Nutr Hosp. 2016; 33(5):1164-1171 ISSN 0212-1611 - CODEN NUHOEQ S.V.R. 318

Nutrición Hospitalaria

Trabajo Original

Epidemiología y dietética

Design and evaluation of a campaign to promote the consumption of vegetables and fruits in Mexican school-age children

Diseño y evaluación de una campaña de promoción del consumo de verduras y frutas en escolares mexicanos

Marcos Galván[1,2], Fernanda Ríos-Pérez[1], Guadalupe López-Rodríguez[1,2], Rebeca Guzmán-Saldaña[1], Trinidad Lorena Fernández-Cortés[1], Gloria Camacho-Bernal[1] and Manuel Robles-Acevedo[3]

[1]Center for Interdisciplinary Research in Health Sciences. Universidad Autónoma del Estado de Hidalgo. Pachuca, México. [2]Academic Group of Nutritional and Molecular Epidemiology. Department of Nutrition. School of Health Sciences. Universidad Autónoma del Estado de Hidalgo. Pachuca, México. [3]Universidad Politécnica de Tulancingo. Tulancingo, México

Abstract

Introduction: In Mexican school-age children the consumption of vegetables and fruits (V&F) is less than 25% of the amount recommended by the World Health Organization.

Objectives: Evaluate the effectiveness of a promotion campaign about the consumption of V&F in urban school children from Hidalgo, Mexico.

Methods: A non controlled community trial in 226 school-age children from private and public schools was conducted, we designed and distributed printed material for promoting the consumption of V&F among the school population, access to V&F was provided through planning and sales at school stores, and consumption was supervised by the teachers.

Results: At the end of the intervention vegetable consumption increased by 50 g and plain water in 100 mL (T-test, $p < 0.05$); the proportion of school-age children who identified the health benefits of the consumption of V&F increased significantly (68% initial, 87% final) and greater support from parents (61% initial, 92 final%) was achieved.

Conclusions: A promotion campaign and improved access to vegetables, fruits and water in the school environment which is supported by parents and teachers can encourage healthier eating at school.

Key words:

Promotion of school health. Vegetables. Fruits. Healthy eating.

Resumen

Introducción: en escolares mexicanos el consumo de verduras y frutas y (VyF) es menor del 25% de la cantidad recomendada por la Organización Mundial de la Salud.

Objetivos: evaluar la efectividad de una campaña de promoción del consumo de VyF en niños de escuelas urbanas de Hidalgo, México.

Métodos: se realizó un ensayo comunitario no contralado en 226 escolares de una escuela privada y una pública; se diseñó y distribuyó material impreso de promoción del consumo de VyF entre la población escolar; se facilitó el acceso a VyF mediante una planificación y venta en establecimientos de consumo escolar, y se supervisó el consumo por los profesores.

Resultados: al finalizar la intervención, se incrementó el consumo de verduras en 50 g y el de agua simple en 100 ml (T-test, $p < 0,05$); se aumentó significativamente la proporción de escolares que identificaban los beneficios en su salud del consumo de VyF (68% inicial, 87% final) y se logró mayor apoyo de los padres de familia (61% inicial, 92% final).

Conclusiones: una campaña de promoción y mejoramiento del acceso a verduras, frutas y agua en el contexto escolar, que cuente con el apoyo de padres de familia y profesores, puede favorecer una alimentación más saludable en la escuela.

Palabras clave:

Promoción de la salud escolar. Verduras. Frutas. Alimentación saludable.

Received: 01/04/2016
Accepted: 21/06/2016

Galván M, Ríos-Pérez F, López-Rodríguez G, Guzmán-Saldaña R, Fernández-Cortés TL, Camacho-Bernal G, Robles-Acevedo M. Design and evaluation of a campaign to promote the consumption of vegetables and fruits in Mexican school-age children. Nutr Hosp 2016;33:1164-1171

DOI: http://dx.doi.org/10.20960/nh.582

Correspondence:

Marcos Galván. Institute of Health Sciences. Universidad Autónoma del Estado de Hidalgo. Abasolo 600. Colonia Centro. 42000 Pachuca. Hidalgo, México
e-mail: mgalvan73@hotmail.com

INTRODUCTION

Regular consumption of vegetables and fruits (V&F) could prevent 60% of the burden of chronic non-communicable diseases (CNCDs), such as obesity, diabetes, cardiovascular disease and several types of cancer (1); scientific evidence suggests that consumption of at least 400 grams of V&F a day, is associated with decreased risk of these diseases (2,3). A varied consumption of V&F can prevent micronutrient deficiencies, such as iron, and vitamins A, C and B12; provide a sufficient quantity of dietary fiber and non nutrient essential substances; in addition, V&F consumption can create a feeling of fullness, thereby reducing the total calorie intake (2).

