Original Article

Acceptance and satisfaction of parents and students about a school-based dietary intervention in Isfahan, 2012–2013

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ABSTRACT

Objective: Snacks play an important role in child health and nutritional status. Schools are considered as the preferred place to encourage healthy eating among children. The aim of this study was to evaluate the effect of buffet school-based intervention on acceptance and satisfaction of parents and students in Iran. **Materials and Methods:** Primary school students (n = 1120, 68.83% girls) from first to third grade, with one of their parents, participated in this prospective field trial study conducted in Isfahan, Iran. The study was consisted of three phases; schools selection, kitchen selection, implementation including two different parts, getting order and distribution. We provided hot snacks as traditional and healthy fast food according to taste and food preferences of children. Acceptance and satisfaction of parents and students were evaluated via a researcher made questionnaire before and after the intervention in one-third of participants as a representative sample of students who ordered the snacks. **Results:** Most of the students usually ate snack in the break-time at school, the eagerness of provided snacks was 98.8% and 63.6% in girls and boys, respectively. The most interesting tastes were Ashe Reshteh and Tahchin, (45.1% girls vs. 36.8% boys), while bean (among girls) and Ashe Jo (among boys) were ranked as the lowest. More than half of parents (66.7%) evaluated the price of snacks as "acceptable," showing their satisfaction. **Conclusion:** Results of this study indicate that school-based interventions accompanied with parental and principals' support is considered as a practical approach to promote healthful eating at an early age. Developing effective interventions for youth might, therefore, help to prevent unhealthy dietary choices becoming habitual.

Key words: Acceptance, buffet intervention, child, parents, personal satisfaction, snack

INTRODUCTION

Food habits are established in childhood and transferred to adulthood.[1] Despite the variety of factors affecting food choice in childhood, research has shown that children and adolescents are mostly affected by the environment and dietary patterns of their parents, which would influence their daily food choice and food intake.[2-4] Snacks play an important role in students' daily energy supply and are often used by the influence of peers, advertisements, and the environment. Following the change in lifestyle and consumption of high calorie food with low nutritional value, many eating disorders such as obesity are developed in children and adolescents.[5] Some previous studies showed that parents and teachers had effective communication with students about the intake on energy, food and nutrients and disease risks.[6] Less access to unhealthy food, as an important factor in the selection

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of vegetables and fruits, has been mentioned in previous studies.[7,8] Healthy food choices provide opportunities for children and adolescents. Such opportunities are strongly related to those provided by social or physical environment, including parents, teachers, place of residence and school. Children and adolescents spend much time at school and their major food intake occurs there. Therefore, the schools can also provide nutrition trainings as a part of their regular curriculum; moreover, they can be introduced as a good place that encourages the adherence to healthy dietary patterns. Food availability in schools is one of the influencing factors on students' food intake through school-based interventions.[9,10] Thus, it is possible to promote healthy nutrition and learn healthy behaviors and preferences in schools. However, limited studies have been conducted about providing healthy snacks in Iranian schools.[11-14] Previous studies have revealed that higher intake of energy-dense snacks could be a dietary risk factor for the development of metabolic syndrome.[15]

The aim of this study is to evaluate the acceptance and satisfaction of parents and students after the implementation of buffet intervention in schools by providing healthy home-made warm food and snacks.

MATERIALS AND METHODS

Study design

This field trial prospective study was conducted in 2013, among elementary school students of district 5 in Isfahan, Iran. The schools were selected randomly. The study was approved by the Research and Ethics committee of the Isfahan University of Medical Sciences. The interventions begun after necessary accommodation with authorities of the health and education offices at provincial and district levels, and obtaining oral assent from students and written informed consent from parents.

This study intended to use local resources and facilities. Therefore, the place of food production was chosen to be the nearest to the place of schools. Moreover, raw material was prepared daily, from community centers such as supermarkets and vegetable stores, and parent participation was considered at schools as much as possible. Home-made warm foods and traditional snacks were distributed. The cooking methods were boiling oven cooking and baking. Details on name, type and ingredients of healthy snacks provided for students are presented in Supplementary Table 1.

