

An Investigation of Self-Evaluated Performance on Foodservice Management among Directors and Teachers in Home Day Care Centers

Joo-eun Lee

Department of Food and Nutrition, Seowon University, Cheongju, South Korea

Abstract: This study examined foodservice management performance evaluated by directors and teachers themselves in home day care centers located in Cheongju area. And it aimed to compare averages depending on positions, hygiene and nutrition education and raise the hygiene and nutrition education on positions. The analysis proved that directors and teachers showed significant differences in distribution on general characteristics ($p < 0.001$) that directors were more experienced in hygiene and nutrition educations and that the former tended more to take charge of cooking and the latter tended more to take charge of distribute meals. There were significant differences in 'foodservice facilities and environment', 'fooddistribution', 'ingredients management' and 'individual hygiene' areas ($p < 0.05$, $p < 0.01$, $p < 0.001$), depending on positions and whether they received hygiene education or not. In nutrition management area, there were significant differences in average scores in four items depending on whether they received nutrition education or not ($p < 0.05$, $p < 0.01$, $p < 0.001$). And there were significant differences in average scores in the 8 items in cooking, washing and sterilization management ($p < 0.001$) depending on whether they received hygiene education or not. The findings of this research proved that hygiene and nutrition education has positive effects on foodservice management performance and that it is, especially, necessary for teachers to receive hygiene and nutrition education related with guiding children to eat food properly and proper amounts per age.

Key words: Home child care center, foodservice management, hygiene education, nutrition education, foodservice, management

INTRODUCTION

For double-income couples and working women who have children it is very important to find places to care their children while they work. With the economic development and the increase of working women, child care is not only done in home but also in facilities (Laughlin, 2013). After the babies and Children Care Act was established in 1991, the number of day care centers has continuously increased. In 1995, the number of such centers was 9,085 which increased 4.8 times to 43,742 by 2014. The number of babies and children cared in such centers was 293,747 in 1995 which increased more than 5 times to 1,496,671 by 2014. Among day care centers, home day care centers take up the majority (53.3%). Home day care center is small in size run by individual in his home or similar facility with 5-20 babies or children (Kwon and Park, 2012). In particular, with high proportion of babies of 2 years old, the average age of babies and children in home day care centers is lower than comparatively big day care centers (Jeon and Lee, 2014).

As children with immature immune system are vulnerable to diseases and are unable to discern and block risk factors when they ingest food, they are at risk

to get food poisoning (Buzby, 2001). In particular, children at day care center are more at risk to get diarrheal illness and Upper Respiratory Infection (URI) than home-care children (Lu *et al.*, 2004). And, there have been cases where microbes were detected in various places to provide food to day care centers and most of them can cause danger to child health (Staskel *et al.*, 2007). Pollutions of microbes in day care center facilities are mostly caused by unsanitary management of them which is derived from lack of hygiene consciousness of directors and staff members of those centers. But such problems can be improved by preparing systematic food management standards and strengthening hygiene education (Cosby *et al.*, 2008; Li *et al.*, 2014).

This study, using directors and teachers of home day care centers as research objects, intends to examine hygiene education and nutrition education of them and how they perform hygiene and nutrition management and find out differences in performance depending on positions and whether they received hygiene and nutrition educations. The findings will serve as basic material to prepare for food management education and standards on food management for those directors and teachers of home day care center.

MATERIALS AND METHODS

Research subjects and duration: This study targeted at directors and teachers of the home day care centers in Cheongju area, conducting a survey to the directors and teachers who participated in the job training held by joint conference of Cheongju-si home day care centers. The questionnaires were distributed at the entrance of the training center before the training started. The researcher explained the meaning of the study and the method of filling out the questionnaires directly to the directors and teachers before the training and collected them after the training finished at the exit. Among 208 questionnaires collected, 163 were used for statistical analysis after excluding the ones with insufficient answers.