The Mexican population has one of the lowest rates of fruit and vegetable consumption in Latin America, on average their consumption does not exceed 110 grams per day and only 30% of the Mexican population has an adequate intake of V&F (1). According to the United Nations Organization for Food and Agriculture (FAO); Chile, Mexico and Brazil have an offer of V&F in their markets of more than 146 kilos/person/year, whereas in other countries it ranges between 80 to 138 kilos, so in Mexico V&F availability is sufficient, varied and accessible in most regions of the country. The causes of low consumption have not been sufficiently studied but a change in eating patterns has been identified in almost the entire population which is increasingly oriented towards the consumption of processed foods with high energy density, high in saturated fats, sugar, salt and low in dietary fiber, which could be contributing to this lower consumption (4). This eating lifestyle, along with physical inactivity, is a global problem which largely explains the high prevalence of obesity and CNCDs existing in most countries (5).

Various initiatives have been launched to promote the consumption of V&F; as the "5 a Day" program, aimed at increasing the average consumption to five or more servings per day of V&F among the United States population. Currently, this initiative is implemented in more than forty countries and has the support of international organizations such as WHO and the International Association for Cancer Research; it performs various actions, such as advertising campaigns and specific activities in schools, workplaces or supermarkets to ensure that people know and assume the importance of eating five or more daily servings of fruits and vegetables (6). Different evaluations of the "5 a Day" program have reported an increase between 0.2 and 1.7 servings per day in the consumption of vegetables and fruits in various population groups. This initiative has been taken by the World Health Organization (WHO) in its Global Strategy on Diet, Physical Activity and Health, 2004, creating a joint initiative to promote V&F, guiding sustainable measures at community, national and global level, which, taken as a whole, lead to reduced risk for CNCDs through increased consumption of V&F (8).

In the state of Hidalgo, Mexico, an evaluation conducted in 2010 reported that only a third of school-age children carried an average of 200 g of V&F in their school snack, and three out of ten children were overweight or obese (9). From this diagnosis, different intervention strategies have been implemented to promote the consumption of healthy foods, reduce sedentary lifestyle and prevent the risk of obesity and chronic diseases in school-age children from public and private schools; so the purpose of this research was to evaluate the effectiveness of a campaign to promote the consumption of vegetables and fruits in children from urban schools in Hidalgo, Mexico.

DATA AND METHODS

STUDY DESIGN

We conducted a non controlled community trial comparing the results of the effect studied in the same group of individuals before and after receiving the intervention (10). Students from first to sixth grade from a private and a public elementary school in the 2014-2015 school year located in an urban area from the municipality of Tula, in the state of Hidalgo, Mexico, participated.

POPULATION AND SAMPLE

A sample size was calculated to find significant differences in consumption of 50 grams of vegetables between the initial (before) and final (after) evaluation of the intervention; an average consumption of V&F of 200 grams in the school snack as reported in the study of Nutritional Profile of School-age children of Hidalgo 2010 (9), and a standard deviation of 30 grams in each measurement (two measurements of the same subject), an precision of 0.05 and a power of 0.80 was considered; thus it was determined that 6 school-age children were required in each group and grade from each school (11). The private school had 23 groups and the public school 18 groups, giving a total of 246 school children. School children were selected randomly from the list provided by the teachers of each group, three men and three women who at the time of the initial evaluation were present were selected, otherwise we proceeded to select another student, and we implemented the evaluation tools to these children at the beginning and end of the intervention. In the sample we included the school children who agreed to participate and who had the informed consent from their parents, who did not have any disease that interfered with the results, and that his attendance was at least 80% during the term of the intervention.

DESIGN OF THE INTERVENTION

In figure 1, the stages of the design intervention to promote the consumption of vegetables and fruits (V&F) in the school setting are presented.

Stage 1. Formative research

We applied a questionnaire to all pupils in the second, third and fourth grade of the selected schools; in the first question