The intervention period was 2 months (January and February 2013), and data were gathered through a questionnaire, which was filled individually by students and their parents before and after the intervention. Questionnaires were designed by researchers, showing acceptable reliability (Cronbach's Alpha; 0.683, parents questionnaire, and 0.767 for students questionnaire). Content and face validity of the questionnaires were assessed by an expert panel of pediatricians and nutritionists. Questionnaires (18 questions) were included items as sociodemographic characteristics, type and snack frequency, taste, price and the score given to each food (1–10). Questions such as family (father, mother) education and job, student gender and grade, consumption frequency of healthy (fruits, vegetables, dates, etc.,) and unhealthy snacks (chips, corn puffs, ice-cream, etc.), were asked.

All students of the elementary schools of the district were eligible for this study in the case that they had no chronic disease, and were not on special diet. If students or parents answered to only 30% of questions of the study questionnaire, they were excluded from the study.

Study protocol

The current study was conducted in three phases:

- Phase 1: School selections,
- Phase 2: Kitchen selections, and
- Phase 3: Implementation (two stages).

Phase 1: School selections

Stages of school selections

Introducing schools to Isfahan's General Department of Education

The selected schools were introduced to Isfahan's General Department of Education after processing the legal steps in Provincial Health Department of Isfahan, the Unit of Schools Health. Then, the notice was issued for Isfahan's District 5. After receiving the notice and the introduction letter personally we went to 28 elementary schools with student number of 6189. The schools included girls, boys, governmental, nonprofit, fixed and rotary schools-in this type of schools students attend school in the morning for a week and in the afternoon for another. The necessity of such a study and its stages were previously explained and students were asked to contact us if only they are interested in participating. All of these schools, which students of various income and education classes were enrolled in, were centralized in the area of Khane Esfahan, which is why this area was chosen. After referring to the schools, speaking with their principals and explaining the program to them only 5 principals, interested in participating, were volunteered and entered the intervention with total students of 1120. The schools included three girl schools, including one nonprofit and two governmental, and two boy schools, including one nonprofit and one governmental. The above schools were only first to third grade (7–9 years). Moreover, all of the five principals were female, and no male principal wanted to cooperate. Supplementary Table 2 shows the days of offering snacks and the number of snacks.

Phase 2: Kitchen selections

In order to know the locals of cooking centers better and also to prevent any spoilage and poisoning the most important priority for selection of kitchens, was the proximity of these centers to the consumption place, namely schools. Hence, we considered the transfer time <15 min. Moreover, this selection was done in three methods mentioned below.

In the first method, the parents associations of the schools participated in the study were asked to cooperate. Thereof, anyone who is willing for cooperation announces to have a cooking place approved by the Department of Health. In the second method, asking the locals, data were gathered regarding the places which are known for observing hygiene standards. Then, the places were visited and were asked to cooperate if interested. Finally, in the third method, guilds were referred to and asked to introduce some places; and then those places were also visited. In all three methods, when the desired place accepted to cooperate it was introduced to the Department of Health. After that it received authentication by health inspectors and then it was entered into the study as a partner.

Phase 3: Implementation (two stages: Getting order-distribution)

Getting order

After the stage of school selection, a meeting was held in which the executor or the school principal explained the program to the parents who were informed through pamphlets and talks. Moreover, parents were asked to participate in the program. Those who announced their interest in participation became the connector between the program and executors. Connectors' duties, on one hand, were getting order from parents for snacks and getting their money, student enrollment and announcing the students' names to the executor. On the other hand, these connectors had to deliver the snacks to the students in time of distribution at school.

