Percent score ranging 0-100 presented in Median (P25, P75); ‡p-value for difference of changes between groups based on Mann-Whitney U test; §Significant difference (p-value < 0.05) between baseline (Pre-test) and post-intervention (Post-test) within groups based on Wilcoxon matched pairs sign rank test.

Table 3. Quality of food provision score[†]

Measurements	ET group (n = 10)			TT group (n = 11)			p-value[‡]
	Pre-test	Post-test	Change	Pre-test	Post-test	Change	
Overall score	62.6	76.0	12.2	62.2	66.0	6.8	0.105
	(59.3, 66.6)	(70.2, 81.5)[§]	(5.4, 20.4)	(56.4, 65.5)	(60.9, 75.1)	(-0.5, 10.1)	
Menu planning	55.0	77.5	17.5	55.0	55.0	5.0	0.047
	(45.0, 60.0)	(57.5, 85.0)[§]	(3.8, 36.3)	(40.0, 65.0)	(30.0, 65.0)	(-10.0, 10.0)	
Nutrients	66.7	75.0	8.3	50.0	75.0	16.7	0.105
	(58.3, 66.7)	(56.3, 83.3)	(-2.1, 18.8)	(50.0, 58.3)[‖]	(66.7, 75.0)[§]	(8.3, 25.0)	
Food sanitation	72.2	83.3	11.1	77.8	77.8	0.0	< 0.001
	(66.7, 78.7)	(80.6, 88.9)[§]	(7.4, 12.0)	(74.1, 81.5)	(70.4, 81.5)	(-3.7, 3.7)	

NOTE: ET= Empowerment training; TT= Traditional training

[†]Score referring to percent score ranging 0-100 and presented in Median (P25, P75); [‡]p-value for difference of change between groups based on Mann-Whitney U test; [§]Significant difference within groups based on Wilcoxon match pair sign rank test (p-value < 0.05); [‖]Significant difference of pre-test between groups based on Mann-Whitney U test (p-value < 0.05).

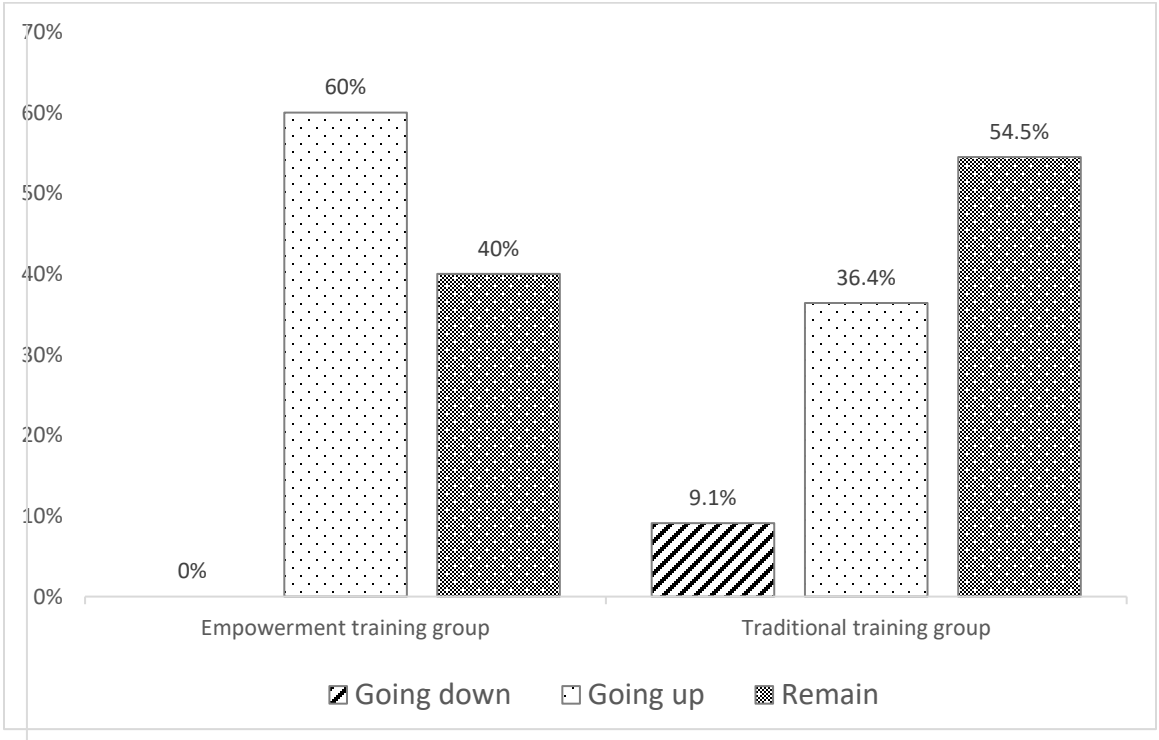

Figure 1 Number of child care centers (%) that changed in quality of food provision level

Figure 2 Number of child care centers (%) that increased quality of food provision scores between pre- and post-intervention divided into three aspects

NOTE: †Significant difference between empowerment and traditional training groups (p-value < 0.05).