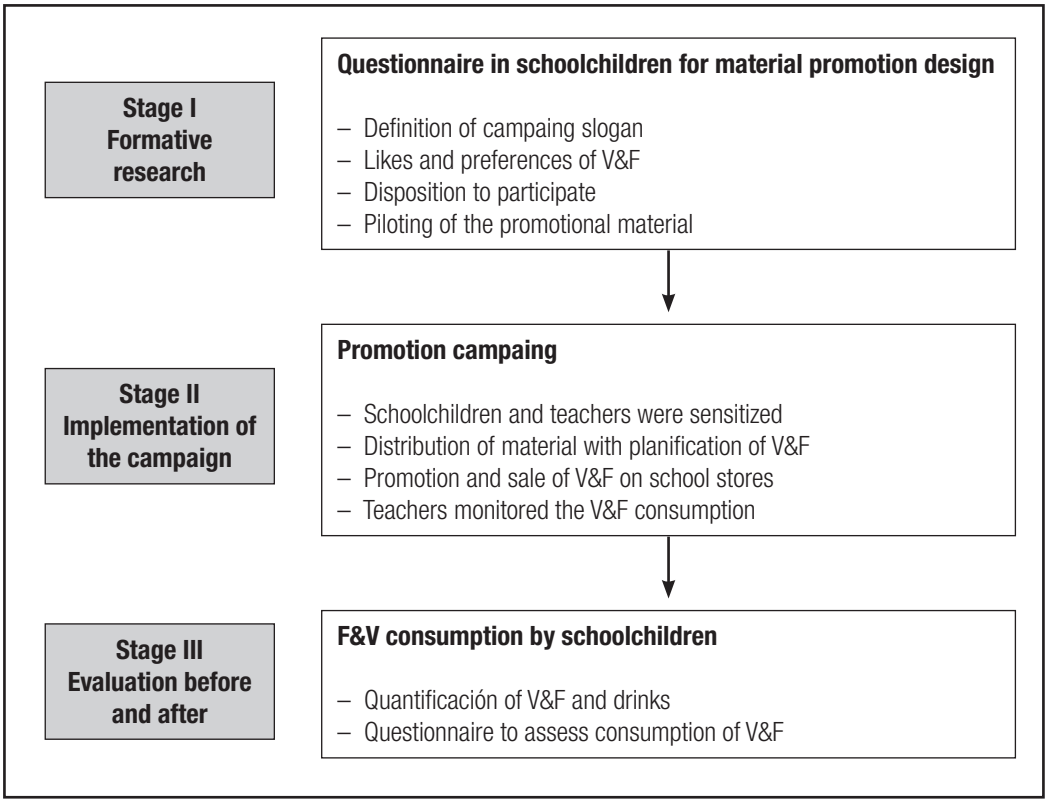

Figure 1.
Design of campaign promotion consumption of vegetables and fruits (V&F) in the school context.

they were presented with three options to choose a motto that would motivate them to increase their intake of V&F at school; in questions 2 and 3, they were asked to write down five vegetables and five fruits they would like to eat at school, and finally they were asked if they would be willing to participate in a campaign to promote the consumption of V&F at school. For the application of the instrument, trained personnel went to each classroom, gave the children the printed questionnaire and the instructions to answer the questions individually.

At this stage, 72% of the students selected the motto *Choose to Be Healthy! Eat vegetables and fruits*, as the highlight of the campaign to encourage the consumption of V&F at school. Vegetables and fruits that were located in the preference of school children were: carrots (84%), broccoli (63%), cucumber (63%), lettuce (52%) and tomatoes (34%); and fruits were: apple (74%), banana (55%), watermelon (45%), orange (42%), mango (38%), grapes (36%) and strawberries (32%). 97% of school children who were surveyed said they would be willing to participate in a campaign promoting the consumption of vegetables and fruits in school.

With this information the expert team conformed by marketing, nutrition and psychology professionals created the messages to promote V&F taking into account social marketing elements tested in other interventions: provide basic and practical concepts based on scientific evidence, avoid confusion and bad information, generate significant messages that were client centered and with relevance of content according to the opinion of teachers and school principals (12,13). This resulted in a brochure with key information that gave answers to simple questions that school children would make themselves about the consumption of vegetables and fruits: *Why should we eat vegetables and fruits?, How can I increase the consumption of vegetables and fruits at school and at home?, Why should I disinfect vegetables and fruits?, and, How many vegetables and fruits should I eat a day?;* plus some good tips were added to enhance the flavor of V&F and the consumption of drinking water. According to consumer preferences of V&F detected, a daily planning of the type of vegetables and fruits with the amount in home measures that the children should bring as lunch was defined, recommending vegetables three days a week and fruit two days a week, for three weeks, and the fourth week as free choice.

We performed a test of the promotional material with the same children that were interviewed; teachers were asked to distribute the brochure in class, the children read the information and identified the words which were difficult to understand and expressed what the images and the campaign motto represented to them. An observer of the research team recorded the suggestions so a team of experts could make relevant adjustments in consensus.