The principal and parents association had to choose the type of snacks, days and times of getting them. The principal determined the number of days getting snacks in accordance with the schedule. Chosen snacks were announced to parents according to the specified table by the connectors. Those who would like their child to use the snacks and to enter into the study filled a testimonial and then ordered the snacks. The price of snacks (Rial) was as below:

(Ashe Jo: 9500 - Ashe Reshteh: 9500 - Hot Beans: 8500 - Tah Chin: 12,000 - Chicken Sandwich: 11,500 - Pasta: 10,000 - Vegetable Burger: 10,000).

Distribution

Snacks were delivered to the executor by connectors according to the list provided. Then, they were labeled in place of production and finally were given to the connectors for distribution by class. For this study, there were not any changes at schools and only existing facilities were used. For example, in every school, where possible, the prayer rooms were used as a place for eating snacks.

Measurement

The measuring instrument was a questionnaire, which was given to both parents and their children before and after the intervention. The evaluation was performed after 3 months. Students filled up the questionnaires at school and under the control of teachers. However, parents filled them up individually at home and then delivered them to the school.

The present study was approved by the research council of Isfahan University of Medical Sciences and was conducted in collaboration with Child Growth and Development Research Center.

Statistics

We analyzed data using SPSS software (version 16, SPSS, Chicago, IL, USA). Categorical variables were presented as percentages. Mean and median were calculated for scores assigned by students to food tastes.

RESULTS

The questionnaires were filled up before and after the intervention by one-third of students and their parents, mostly mothers. Table 1 shows the demographic characteristics of study participants. The table is based on 306 individual responses of parents to the questionnaires. The parents who responded the questionnaires were all students' mothers, however, students, under study, were both girl and boy. Moreover, most of the students belonged to the middle class, and as they have stated in questionnaires their fathers were mostly employed or retired and their mothers were housewives. The consumption frequency of healthy and unhealthy snacks according to student and parents' responses are shown in Table 2, for boys and girls, separately.

Parents and their children were asked, before and after the intervention, where from they provided their snacks. 87.4% of the girls and 67.4% of the boys have answered: From the home; their responses were the same before and after the intervention. Both parents and their children answered similarly to the question about whether they eat something at their break time 97.1% of the girls and 73.7% of the boys answered "Yes." The answer to this question as well was the same before and after the intervention. However, the answers were different while questioning about how many days in a week they take snacks. For this question, 84.9% of the girls answered 5 days in a week (i.e., all school days), while only 76.1% of their parents answered the same. On the other side, however, 49.5% of the boys answered 4 days in a week only 66.7% of their parents answered the same and 33.3% of them answered 5 days. Moreover, students were asked how many times a week they have eaten hot snacks. The answer of 98.8% of the girls was at least once a week and 63.6% of the boys answered at least twice. This question indicated how eager each gender was. Students were also asked to score the taste of snacks from 1 to 10 (least to most). These scores are presented in Table 3.

The best snack chosen among others, by 45.1% of the girls was Ashe Reshteh; however, 36.8% of the boys chose Tah Chin as their best. In comparison to other provided foods, the least interest was in hot beans for girls and in Ashe Jo for boys.

Table 1: Demographic characteristics of study participants

Gender	Grade		Type of school (%)		Education of father (%)	
	Second	Third	Governmental	Nonprofit	Lower than diploma degree	Higher than diploma degree (%)
Girls	109	105	68.6	31.4	56.9	43.1
Boys	60	28	100	0	87.7	12.3
	Education of mother (%)		Profession of father (%)		Profession of mother (%)	
	Lower than diploma degree	Higher than diploma degree	Employed	Retired	Employed	Housewife
Girls	54.9	45.1	98	3	29.4	70.6
Boys	84.2	15.8	93	7	10.5	89.5