Survey contents and method: The questionnaire for this research was made referring to the guidelines generated by the Center for Children's Foodservice Management which include 'Fact-finding table on Children's Foodservice Facilities', 'Checklist on Hygiene and Safety Management in Children's Foodservice Facilities' and 'Checklist on Small-size Children's Foodservice Facilities'. The questionnaire consists of two parts: general aspects and performance of foodservice management of day care center. Questions in general aspects include gender, age, position, education level, period of working, experience of hygiene and nutrition education, role in foodservice. Performance of foodservice management is composed of 7 areas ('foodservice facilities and environment'; 'personal hygiene'; 'cooking process management'; 'ingredients management'; 'food distribution management'; 'washing, disinfection management'; 'nutrition management') and 34 items. For general matters, nominal scale was applied and for all the items in performance of food management, Likert 5-point scale (1 point: very poor to 5 points: very excellent) was used.

Data analysis: Data were analyzed using SPSS Ver. 18.0 for Windows (Statistical Package for Social Science, SPSS Inc., Chicago, IL, USA). Frequencies and percentages were acquired for general matters for directors and teachers of home day care centers and χ^2 -test was applied to find out the differences in distributions between directors and teachers. After getting means and standard deviations on performance of food management, t-test was done per each area to know the differences in means.

RESULTS AND DISCUSSION

General aspects of research subjects: The general aspects for research subjects, directors and teachers are

shown in Table 1. All of them were females and the proportion of those in their 40s (55.8%) was the largest among age groups. In schooling, the majority of directors (53.6%) were 4 years university graduates and the majority of teachers (58.9%) were technical college graduates. The largest proportion of them 27.6% has duration of work of 3~5 years. About 116 respondents (71.2%) said they had got hygiene education and 96 (58.9%) said they had got nutrition education. About 55.2% of respondents distribute food and 14.1% take charge of cooking and 11.7% participate in cooking only when they are needed. In general matters there were significant differences ($p < 0.001$) in distribution between directors and teachers. In experiences of receiving hygiene education and nutrition education, proportions of directors who received such educations were higher than those of teachers. The former tended more to cook 39.3% and teachers tended more to distribute food 69.2%.

Mean scores in performance on food management in day care centers: Mean and standard deviation per area in performance on food management among directors and teachers of day care centers are shown in Table 2. The total mean score for all the 34 items was 3.34 and the means for each area was as follows: 3.55 on 'facilities and environment', 3.34 on 'personal hygiene', 3.35 on 'nutrition management', 3.15 on 'cooking process management', 3.54 on 'distribution management', 3.44 on 'ingredients management', 3.04 on 'washing, disinfection management'.

Comparison of performance on foodservice management depending on positions and whether they received hygiene education: Using t-test, mean scores in performance levels on food management between directors and teachers of home day care centers on the following 4 areas were compared: 'foodservice facilities and environment', 'distribution management', 'ingredients management'; 'personal hygiene' by t-test depending on positions and whether they received hygiene education or not (Table 3). In 'personal hygiene' area there were no differences in mean scores depending on job positions or experiences of hygiene education in the item, 'before starting cooking job it should be checked whether any cook has any infectious disease or digestive organ disease' and there were no differences in mean scores depending on job positions in the item 'if any cook has such a disease she should be excluded from the cooking process' and there was no difference in means in 'before cooking it should be checked whether any cook has injury on hand and the injury should be wrapped with bandage and the cook should wear glove's. In all the other items in