Stage 2. Implementation of the campaign

The promotional campaign is a 30-minute session to raise awareness with all groups of students and teachers involved, where they were given the diffusion material (brochure) and

their content was explained, as well as daily planning of the type of vegetable and/or fruit that the children should bring to school in their lunch box to eat at school for three weeks; for the fourth week the school children together with the teacher agreed on the V&F they would consume each day. Those responsible for the school stores of both schools, placed a promotional notice in a visible place to encourage the consumption of V&F in their business (canvas of 92 cm x 142 cm) and were instructed to promote each day, the vegetable and/or fruit indicated in the daily planning, so in case the children did not bring it from home, they could have access to it. During the three months of the campaign, teachers monitored the V&F as well as the beverage the school children carried in their lunchbox every day.

Stage 3. Evaluation before and after

At the beginning (before) and ending (after) of the intervention an evaluation was performed on the sample of selected school children. The evaluation was made in one day and consisted in the weighing of V&F, recording the amount and type of drinks they brought from their home for lunch, and applying an individual questionnaire to assess consumption of V&F. The weight of V&F was measured on a scale for weighing food from the brand SECA, model 852; once the weight was displayed, the value in grams was entered in the assessment tool; to ensure food safety in these procedures, the field staff used coif, face masks, gloves and disposable materials. The amount of the drinks in milliliters was recorded in accordance with the indications on the container or with a measuring cup; the beverages with water, but with no additives, were registered as plain water; registered as fruit juice were those containing sucrose mixed with any unprocessed fruit, and registered as flavored water or processed juice, the beverages containing flavorings and/or artificial sweeteners, plus any additives for preservation or stabilization. The assessment questionnaire about the consumption of V&F consisted of 5 questions, aimed at evaluating the frequency of consumption of V&F, consumer preference of V&F, health benefits from the consumption of V&F, purchase of V&F in school stores in case they did not bring them from home and parental support so the children could have access to V&F as well as their consumption.

DATA ANALYSIS

A descriptive analysis with percentages, averages and standard deviations of the total sample was performed by gender and type of school (private and public). McNemar test was applied to compare responses related to the school children by gender and type of school; and the Student t test was used for related samples to compare means at the beginning and end of the intervention. A $p < 0.05$ value was considered significant. For the analysis STATA 12 statistical software was used.

ETHICAL CONSIDERATIONS

This research is part of the project Prevention of Overweight and Obesity in School Children of Hidalgo (PESOEH) approved by the Ethics Committee of the School of Health Sciences at the Autonomous University of Hidalgo, which is governed by principles for medical research involving human subjects (Declaration of Helsinki). In all cases we have an informed consent letter which was signed in due course by the parent or guardian and took into account the consent of the child to perform evaluations.

RESULTS

We analyzed data from a total of 226 school children from first to sixth grade; from the initial sample, 20 cases were eliminated for not having some of the criteria defined or for having incomplete data; 49.9% were male and the rest female, the age range was 6 to 12 years, 56% of school children were from private schools and the rest from public schools (Table I).

In the total sample, in men and in public schools, an increase of more than 50 g ($p < 0.05$) was recorded in the intake of vege-

Table I. Vegetables, fruits and drinks average basal and final consumption at school context in the total sample by sex and school type

	Total (n = 226)		Men (n = 112)		Women (n = 114)		Private (n = 127)		Public (n = 99)	
	Initial	**Final**	**Initial**	**Final**	**Initial**	**Final**	**Initial**	**Final**	**Initial**	**Final**
Food	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*	*g/day*
Vegetables	74 ± 39*	128 ± 52*	69 ± 41*	130 ± 66*	81 ± 36	126 ± 44	73 ± 42	119 ± 50	76 ± 32*	137 ± 58*+
Fruits	146 ± 92	140 ± 58	145 ± 80	135 ± 59	148 ± 66	145 ± 56	142 ± 62	141 ± 58	161 ± 74	139 ± 58
Drinks	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*	*ml/day*
Plain water	503 ± 231*	597 ± 234*	532 ± 240*	613 ± 248*	487 ± 222	518 ± 211	488 ± 219*	534 ± 221*	544 ± 248*	617 ± 248*
Fruit Water	488 ± 205*	531 ± 186*	518 ± 216	514 ± 145	441 ± 185	560 ± 244	425 ± 179	460 ± 103	548 ± 215	619 ± 229
Flavored water or industrialized juice	326 ± 92*	408 ± 132*	361 ± 98	436 ± 170	261 ± 60	388 ± 141	350 ± 110	420 ± 147	305 ± 78	393 ± 160

**p < 0.05 with T-test for related samples.*

tables, without any changes in the amount of fruits. In the total sample, in men and in private and public schools, a significant increase of 100 mL was found in the consumption of plain water. About the consumption of fruit water and flavored water or processed juice, an increase in the amount consumed in the total sample was observed, but only 20% of school children consumed such beverages (Table I).