Table 2: The consumption frequency of healthy and unhealthy snacks

Food items	Students (%)		Parents (%)	
	Girls	Boys	Girls	Boys
Healthy snacks				
Cheese	50	77.4	39.8	33.3
Baguettes	41.8	16.8	30.7	33.3
Baked bread	66.1	42.1	48.9	33.3
Vegetables	71.1	41.1	59.1	33.3
Fruits	89.1	61.1	100	90.9
Juice	41	18.9	31.8	66.8
Walnuts	73.6	53.7	63.6	66.7
Dates	59.8	46.3	30.7	33.3
Boiled egg	44.4	37.9		
Milk	64.4	64.2	60.2	66.7
Hot beans	31.1	25.3	11.4	33.3
Unhealthy snacks				
Cake and biscuits	71.1	85.4	77.3	66.7
Chips	14.6	22.0	5.7	0
Ice cream	34.3	34.7	11.4	33.3
Cheese puffs	11.3	11.6	3.4	0
Yakhmak	8.8	25.3	8	0
Fruit bar	17.2	18.9	11.4	33.3
Candy	25.1	17.9	19.3	0
Sausage	17.9	13.8	8	0
Butter	38.9	23.2	20.5	33.3
Soft drinks	10.5	16.8	6.8	0

Table 3: Mean and median scores assigned by students to food tastes

Type of snack	Girls		Boys	
	Median	Mean	Median	Mean
Noodle soup	9	7.58	9.5	7.88
Grain soup	8	6.46	6	6.04
Hot beans	9	6.4	7	6.27
Pasta	9	7.71	8.5	7.53
Vegetable Burger	9	7.11	10	8.5
Tah-Chin	7	6.4	10	8.5
Chicken Sandwich	7.5	6.4	8	6.68

Parents' satisfaction was measured by asking them how the prices were, to which 66.7% of them answered "acceptable."

DISCUSSION

The current study aimed to use local capacities and resources to determine whether providing home-made warm foods affect children snack habits and parental satisfaction.

The school food environment is of important concern as less healthful food options and beverages are widely available at school cafeterias. The findings of this study indicate that availability and accessibility of healthy home-made foods play an important role in children's snack selection, acceptance and consumption of healthy and nutritious food items.

In our study, the acceptance of parents (of boy or girl students) and public or private schools was not differed, however it would highly depends on how school principals could actively manage the parent-teacher association,[2,10,16] to achieve a higher acceptance rate up to 63% (110 participants from the total of 171).

According to our findings, first grade students were participated more than second and third graders. One possible explanation might be family over-control and being more influenced by parental food habits and nutrition preferences.[16,17] Hence, it is suggested to develop nutrition education and intervention from primary schools alongside parental monitoring and participation.[9,11]

Principals of public schools were participated more actively than the nonprofit private schools (33.3% vs. 6.6%, respectively). Higher costs and expenses, which families have to pay for education services might be the reason for the unwillingness to participate in such studies. On the other hand, it might be due to less attention paid to nutrition and health related programs than education.[18,19] Therefore, it is necessary to provide supportive policies and more appropriate environment to conduct dietary modification strategies, as previous studies have revealed the association between school food environment and eating behaviors of children.[20-22]

In the present study, we found that the participation rate was higher among female-principals than their male colleagues and boy-schools managed by female-principals. Lack of

sufficient nutrition and/or health knowledge combined with unfavorable sociodemographic profile, restricting certain marketing, inadequate capacity and resources at school and education district levels might be the reason.[23-26]

The overall participation rate was not as the expectations (14.8%); this probably may result from the insufficient resources at schools. Another barrier to conduct healthful eating pattern was that the program was not compulsory for all students in a target school and this way would change the overall discipline of schools.