Table 1: General characteristics of the respondents N = 163

Respondents	Total (N = 163)	Position		χ^2 -values
		Director (N = 56)	Teacher (N = 107)	
Gender				
Male	0 (0.0)	0 (0.0)	0 (0.0)	-
Female	163 (100.0)	56 (100.0)	107 (100.0)	
Age (years)				
20~29	6 (3.7)	0 (0.0)	5 (5.6)	20.26***
30~39	43 (26.4)	5 (8.9)	38 (35.5)	
40~49	91 (55.8)	39 (69.6)	52 (48.6)	
50~59	19 (11.7)	9 (16.1)	10 (9.3)	
60~69	4 (2.5)	3 (5.4)	1 (0.9)	
Education level				
High school	15 (9.2)	3 (5.4)	12 (11.2)	21.60***
College	80 (49.1)	17 (30.4)	63 (58.9)	
University	61 (37.4)	30 (53.6)	31 (29.0)	
Graduate school	7 (4.3)	6 (10.7)	1 (0.9)	
Duration of work (years)				
<1	22 (13.5)	0 (0.0)	22 (20.6)	34.61***
1 ≤ <3	30 (18.4)	4 (7.1)	26 (24.3)	
3 ≤ <5	45 (27.6)	18 (32.1)	27 (25.2)	
5 ≤ <10	39 (23.9)	15 (26.8)	24 (22.4)	
10 ≤ <15	17 (10.4)	13 (23.2)	4 (3.7)	
≥ 15	10 (6.1)	6 (10.7)	4 (3.7)	
Experience of food hygiene education				
Yes	116 (71.2)	56 (100.0)	60 (56.1)	34.57***
No	47 (28.8)	0 (0.0)	47 (43.9)	
Experience of nutrition education				
Yes	96 (58.9)	46 (82.1)	50 (46.7)	19.04***
No	67 (41.1)	10 (17.9)	57 (53.3)	
Work activity for lunch				
Cooking	23 (14.1)	22 (39.3)	1 (0.9)	49.61***
Helping cook when busy	19 (11.7)	6 (10.7)	13 (12.1)	
Distributing food	90 (55.2)	16 (28.6)	74 (69.2)	
Doing nothing	31 (19.0)	12 (21.4)	19 (17.8)	
Total	163 (100.0)	56 (100.0)	107 (100.0)	

***p<0.001

Table 2: Mean scores of foodservice hygiene management in child care centers N = 163

Facility and environment	Mean±SD
F1; Kitchen floor, walls, ceiling and trash cans are cleaned periodically and they are maintained cleanly	3.67±0.52
F2; For comfortable atmosphere, mechanical ventilation facilities like hood, ventilator and air cleaner are used	3.53±0.56
F3; Insect nets are installed on windows and they are maintained cleanly	3.18±0.51
F4; Ultraviolet ray or electric disinfectant is installed in the kitchen and used	3.61±0.66
F5; Drinking water is boiled or if water purifier is used its filter should be changed and cleaned periodically	3.58±0.61
F6; The temperature of refrigerator is set at 5°C or below and that of freezer is set at -18°C or below	3.69±0.67
Subtotal (Chronbach's $\alpha = 0.817$)	3.55±0.43
Personal hygiene	
P1; Cook should get medical check-up once a year and the record is kept	3.69±0.61
P2; Cooks should never fail to wear sanitary outfit (sanitary clothes, sanitary hat and sanitary gloves)	3.10±0.81
P3; Personal accessories (earrings or rings) and manicure are prohibited	3.45±0.73
P4; Before cooking and food distribution and after using restroom, cook should never fail to wash her hands with soap	3.87±0.65
P5; Before cooking, it should be checked whether any infectious disease or digestive organ disease and if anyone has he should be excluded from cooking process	2.89±0.82
P6; Before cooking, it should be checked whether any cook has injury on hand and the injury should be wrapped with bandage and the cook should wear gloves	3.02±0.81
Subtotal (Chronbach's $\alpha = 0.779$)	3.34±0.51
Nutrition management	
N1; We provide babies and children with meal and snacks matching the menu list composed by nutritionist	3.76±0.56
N2; We deliver the portion of food to each of babies and children according to the nutrition standards	3.06±0.70
N3; We provide substitute food to babies and children who have food allergy	3.51±0.62
N4; We display the monthly menu list and open the list to parents of babies and children	3.87±0.55
N5; We provide fried meal twice or less a week	3.71±0.57
N6; We provide instant food twice or less a week	3.75±0.50
N7; We cook food using standard recipe	1.78±0.72
Subtotal (Chronbach's $\alpha = 0.681$)	3.35±0.36