In the final evaluation a higher proportion of school children who consumed V&F on a daily basis in the total sample and in the private school (McNemar, $p < 0.05$) was recorded; and in these same school children a decrease in the proportion of those who consumed V&F, from 3 to 5 times a week (McNemar, $p < 0.05$) was recorded. No significant changes were observed in public schools (Fig. 2).

Generally speaking, 46% of school children mentioned they prefered to consume vegetables incorporated into a stew, with no significant differences at the beginning and end of the evaluation. In the private school a decrease of 9 points in the preference of consuming raw V&F, and an increase of 8 points in the preference of consuming cooked vegetables was recorded; while in the public school the preference for consuming raw vegetables increased by 8 points (McNemar, $p < 0.05$) (Table II). In the total sample, 90% of school children said they prefered to consume V&F with lemon, chili and salt, and the rest with some seasoning such as cream or yogurt, without differences at the beginning and end of the evaluation (Table II).

In the final evaluation the proportion of school children who identified the health benefits from the consumption of V&F increased by 20 points (68% initial *vs.* 87 final%, McNemar, $p < 0.05$); for example they mentioned that V&F helps them in their development and growth, protects them from diseases and contributes to their health, to have a proper and healthy diet, and because

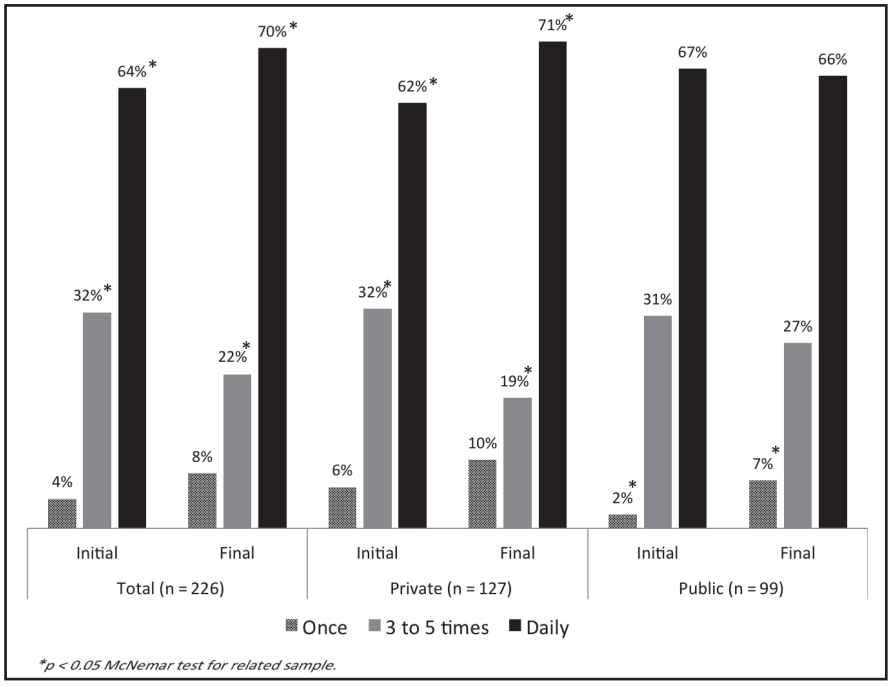

Figure 2.

Frecuence of weekly consumption of vegetables and fruits (V&F) in the total sample of schoolchildren and by school type.

Table II. Preference proportion of schoolchildren vegetables and fruit consumption in the total sample, by sex and school type

	All (%)		Men (%)		Women (%)		Private (%)		Public (%)	
Preference of consumption of V and F	**Intial**	**Final**	**Intial**	**Final**	**Intial**	**Final**	**Intial**	**Final**	**Intial**	**Final**
Raw	25	24	27	26	26	27	30*	21*	19*	29*
Coooked	27	31	29	28	27	26	25*	33*	30	28
In stew	48	45	44	46	47	45	45	46	51	43
With chili, salt and lemon	88	87	86	88	89	88	91	89	91	93
With dressing, cream, or yogurt	12	13	14	12	11	12	9	11	9	7

p < 0.05 McNemar test for related samples.

they provide energy, vitamins and minerals. In the final evaluation school children from private schools recorded a higher increase in the proportion of school children who selected correct answers on the health benefits from the consumption of V&F, compared to public schools (23% and 16%, respectively, McNemar, $p < 0.05$) (Fig. 3). In the final assessment the proportion of school children who reported buying vegetables and fruits (V&F) in school stores (ECE) in case they did not take them from home, increased 17 points, (McNemar, $p < 0.05$). A twofold increase in the purchase of vegetables and fruits (V&F) in school stores (ECE) in private schools, compared to public schools (22% and 11%, respectively, McNemar, $p < 0.05$ was recorded) (Fig. 3). In the final assessment the proportion of students who indicated that their parents supported them to achieve the consumption of vegetables and fruits increased 31 points (McNemar, $p < 0.05$); in both types of schools the increase in this proportion was similar (Fig. 3).