Nearly 90% of female students (89.9%) reported to eat the offering snacks at least once per week. The corresponding figure for snack consumption was 63.6%, 2 times/week among male students. All school principals had requested to distribute snacks only for 3 days/week. Students were asked to score food tastes from 1 to 10; girls mostly preferred the Ashe Reshteh, as an Iranian traditional food, with an average score of 7.58. Pasta was their second choice scored 7.11 on average. When boy students ranked the offering snacks, Tah-chin was scored as the highest favorable food with a mean score of 8.5 and the second was Ashe Reshteh with the score near to 7.88. As previously reported, being familiar with tastes and repeated taste exposure, environmental and family-related factors could possibly influence snack selections and increase acceptance of healthy food options.[19,27] Another possibility refers to providing Iranian traditional and favorite foods for children, namely Tah-chin and pasta. Moreover, Ashe Reshteh, which has contained vegetables, been and pulses, is recognized as a popular healthy meal among Iranian families. Therefore, emphasizing on availability of popular traditional foods with a focus on ethnic preferences and child food experiences enable us to conduct approaches to address childhood food selection and eating behaviors.[28-30] Consistent to previous reports, the most popular consumed snacks reported by students were cake and biscuits,[11,12,28] while parents reported low consumption of unhealthy snacks such as chips, cheese puffs, yakhmak (a kind of icy-sweet drink), candy and soft drinks. These nonnutritious items are not allowed to be sold in school buffets in Iran, so parents would not supply their children with the aforementioned snacks, however student may consume those less-healthful choices from food outlets located near the schools.[20] Moreover, previous reports have shown under-reporting of unhealthy food options.[31]

Parental satisfaction was measured via the question about prices of snacks provided, categorized as cheap, reasonable, expensive and very expensive. More than half of parents (66.7%) confirmed that the price was reasonable. One possible explanation for such relatively high eagerness is that the quality of offering snacks was good enough, and volunteer parents were allowed to evaluate the setting and process of snack production, distribution and being aware of some implementation problems. Taking into account that, such school-based interventions using voluntarily cooperation of families, school principals and staffs was performed for the first time, making the appropriate local environment to participate in such interventions seems necessary.

Unlike other countries, there is no organized governmental school meal program, including lunch or snack program, in Iran. Hence, it was not easy to persuade school principal and official staffs of the necessity of such interventions. Another limitation problem was some inconsistencies during the implementing the program. Less variety in the offering menu was mentioned as the other limitation by school principals. Sudden off-days due to air pollution and so on, made the daily preparation of snacks much more difficult. School meal programs are usually considered teamwork plans, managed through partnerships and donation schools or individuals,[9] however contribution of donors was not highly outstanding in the present study due to some executive problems. Changes in course times, more hours spent at schools, establishing schools without carrying bags in which students have to eat their lunch there, necessitate on more planned, organized nutrition intervention programs for students similar to developed countries such as England, US and Netherland.[21,32-34]

Our study had some strengths worth to mention; face to face meetings and discussions to clarify the purpose of the study were the most determinants to rise the participation rate among school principals. Besides, we offered healthy home-made foods using the potential of parental involvement and school principal help for the 1st time in the country.

Results of the present study indicate that school-based interventions accompanied with parental and principals' support is considered as a practical approach to promote healthful eating at an early age. Developing effective interventions for youth might therefore help to prevent unhealthy dietary choices becoming habitual. More prospective studies are needed to improve family potential to participate in child nutrition and evaluating the effect of such interventions.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. te Velde SJ, Twisk JW, Brug J. Tracking of fruit and vegetable consumption from adolescence into adulthood and its longitudinal association with overweight. Br J Nutr 2007;98:431-8.
2. Hanson NI, Neumark-Sztainer D, Eisenberg ME, Story M, Wall M. Associations between parental report of the home food environment