Table 2: Continue

Facility and environment	Mean±SD
Cooking process management¹	
C1; Different knives and chopping boards should be used for vegetable, meat and fish or if one use the same knife and chopping board, wash and disinfect them after using one ingredient	2.60±0.89
C2; Ingredients should not be put on the kitchen floor and food-making job done on the floor	3.12±0.83
C4; To thaw food, we put it in refrigerator, use microwave or running cold water and do not leave it in room temperature	2.79±0.61
C5; Boiling food should be done sufficiently until the temperature of the center of the food goes up to 74°C or above	3.79±0.61
C6; Make sure that the cooked food is consumed within 2 h	3.74±0.70
C7; There should be different dish-clothes, rubber gloves and aprons for cooking and cleaning	2.86±0.90
Subtotal (Chronbach's $\alpha = 0.771$)	3.15±0.51
Distribution management	
D1; When distributing food, sanitary gloves and apron should be worn	3.28±0.60
D2; Before and after distributing food, the desk or table should be wiped with dishcloth	3.62±0.63
D3; Utensils (tongs and scoop, etc.) are used for distributing unwrapped food	3.63±0.59
D4; The food which remains after distributing never be reused	3.63±0.59
Subtotal (Chronbach's $\alpha = 0.858$)	3.54±0.51
Ingredients management	
I1; Food or ingredients not licensed or unmarked should not be used	3.62±0.54
I2; Expiration date and the date Ingredients entered should be checked	3.14±0.60
I3; Food and non-food (detergent, disinfectant, etc.) should be stored separately	3.58±0.63
Subtotal (Chronbach's $\alpha = 0.783$)	3.44±0.49
Washing, disinfection management¹	
Wd1; Utensils like dishes, chopping board, knife and apron, etc. should be Washed and disinfected periodically	3.12±0.86
Wd2; Cooking room and food storage room should be taken prevention measures against epidemics and disinfected periodically	2.95±0.85
Subtotal (Chronbach's $\alpha = 0.845$)	3.04±0.81

¹Only those who cook included (N = 42)

Table 3: Comparison of performance on foodservice management depending on positions and hygiene education

Variables	Position		t-values	Experience of food hygiene education		t-values
	Director (N = 56)	Teacher (N = 107)		Yes (N = 116)	No (N = 47)	
Facility and environment						
F1	3.93±0.26	3.54±0.57	5.927***	3.91±0.35	3.12±0.43	12.378***
F2	3.84±0.37	3.37±0.58	6.252***	3.76±0.47	2.98±0.33	12.041***
F3	3.32±0.51	3.11±0.50	2.508*	3.31±0.48	2.87±0.45	5.526***
F4	3.75±0.58	3.54±0.69	2.033*	3.88±0.44	2.96±0.66	8.836***
F5	3.89±0.31	3.41±0.66	6.331***	3.80±0.44	3.02±0.61	9.122***
F6	4.00±0.48	3.53±0.70	5.058***	3.98±0.49	2.99±0.49	11.807***
Subtotal	3.79±0.27	3.42±0.46	7.137***	3.77±0.21	2.99±0.29	16.746***
Distribution management						
D1	3.48±0.50	3.18±0.63	3.142**	3.48±0.52	2.79±0.51	7.869***
D2	3.96±0.27	3.44±0.69	6.945***	3.94±0.27	2.83±0.56	12.890***
D3	3.91±0.35	3.48±0.63	5.655***	3.92±0.30	2.89±0.48	13.731***
D4	3.86±0.40	3.51±0.69	4.111***	3.90±0.38	2.96±0.62	9.614***
Subtotal	3.80±0.27	3.40±0.56	6.255***	3.81±0.25	2.87±0.36	16.574***
Ingredients management						
I1	3.91±0.29	3.47±0.57	6.587***	3.89±0.32	2.96±0.36	16.342***
I2	3.50±0.50	2.94±0.56	6.415***	3.34±0.51	2.64±0.53	7.834***
I3	3.89±0.41	3.41±0.66	5.722***	3.83±0.50	2.96±0.46	10.295***
Subtotal	3.77±0.30	3.27±0.49	7.922***	3.68±0.33	2.85±0.27	15.210***
Personal hygiene						
P1	4.04±0.42	3.51±0.62	6.320***	3.98±0.40	2.98±0.44	14.194***
P2	3.38±0.89	2.95±0.73	3.246**	3.27±0.82	2.68±0.63	4.417***
P3	3.71±0.71	3.32±0.71	3.397**	3.68±0.71	2.89±0.43	8.693***
P4	4.13±0.38	3.73±0.72	4.573***	4.16±0.44	3.13±0.49	13.212***
P5	2.91±0.88	2.88±0.80	0.236	2.94±0.88	2.77±0.70	1.221
P6	3.04±0.85	3.01±0.79	0.196	3.13±0.84	2.74±0.67	2.795**
Subtotal	3.53±0.46	3.23±0.51	3.666***	3.53±0.45	2.87±0.30	10.872***