DISCUSSION

In the school children who participated, a significant increase in vegetable consumption was registered, indicating that a campaign of short duration (3 months) informing about the health benefits of vegetables and fruits, promotes its consumption through planning based on tastes and preferences of children, facilitates access in school stores and which has the support of the school community, can be effective to promote the consumption of healthier foods at school. In similar interventions which disseminate information about the benefits of healthy snacks in children and parents are involved, the preferences of healthier food consumption have improved (14); but there is little evidence of the increase in the amount of vegetables consumed. In an intervention where teachers were trained and parents were given informative workshops, only positive changes in knowledge and attitudes regarding V&F were observed, but there was not a significant increase in its consumption, which indicates that to make a quantitative impact it is necessary to modify the environment of school feeding (15), and would explain the significant increase in the consumption of vegetables found in this research, by facilitating access to vegetables and fruits in school stores and parents support.

It is much easier for children to consume fruits than vegetables (16); the latter are less accepted because of their neutral flavor and hard consistency, compared to fruits which are sweet and have a smooth consistency (17); which is an important point to note in this intervention that gave the same priority to V&F, but the significant increase was observed only in vegetables, probably because at the beginning of the intervention they were consumed in small quantities and variety. Other factors that determine the consumption of vegetables are the cost and time required in its preparation (18), so in this intervention we included vegetables that were available in local markets, and in the dissemination material we recommended parents to involve their children in buying, washing, disinfecting and preparing vegetables.

After the intervention, the participating school children consumed on average 268 g of V&F, thereby achieving 70% of the daily intake recommended by the WHO, indicating that the environment generated in schools may be the most important factor for changing consumption patterns. This is confirmed by a study made in 5 countries where the socioeconomic level is not consistently associated with the consumption of V&F, but it was identified that the environment of the area where people live has the potential to influence in their behavior (19).

At the end of the intervention a significant increase in the consumption of plain water was registered school children, indicating that monitoring the type of beverage they consume and a healthier environment in the school grounds can positively influence their consumption habits, as observed in an intervention made in school children in Mexico City, which promoted the modification of the environment and consumption of plain water (13).

Identifying the culinary preferences of consumption of vegetables and fruits in the population is very important to design promotion campaigns appropriate to the cultural practices. In this research it was a constant that half of the students mentioned that they prefer to consume vegetables incorporated into a stew, which could be determined by the cultural practices of the region, where it is common to consume soup-like dishes which feature

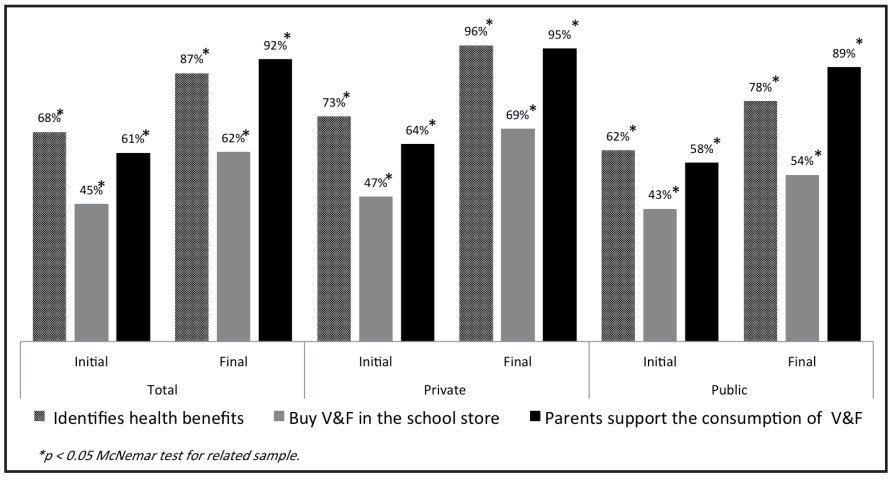

Figure 3.

Contributing factors to consume vegetables and fruits (V&F) at school context in the total sample and by school type.

vegetables. In a study of culinary practices of women in Chiapas, Mexico, it was found that 77% of wild species of vegetables were boiled and 23% cooked (20), so in future interventions correct guidelines for cooking and preserving vegetables must be given, so that the school community benefits from their nutritional properties and health protection.