and adolescent intakes of fruits, vegetables and dairy foods. Public Health Nutr 2005;8:77-85.
3. Hendrie G, Sohonpal G, Lange K, Golley R. Change in the family food environment is associated with positive dietary change in children. Int J Behav Nutr Phys Act 2013;10:4, 1-11.
4. Haapala I, Hodge A, Tseng M, McNeill G, Yngve A. Nutritional environments affecting the future of our children. Public Health Nutr 2012;15:949-50.
5. Pulgarón ER. Childhood obesity: A review of increased risk for physical and psychological comorbidities. Clin Ther 2013;35:A18-32.
6. Williamson DA, Han H, Johnson WD, Martin CK, Newton RL Jr. Modification of the school cafeteria environment can impact childhood nutrition. Results from the Wise Mind and LA Health studies. Appetite 2013;61:77-84.
7. Auld G, Boushey CJ, Bock MA, Bruhn C, Gabel K, Gustafson D, *et al.* Perspectives on intake of calcium-rich foods among Asian, Hispanic, and white preadolescent and adolescent females. J Nutr Educ Behav 2002;34:242-51.
8. O'dea JA. Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents. J Am Diet Assoc 2003;103:497-501.
9. Mâsse LC, de Niet JE. School nutritional capacity, resources and practices are associated with availability of food/beverage items in schools. Int J Behav Nutr Phys Act 2013;10:26.
10. Haerens L, De Bourdeaudhuij I, Maes L, Vereecken C, Brug J, Deforche B. The effects of a middle-school healthy eating intervention on adolescents' fat and fruit intake and soft drinks consumption. Public Health Nutr 2007;10:443-9.
11. Esfarjani F, Mohammadi F, Roustaee R, Hajifaraji M. Schools' Cafeteria Status: Does it Affect Snack Patterns? A Qualitative Study. Int J Prev Med 2013;4:1194-9.
12. Amini M, Dadkhah-Piraghaj M, Abtahi M, Abdollahi M, Houshiarrad A, Kimiagar M. Nutritional assessment for primary school children in tehran: An evaluation of dietary pattern with emphasis on snacks and meals consumption. Int J Prev Med 2014;5:611-6.
13. Rashidi A, Mohammadpour-Ahranjani B, Karandish M, Vafa MR, Hajifaraji M, Ansari F, *et al*. Obese and female adolescents skip breakfast more than their non-obese and male peers. Cent Eur J Med 2007;2:481-7.
14. Darvishi L, Ghiasvand R, Ashrafi M, Ashrafzadeh E, Askari G, Shiranian A, *et al.* Relationship between junk foods intake and weight in 6-7 years old children, Shahin Shahr and Meymeh, Iran. J Educ Health Promot 2013;2:2.
15. Mirmiran P, Bahadoran Z, Delshad H, Azizi F. Effects of energy-dense nutrient-poor snacks on the incidence of metabolic syndrome: A prospective approach in Tehran Lipid and Glucose Study. Nutrition 2014;30:538-43.
16. Arcan C, Neumark-Sztainer D, Hannan P, van den Berg P, Story M, Larson N. Parental eating behaviours, home food environment and adolescent intakes of fruits, vegetables and dairy foods: Longitudinal findings from Project EAT. Public Health Nutr 2007;10:1257-65.
17. Dadkhah Piraghaj M, Amini M, Houshiar Rad A, Abdollahi M, Zoghi T, Eslamiamirabadi M. Qualitative and quantitative dietary assessment of primary school in Tehran. Iranian J Nutr Sci Food Technol 2008;3:31-44.
18. Brown R, Ogden J. Children's eating attitudes and behaviour: A study of the modelling and control theories of parental influence. Health Educ Res 2004;19:261-71.
19. Scaglioni S, Salvioni M, Galimberti C. Influence of parental attitudes in the development of children eating behaviour. Br J Nutr 2008;99 Suppl 1:S22-5.
20. Smith D, Cummins S, Clark C, Stansfeld S. Does the local food environment around schools affect diet? Longitudinal associations in adolescents attending secondary schools in East London. BMC Public Health 2013;13:70.
21. Haerens L, Deforche B, Maes L, Cardon G, Stevens V, De Bourdeaudhuij I. Evaluation of a 2-year physical activity and healthy eating intervention in middle school children. Health Educ Res 2006;21:911-21.
22. De Bourdeaudhuij I, te Velde S, Brug J, Due P, Wind M, Sandvik C, *et al.* Personal, social and environmental predictors of daily fruit and vegetable intake in 11-year-old children in nine European countries. Eur J Clin Nutr 2008;62:834-41.
23. Agron P, Berends V, Ellis K, Gonzalez M. School wellness policies: Perceptions, barriers, and needs among school leaders and wellness advocates. J Sch Health 2010;80:527-35.
24. Anderson PM, Butcher KF. Reading, writing, and refreshments are school finances contributing to children's obesity? J Hum Resour 2006;41:467-94.
25. French SA, Story M, Jeffery RW, Snyder P, Eisenberg M, Sidebottom A, *et al.* Pricing strategy to promote fruit and vegetable purchase in high school cafeterias. J Am Diet Assoc 1997;97:1008-10.
26. French SA, Story M, Fulkerson JA, Hannan P. An environmental intervention to promote lower-fat food choices in secondary schools: Outcomes of the TACOS Study. Am J Public Health 2004;94:1507-12.
27. Brug J, Tak NI, te Velde SJ, Bere E, de Bourdeaudhuij I. Taste preferences, liking and other factors related to fruit and vegetable intakes among schoolchildren: Results from observational studies. Br J Nutr 2008;99 Suppl 1:S7-14.
28. Kelishadi R, Ardalan G, Gheiratmand R, Sheikholeslam R, Majdzadeh S, Delavari A, *et al*. Do the dietary habits of our community warrant health of children and adolescents now and in future? CASPIAN Study. Iran J Pediatr 2005;15:97-109.
29. Vereecken CA, Bobelijn K, Maes L. School food policy at primary and secondary schools in Belgium-Flanders: Does it influence young people's food habits? Eur J Clin Nutr 2005;59:271-7.
30. Hoelscher DM, Evans A, Parcel GS, Kelder SH. Designing effective nutrition interventions for adolescents. J Am Diet Assoc 2002;102:S52-63.
31. Lioret S, Touvier M, Balin M, Huybrechts I, Dubuisson C, Dufour A, *et al.* Characteristics of energy under-reporting in children and adolescents. Br J Nutr 2011;105:1671-80.
32. Story M, Nanney MS, Schwartz MB. Schools and obesity prevention: Creating school environments and policies to promote healthy eating and physical activity. Milbank Q 2009;87:71-100.
33. Evans CE, Harper CE. A history and review of school meal standards in the UK. J Hum Nutr Diet 2009;22:89-99.
34. Martens MK, Van Assema P, Paulussen TG, Van Breukelen G, Brug J. Krachtvoer: Effect evaluation of a Dutch healthful diet promotion curriculum for lower vocational schools. Public Health Nutr 2008;11:271-8.