four areas, there were significant differences in means depending on positions and hygiene education ($p < 0.05$, $p < 0.01$, $p < 0.001$).

Comparison of performance on foodservice management depending on positions and whether they received

nutrition education: Comparison of mean scores in performance levels on food management between directors and teachers of home day care centers is in Table 4. There were significant differences in mean scores between directors and teachers in the following two items in 'nutrition management' area: 'we provide

Table 4: Comparison of performance on food management depending on positions and nutrition education

Variables	Position			Experience of food hygiene education		
	Director (N = 56)	Teacher (N = 107)	t-values	Yes (N = 96)	No (N = 67)	t-values
Nutrition management						
N1	4.02±1.34	3.63±0.65	5.980***	3.94±0.38	3.51±0.68	4.679***
N2	3.09±0.77	3.04±0.67	0.445	3.16±0.70	2.91±0.69	2.217*
N3	3.59±0.26	3.47±0.63	1.190	3.65±0.56	3.31±0.66	3.468**
N4	3.95±0.44	3.83±0.59	1.393	3.93±0.44	3.79±0.66	1.467
N5	3.86±0.35	3.64±0.65	2.820**	3.80±0.43	3.58±0.72	2.240*
N6	3.79±0.41	3.73±0.54	0.714	3.78±0.46	3.70±0.55	1.016
N7	1.80±0.82	1.77±0.67	0.312	1.81±0.77	1.73±0.64	0.707
Subtotal	3.44±0.21	3.39±0.40	2.941**	3.44±0.27	3.22±0.42	3.728***

Table 5: Comparison of cooking, washing and disinfection management depending on cooking history and hygiene education

Variables	Work activity for meal			Experience of food hygiene education		
	Cooking (N = 23)	Helping cook when		Yes (N = 116)	No (N = 47)	t-values
		busy (N = 19)	t-values			
Cooking process management						
C1	2.83±1.03	2.42±0.69	1.462	2.72±0.90	2.64±0.64	0.685
C2	3.43±0.90	2.84±0.60	2.551*	3.28±0.99	2.66±0.56	5.061***
C3	3.13±0.34	2.37±0.60	4.926***	2.84±0.71	2.66±0.56	1.523
C4	4.00±0.30	3.58±0.84	2.082*	3.94±0.44	3.00±0.51	11.726***
C5	4.09±0.29	3.26±0.96	4.239***	3.97±0.38	2.83±0.56	12.763***
C6	3.13±0.92	2.63±0.96	1.720	3.05±0.94	2.55±0.58	4.092***
Subtotal	3.44±0.44	2.85±0.48	3.608**	3.30±0.48	2.72±0.32	7.393***
Washing, disinfection management						
Wd1	3.26±0.69	2.95±1.03	1.180	3.28±0.71	2.51±0.59	6.630***
Wd2	3.22±0.74	2.63±0.90	2.329*	3.07±0.68	2.30±0.46	7.113***
Subtotal	3.24±0.64	2.79±0.93	1.850	3.18±0.64	2.40±0.46	7.545***