Generally speaking, school children in this study prefer to add lemon, chili and salt to enhance the flavor of V&F for its consumption. This culinary practice is common among the Mexican population. It has been observed that the addition of a condiment or other food to enhance the flavor of fruits and vegetables is a facilitator for their consumption among children (21); however, it is recommended to moderate their consumption to avoid health risks due to high sodium intake (22), and the possible adverse effects of chili in the digestive tract of children (23). After the intervention, a higher proportion of school children identified the health benefits of consuming V&F, indicating that the messages of the printed material together with the planning action of the consumption of V&F can ease the appropriation of information by children. This has been observed in some interventions, where information is given but the means to adopt healthier behaviors are also provided (15).

Selling fruits and vegetables in school stores was an environment facilitator, an increase in the proportion of school children who bought their share of vegetables or fruits in these places was observed. It has been identified that one of the barriers to buying healthy food in schools is the low availability and high price, so the supply of healthy food and marketing strategies to increase consumption of these foods among school population must be increased. In a study made in Chile with the implementation of healthy kiosks in schools, a significant increase was achieved in buying fruits, milk, yogurt, juice and light juices, dried fruit, healthy sandwiches and fat free ice cream by school children who participated in the study as compared to control group (24).

In this intervention the proportion of school children who reported having the support of their parents to achieve the consumption of vegetables and fruits in school increased; it has been found in other studies that parental encouragement can influence their children to consume V&F, providing them the food and continually encouraging them to consume them (25), so interventions aimed at promoting the consumption of vegetables and fruits in children must train parents and help them prepare more attractive dishes for their children.

A favorable aspect of this study was to include the opinion of children before starting the campaign to promote consumption of vegetables and fruits, as this action prepared them to make a change in their consumption habits. Moreover, the design of the campaign to promote fruit and vegetable consumption was strengthened by the collaboration of marketing and health experts, where the communication strategy enabled to facilitate the appropriation of information by school children. It has been reported that one of the keys to increasing the demand of V&F is in the messages of promotional campaigns, addressing the issue from perspectives that go beyond disease prevention, being sufficiently clear and directed to the target group (26); however, a weakness of this study was not having a control group which allows us to affirm that the observed changes are due solely to the actions taken. In futures studies it is necessary to evaluate whether changes in the consumption of V&F remain after completion of the intervention. It can be concluded that a promotion campaign and improved access to vegetables, fruits and water in the school environment which is supported by parents and teachers can encourage healthier eating at school. It is necessary to implement campaigns to promote the consumption of V&F throughout basic education, for positioning in the minds of school children the benefits and well being provided by their consumption, thus giving them elements to make informed decisions throughout their lives.

ACNOWLEDGMENTS

This study was funded by CONACyT project 216092 of the call National Problems PDCPN2013-01: Prevention and control of childhood overweight and obesity through the National Basic Education Curriculum: Prospective study of multisectoral transfer.

REFERENCES

1. World Health Organization. Diet, nutrition and the prevention of chronic diseases. Report of a Joint FAO/WHO Expert Consultation. WHO Technical Report Series, No. 916. Geneva 2003. Consultado el 19 de noviembre de 2015. Available from: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf
2. Centers for Disease Control and Prevention. Strategies to Prevent Obesity and other Chronic Diseases: The CDC Guide to Strategies to Increase the Cosuption of Fruit and Vegetables. Atlanta: U.s. Department of Health and Human Services;2011. Consultado el 3 de febrero de 2016. Avaible from: http://www.cdc.gov/obesity/downloads/FandV_2011_WEB_TAG508.pdf
3. Jetter KM, Chalfant JA, Summer DA. Does 5-a-Day Pay? Potential Gains to Growers from Increasing Consumption of Fruits and Vegetables to Recommended Levels in a Cancer Prevention Diet. Agricultural Issues Center AIC Issues Brief 2004;27:1-7. Consultado el 3 de marzo de 2016. Avaible from: http://aic.ucdavis.edu/pub/briefs/brief27.pdf
4. Olivares S, Kain J, Lera L, Pizarro F, Vio F, Moóon C. Nutritional status, food consumption and physical activity among Chilean school children: a descriptive study. Eur J Clin Nutr 2004;58:1278-85.
5. World Health Organization. Obesity, preventing and managing the global epidemic. Report of a WHO Consultation. Geneva: World Health Organization; 1998.
6. Stables G, Heimendinger J. 5 a day for Better Health Program Monograph: Bethesda, MD: National Institute of Health, National Center Institute; 1999.
7. Stables GJ, Subar AF, Patterson BH, Dodd K, Heimendinger J, Van Duyn MA, et al. Changes in vegetable and fruit consumption and awareness among US adults: results of the 1991 and 1997 5 A Day for Better Health Program surveys. J Am Diet Assoc 2002;102:809-17.
8. World Health Organization. Global Strategy on Diet, Physical Activity and Health. WHA57.17. Geneva: World Health Organization; 2004. Consultado el 19 de noviembre de 2015. Avaible from: http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf?ua=1
9. Galván M, Amezcua-González A, López- Rodríguez G. Perfil Nutricional de Escolares de Hidalgo 2010: Estado de Nutrición y Variables del Contexto Familiar, Escolar e Individual. Pachuca, Hidalgo: Universidad Autónoma del Estado de Hidalgo; 2011. Consultado el 19 de noviembre de 2015. Avaible from: https://pesoehblog.files.wordpress.com/2013/09/libro_penuteh_2010_mg.pdf
10. Royo M, Martín J. Estudios experimentales. En: Royo M, Damiàn J, coordinadores. Método epidemiológico. Madrid: Escuela Nacional de Sanidad; 2009. p. 149-68.
11. Elashoff J.D. nQuery Advisor Version 7.0 User's Guide. Boston, U.S.A; 2007. Consultado el 3 de noviembre de 2015. Avaible from: http://www.statsols.com/wp-content/uploads/2013/10/nQ70_version2_manual.pdf