Supplementary Table 1: Menu, ingredients and food/ snack types

Name of snack	Type of snack	Ingredients
Ashe Reshteh	Traditional	Whey-vegetable-noodle-chickpeas-lentils-bean-oil-spices-wheat germ
Ashe Jo	Traditional	Whey-vegetable-grain-chickpeas-lentils-bean-oil-spices-wheat germ
Vegetable Burger	Healthy fast food	Soy-onion-green pepper-carrot-parsley-oil-corn flour-egg-bread-tomato sauce-wheat germ-lemon juice-lettuce
Chicken Sandwich	Healthy fast food	Chicken-tomato-medium bread-parsley-wheat germ-green pepper-corn
Tah-Chin	Traditional	Chicken-yogurt-egg-oil-rice-cinnamon-saffron
Beans	Traditional	Beans-tomato paste-wheat germ-oil-lemon juice
Pasta	Healthy fast food	Pasta-soy-tomato paste-onion-oil-green pepper-wheat germ-mushroom-corn

Supplementary Table 2: Days of offering snacks at schools and the number of snacks

School name	Total number of students	Grade	Type of school	Gender	Number of order in week (day)	Number of order (person)
Forouzesh (2)	120	1th-3rd	Nonprofit	Girls	3 days (even days)	85
Fadak (1)	171	1th-3rd	Governmental	Girls	1 day	141
Mahjoub (1)	350	1th-3rd	Governmental	Girls	2 days (odd days)	113
Milad	359	1th-3rd	Governmental	Boys	2 days (odd days)	134