*p<0.05, **p<0.01, ***p<0.001

babies and children with meal and snacks matching the menu list composed by nutritionist' and 'we provide fried meal twice or less a week' (p<0.01, p<0.001) and there were significant differences in mean scores depending on whether they received nutrition education or not in the above two items and following two items (in 4 items): 'deliver the portion of food to each of infants and children according to the nutrition standards'; 'provide substitute food to babies and children who have food allergy' (p<0.05, p<0.01, p<0.001).

Comparison of cooking, washing and disinfection management depending on cooking history and whether they received hygiene education: Comparison of means on cooking, washing and disinfection management depending on cooking history and whether they received hygiene education between directors and teachers in home day care centers is shown in Table 5. In 'cooking process' area, there were significant differences in means between those who received hygiene education and those who did not in all the items (p<0.001) except for the following two items: 'different knives and chopping boards should be used for vegetable, meat and fish or if one use the same knife and chopping board, wash and disinfect them after using one ingredient', 'to thaw food, we put it in refrigerator, use microwave or running cold water and do not leave it in room temperature'.

This study, using directors and teachers of home day care centers in Cheongju area as research objects intended to examine self-evaluated performance in foodservice management of them, compared means depending on positions and their experiences of hygiene and nutrition education and raise the necessity of hygiene and nutrition education depending on positions. All the 34 items were divided into 7 areas and performance levels on foodservice management were suggested. The mean value in 'washing, disinfection management' was the lowest, followed by that in 'cooking process' area. In the study by Lee *et al.* (2012) who examined foodservice performance among directors of kindergartens, the mean value in work process area including washing, disinfection and cooking was the lowest and they ascribed it to lack of special knowledge and experiences in cooking and disinfection among them. Such a problem can be improved by supporting tools for practice and providing periodic repair education as well as education on food hygiene and safety (Soares *et al.*, 2013; Adesokan *et al.*, 2015; Pilling *et al.*, 2008).

This analysis revealed that teachers had less experiences in hygiene and nutrition educations compared with directors. And mean performance value in each item of teachers was significantly lower than that of directors. Teachers not only teach babies and children but mainly take charge of distributing food at meal time. As they need special nutrition knowledge on proper portion of

food per age and teaching on how to eat it is necessary to provide those teachers with nutrition education and hygiene education needed for delivering food (Yeoh and Kwon, 2015; Kwon *et al.*, 2014).

And, it was found that the performance values on the following items were lower than the average: 'different knives and chopping boards should be used for vegetable, meat and fish or if one use the same knife and chopping board, wash and disinfect them after using one ingredient'; 'there should be different dish-clothes, rubber gloves and aprons for cooking and cleaning'. While it is important to learn cross contamination from hygiene education it is necessary to provide various means of education and publicity to embody concrete practice for prevention of diseases (Park *et al.*, 2011; Kim and Lee, 2014).

In the 'personal hygiene' area, the performance levels of the following item were low: 'prohibition of cooks who have digestive diseases' and 'periodic preventive measures against diseases and disinfection'. Because of hardship of financial and human resources in home day care centers it may be difficult to pay attention to personal diseases and sanitary management of cooking room and its facilities (Kwon and Park, 2012; Jeon and Lee, 2014). But considering that fact that those who use home day care centers are infants and children of 1-5 years old and they have weak immune system it is necessary for those facilities to pay attention to more drastic personal hygiene and sanitary management of cooking room (Song and Kim, 2010; Kim, 2014).

CONCLUSION

This study, using directors and teachers of home day care centers in Cheongju area as research subjects intended to examine self-evaluated performance in foodservice management of them, compare means depending on positions and their experiences of hygiene and nutrition education and raise the necessity of hygiene and nutrition education depending on positions. The analysis found out that those who had experiences of hygiene and nutrition educations are better in hygiene in foodservice and nutrition management than others and directors are better than teachers in those aspects. For stricter management of foodservice in small-size home day care centers it seems necessary to provide supportive management on them such as continuous education and systematic monitoring.