12. Upton D, Upton P, Taylor C. Increasing children's lunchtime consumption of fruit and vegetables: an evaluation of the Food Dudes programme. Public Health Nutr 2013;16:1066-72.
13. Carriedo A, Bonvecchio A, López N, Morales M, Mena C, Theodore FL, et al. [Use of social marketing to increase water consumption among school-age children in Mexico City]. Salud Publica Mex 2013;55(Suppl 3):388-96.
14. Matvienko O. Impact of a nutrition education curriculum on snack choices of children ages six and seven years. J Nutr Educ Behav 2007;39:281-5.
15. Prelip M, Kinsler J, Thai CL, Erausquin JT, Slusser W. Evaluation of a school-based multicomponent nutrition education program to improve young children's fruit and vegetable consumption. J Nutr Educ Behav 2012;44:310-8.
16. Ransley JK, Greenwood DC, Cade JE, Blenkinsop S, Schagen I, Teeman D, et al. Does the school fruit and vegetable scheme improve children's diet? A non-randomised controlled trial. J Epidemiol Community Health 2007;61:699-703.
17. Prada GE, Dubeibe-Blanco LY, Herran OF, Herrera-Anaya M. [Evaluation of the impact of a community intervention on the consumption of fruits and vegetables in Colombia]. Salud Publica Mex 2007;49:11-9.
18. Krolner R, Rasmussen M, Brug J, Klepp KI, Wind M, Due P. Determinants of fruit and vegetable consumption among children and adolescents: a review of the literature. Part II: qualitative studies. Int J Behav Nutr Phys Act 2011;8:112.
19. Ball K, Lamb KE, Costa C, Cutumisu N, Ellaway A, Kamphuis CB, et al. Neighbourhood socioeconomic disadvantage and fruit and vegetable consumption: a seven countries comparison. Int J Behav Nutr Phys Act 2015;12:68.
20. Solís-Becerra C, Estrada-Lugo E. Prácticas culinarias y (re)conocimiento de la diversidad local de verduras silvestres en el colectivo mujeres y maíz de Teopisca, Chiapas, México. LiminaR 2014;12:148-62.
21. Baranowski T, Domel S, Gould R, Baranowski J, Leonard S, Treiber F, et al. Increasing fruit and vegetable consumption among 4th and 5th grade students: results from focus groups using reciprocal determinism. J Nutr Educ 1993;25:114-20.
22. Correia-Costa L, Cosme D, Nogueira-Silva L, Morato M, Sousa T, Moura C, et al. Gender and obesity modify the impact of salt intake on blood pressure in children. Pediatr Nephrol 2016;31:279-88.
23. Maji AK, Banerji P. Phytochemistry and gastrointestinal benefits of the medicinal spice, Capsicum annuum L. (Chilli): a review. J Complement Integr Med 2016. [Epub ahead of print].
24. Bustos N, Kain J, Leyton B, Vio F. [Changes in food consumption pattern among Chilean school children after the implementation of a healthy kiosk]. Arch Latinoam Nutr 2011;61:302-7.
25. Wolnicka K, Taraszewska AM, Jaczewska-Schuetz J, Jarosz M. Factors within the family environment such as parents dietary habits and fruit and vegetable availability have the greatest influence on fruit and vegetable consumption by Polish children. Public Health Nutr 2015;18:2705-11.
26. Olavarria S, Zacarías I. [Barriers and facilitators to increase consumption of fruits and vegetables in six countries in Latin America]. Arch Latinoam Nutr 2011;61:154-62.