Discussion

Findings from this study showed that knowledge scores for both groups increased after the intervention; however, changes in knowledge scores were not different between the ET and TT groups. These findings were expected, because participants in both groups received the same knowledge content and methods of knowledge provision. The utilization of passive learning in training for the TT group and in some activities for ET group allowed researchers to structure the curriculum and provide necessary information to the participants[10], which resulted in an expected increase in knowledge scores for both groups. However, passive learning may not encourage participants to think independently, which can limit their ability to take proactive actions in food provision[10]. Self-efficacy scores of both groups in this study remained unchanged from baseline due to high scores at baseline. This finding could be due to two possible reasons. Firstly, participants may have had high levels of prior working experience, leading to overconfidence[20], and resulting in high self-efficacy ratings at baseline, despite a lack of correct knowledge and understanding of food provision. Secondly, at post-intervention, participants may have realized that they had been performing food provision incorrectly, resulting in a decrease in their self-

efficacy scores compared to baseline. Consequently, we were unable to detect a significant increase in self-efficacy at post-intervention. At post-intervention, practice scores of cooks in both groups increased, and changes in the scores of the ET group were greater than for those of the TT group. In addition, increases in scores of 2 out of 3 aspects (menu planning and food sanitation) that contributed to the QF score of the ET group were greater than for the TT group. It can be implied that both ET and TT training approaches could improve cook practices; however, ET was more efficient than TT. Participants in the ET group received 3 training sessions where they had to plan implementation activities to conduct after each training session and then were also requested to reveal the changes they made to other participants in the next training session. However, participants in the TT group received only knowledge related to food provision through lectures and practical activities without any follow-up procedures. Regarding menu planning, participants from both groups planned 5-day menus during the training, but the process after planning was different between two groups. Participants in the ET group were asked to prepare food for their children using those planned menus and then share feedback from the children as well as any difficulties or simplicities in applying menus and solutions during the next training session. For food sanitation, relevant knowledge was planned to be introduced in the second session of ET. However, participants in the ET group raised issues related to food sanitation ever since the first session. This situation demonstrates the benefits of empowerment training, which encourages participants to become active and engage in the training process. It may also imply that food sanitation was one of their major concerns and may have contributed to greater willingness to make improvements. Furthermore, improvements in food sanitation in this study were related to behavioral changes and management that would not require a large budget. Participants preferred spending the allocated budget to improve the conditions of kitchenware or utensils rather than waiting for the budget from SAOs. However, this type of arrangement was not possible when a large budget was required, such as when they needed to improve CCC structure. Based on previous studies that reported a positive effect of ET on behavior change[12-13, 20], it was hypothesized that changes in behaviors related to food provision would lead to an improvement in QF in terms of menu planning and food sanitation. In addition, improvements in food serving and menu planning would lead to an improvement in nutrient contents. However, no difference in change in terms of the nutrient content aspect between the groups was observed in this study. In order to meet nutrient content recommendations, both the quality of food (i.e., planned menus met recommendations) and quantity of food served must be considered. In general, improvement in the amount of food served (either increases or decreases to meet recommendation) was not consistently found for all food groups. Estimation of quantity of food served was complicated, because the recommendation was based on food groups; however, the food that

was actually served usually comprised mixed dishes. For example, one serving of a dish may contain meat together with vegetables and soup. Consequently, correct portion sizes for all food groups were difficult to meet. More practice with different types of mixed dishes would help to overcome this problem and, as a result, would improve nutrient contents. Moreover, this finding may also be attributed to errors in food collection and the calculation process. For instance, difficulty in separating each ingredient from mixed ingredients in some menus could affect the accuracy of quantity estimation. A non-significant change in nutrient content might also be due to a site visit for the ET group that was canceled and, consequently, participants did not receive sufficient feedback. Originally, the CCC site visit was included in the empowerment program to observe food served. In addition, during this site visit, the researcher would be able to discuss with participants about how to improve the amount of food served. Previous studies reported a positive change in behavior when site visitation was included[21-23] and thus this activity was planned. Unfortunately, this site visit was cancelled because of COVID-19. Hence, food serving practice was carried out for only 1 hour in ET and did not have any site visit activity. The third session of ET was also changed to online training which could have affected the efficiency of the empowerment process and limit learning and practice[24-25]. This study comprised three sessions of ET over 12 weeks. These training sessions were planned as the least possible number of sessions in order not to burden participants. Moreover, the same number of sessions was used in a previous study which showed an increment increase in self-efficacy and skill in taking care of children[15]. It might be possible that frequency and duration of ET sessions in this study were not sufficient to impact on all aspects of behavior. Weekly or monthly ET sessions for 4-24 months may be needed as reported in some previous studies[9,13,26]. Overall, therefore, this study was limited in terms of the lower frequency and shorter duration of training due to the COVID-19 pandemic. The empowerment process was also modified by excluding site visits, resulting in only two sessions for participants to reflect on their actions. Furthermore, changing the last empowerment session from an on-site to an online meeting may have affected the efficiency of ET as opportunities for physical expression and speaking were limited[24]. Lastly, the questionnaire used in this study was tested only for validity but not for reliability. Future studies should include reliability testing to confirm the consistency and stability of the questionnaire.

Conclusions

Training on food provision using a traditional approach, i.e., lecture based, demonstrations, and small practice sessions, can improve knowledge among CCC cooks and staff. However, it is not sufficient to change their self-efficacy and capability to perform appropriate practices compared to training that integrates an empowerment process. This process can help to fill gaps by enhancing knowledge and capability to perform appropriate food provision practices, although self-efficacy changes may depend on previous experiences. Participants in this study were encouraged to

improve their food provision practices by enhancing knowledge and critical thinking skills through the empowerment process. Findings from this study can inform government sectors to consider implementing a food provision training program that provides knowledge through an empowerment process. Nevertheless, regular site visits and an adequate budget might be needed to complement the efficiency of the empowerment process. Since food provision training using an empowerment process requires frequent sessions, responsible sectors could take this opportunity to allow cooks and CCC staff to address problems and to provide support for solution planning and implementation.

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