REFERENCES

Adesokan, H.K., V.O. Akinseye and G.A. Adesokan, 2015. Food safety training is associated with improved knowledge and behaviours among foodservice establishments workers. *Intl. J. Food Sci.*, 2015: 1-8.

- Buzby, J.C., 2001. Children and microbial foodborne illness. *Food Rev.*, 24: 32-37.
- Cosby, C.M., C.A. Costello, W.C. Morris, B. Houghton and M.J. Devereaux *et al.*, 2008. Microbiological analysis of food contact surfaces in child care centers. *Appl. Environ. Microbiol.*, 74: 6918-6922.
- Jeon, S.G. and D.K. Lee, 2014. A study on difficulties and joys of teachers in home day-care center. *J. Child. Lit. Educ.*, 15: 253-282.
- Kim, J. and Y. Lee, 2014. The effect of a periodic visiting education program on food safety knowledge of cooks in childrens foodservice facilities. *J. Korean Dietetic Assoc.*, 20: 36-49.
- Kim, O.S., 2014. Performance of hygiene management according to capacity and food cost of foodservice in kindergartens. *J. East Asian Soc. Dietary Life*, 24: 680-690.
- Kwon, K.S. and J.Y. Park, 2012. A study of the directors discourse on the home based child care facilities management. *J. Korea Early Childhood Educ.*, 19: 1-27.
- Kwon, S.K., J.Y. Park and C.J. Hong, 2014. Current state and demand of young children nutrition management. *J. Young Child Stud.*, 17: 5-13.
- Laughlin, L., 2013. Who's minding the kids? Child care arrangements: Spring 2011. United States Department of Commerce, Washington, D.C., USA.
- Lee, J.E., K.S. Choi and T.K. Kwak, 2012. Assessment of kindergarten principals and teachers performance degree of foodservice hygiene management and foodservice employees hygiene knowledge. *J. Korean Dietetic Assoc.*, 18: 308-325.
- Li, Y., A. Fraser, X. Chen, S. Cates and K. Wohlgenant *et al.*, 2014. Microbiological analysis of environmental samples collected from child care facilities in North and South Carolina. *Am. J. Infect. Control*, 42: 1049-1055.
- Lu, N., M.E. Samuels, L. Shi, S.L. Baker and S.H. Glover *et al.*, 2004. Child day care risks of common infectious diseases revisited. *Child Care Health Dev.*, 30: 361-368.
- Park, N.Y., H.K. Park, H.J. Park, M.K. Seo and H.R. Im *et al.*, 2011. Employee food-hygiene and nutrition awareness and performance at child care centers and kindergartens located in Seoul. *Korean j. Food Cookery Sci.*, 27: 45-59.
- Pilling, V.K., L.A. Brannon, C.W. Shanklin, K.R. Roberts, B.B. Barrett and A.D. Howells, 2008. Food safety training requirements and food handler's knowledge and behaviors. *Food Prot. Trends*, 28: 192-200.

- Soares, K., J.G. Díez, A. Esteves, I. Oliveira and C. Saraiva, 2013. Evaluation of food safety training on hygienic conditions in food establishments. *Food Control*, 34: 613-618.
- Song, E. and E. Kim, 2010. The foodservice sanitation status of the child care centers at Asan City in Chungnam. *Korean J. Community Nutr.*, 15: 806-819.
- Staskel, D.M., M.E. Briley, L.H. Field and S.S. Barth, 2007. Microbial evaluation of foodservice surfaces in texas child-care centers. *J. Am. Dietetic Assoc.*, 107: 854-859.
- Yeoh, Y. and S. Kwon, 2015. Analysis of the importance-performance related service management and feeding practices of teachers at mealtime in childcare centers. *J. Nutr. Health*, 48: 289-297.