

## Healthy eating and restaurants. A review of recent evidence in the literature

Mónica del Pilar Díaz Beltrán <sup>1</sup>  
Yiseth Mariana Hernandez Romero <sup>1</sup>

**Abstract** *Food environments influence food consumption and population health. This study sought to establish the outstanding themes in recent scientific literature about healthy eating and restaurants. Studies about the topic published from 2011 to 2016 in seven recognized databases were reviewed systematically. From 999 titles, 20 articles were selected. Content analysis through an inductive method by two independent investigators was performed using Nvivo 10.0. Three dominant subjects were identified: Food supply modifications, promotion of healthy choices and barriers against healthy eating promotion. The findings describe research opportunities in the area, particularly in the Latin American context. It is necessary to make interventions that result in healthy food environments given the impact on collective health.*

**Key words** *Food services, Collective feeding, Restaurants, Healthy lifestyle (DeCS)*

---

<sup>1</sup> Pontificia Universidad  
Javeriana. Carrera 7 n°  
40-62. Colombia. m-diazb@  
javeriana.edu.co

## Introduction

Nowadays a large proportion of the population regularly consumes meals away from home<sup>1</sup>. In fact, in countries such as the United States (U.S.), individuals spend half of every dollar on out-of-home food<sup>2</sup>. In comparison, in 2009 the Brazilian population spent a third of its food budget at food establishments, while in 2002 they only spent 24%<sup>3</sup>. This illustrates the growth in food consumption at restaurants. Consequently, these places have an important impact not only on the economy, but also on food consumption. From an economic point of view, the foodservice industry generates more than 500 billion transactions per day<sup>4</sup>. On the other hand, one-third of the population's daily energy consumption comes from fast food shops, restaurants and other food establishments<sup>5</sup>.

Eating places creates scenarios for making food choices and influencing collective health; for example, the World Health Organization (WHO) addresses out-of-home food as an environmental determinant of health<sup>6</sup>. Specifically, food environments can be broadly conceptualized as any opportunity to obtain food at or away from home<sup>7</sup>. However, in the case of food consumption away from home, elements are considered related to marketing, advertising, access, geographical availability, among others. Particularly, Minaker et al.<sup>8</sup> point out that geographic access to food sources as well as marketing within those sources are associated with dietary behaviors and downstream effects on health status. Similarly, other scientific reports show that environments influence food consumption<sup>9</sup>. Due to these factors, it is recognized that restaurants generate conditions in which food is found and choices are made.

It would be expected that food choices made by individuals away from home maximize their wellness, particularly considering the relationship between health and food intake. For this reason, a balanced diet is included in several strategies to generate optimal conditions for growth and development in childhood<sup>10</sup>, productivity in adult life<sup>11</sup>, and active aging<sup>12</sup>. To illustrate this, from a public health perspective, multiple dietary guidelines are implemented for different countries to give recommendations for a balanced diet among their populations. Examples are the guidelines developed in countries such as Mexico<sup>13</sup>, Argentina<sup>14</sup> or Colombia<sup>15</sup>. However, choosing meals in food establishments is determined by other economic, physical and social variables.

In fact, food consumption decisions involve a multifactorial process. In the case of the decisions made in restaurants, they are influenced by price promotion, characteristics of products, physical layout, among others<sup>16</sup>.

Given the exposed relationships and the complexity of food choices in out-of-home environments, there is a need to establish ways to promote healthy eating in food establishments, particularly in restaurants, due to their availability in urban areas and their economic impact. Consequently, the objective of this study was to identify relevant topics in the recent scientific literature about healthy eating and restaurants. A systematic review of research in this area published between 2011 and 2016 was conducted, which resulted in updated research on the subject as well as opportunities to influence collective health.

## Methods

The review considered scientific articles published from January 1, 2011 to April 30, 2016. Seven databases were consulted: Web of Science, Scopus, PubMed, Ebsco Host (Medline full text), Science Direct (Elsevier), Redalyc and Dialnet. The pre-defined search terms and text words used across all the databases included: "Healthy eating" AND "Choices" AND "Restaurants"; "Healthy eating" AND "Choices" AND "Food service"; "Healthy eating" AND "Dining" AND "Food service"; "Healthy eating" AND "Dining" AND "Restaurants"; "Healthy" AND "Offer" AND "Food service"; "Healthy" AND "Offer" AND "Restaurants"; "Healthy food" AND "Food service"; "Healthy food" AND "Restaurant"; "Healthy offers" AND "Food service"; "Healthy offers" AND "Restaurant".

Documents were eligible for inclusion if (1) they addressed healthy eating in restaurants; (2) they were presented in research articles or reviews; and (3) they were written either in English or Spanish. First, documents were identified through search terms and filters on the databases. Following this, titles and abstracts were screened for inclusion based on the eligibility criteria. Finally, the full-text records were read to select the documents that were part of this literature review.

The articles included in the final sample were recorded in a data table, which listed title, year and country of publication, study place, type of study, objective, summary of results, main ideas of discussion and conclusions. Additionally, for

those who had a more extensive description of healthy eating in restaurants, analytical summaries were written. The selection of the documents, the registration in the data table and the preparation of analytical summaries were carried out by the two authors.

Content analyses of the data table and summaries were independently conducted by the authors using NVivo 10.0. First, the information was coded focusing on healthy eating criteria used in the studies as well as descriptions of interventions to promote healthy eating and their effectiveness. After that, emerging themes were identified, and similarities and differences between articles were analyzed. Disagreements among the researchers were settled through discussion until consensus was reached. Recurrence tables, flowcharts and cloud maps were used to target dominant subjects. Eventually, narrative syntheses with the predominant topics were written. The topics included were those repetitive in the literature, those that contributed to understanding healthy eating promotion in restaurants or those that had a strong relationship with recognized dietary guidelines.

## Results

This review included 20 documents published between 2011 and 2016 in well-known scientific databases. Figure 1 shows the selection process of the articles included in this study.

From the selected articles, 50% of the studies were completed in U.S. and 20% in the United Kingdom (4 articles). In contrast, only one study was conducted in Latin America, specifically in Brazil. The documents included experimental investigation (65%) and descriptive studies (20%), and only three (15%) were the result of reviews. Chart 1 shows the 20 review articles.

From the content analysis, three relevant themes emerged: Food supply modifications, promotion of healthy choices and barriers against healthy eating promotion in restaurants. Each of them is described in a narrative synthesis below.

### Food supply modifications

In the studies included, there was a clear statement about the importance of environmental factors over health promotion. Researchers such as Caraher et al.<sup>17</sup>, Martínez-Donate et al.<sup>18</sup> and Skov et al.<sup>19</sup> described health behaviors as the result of interaction between individuals'

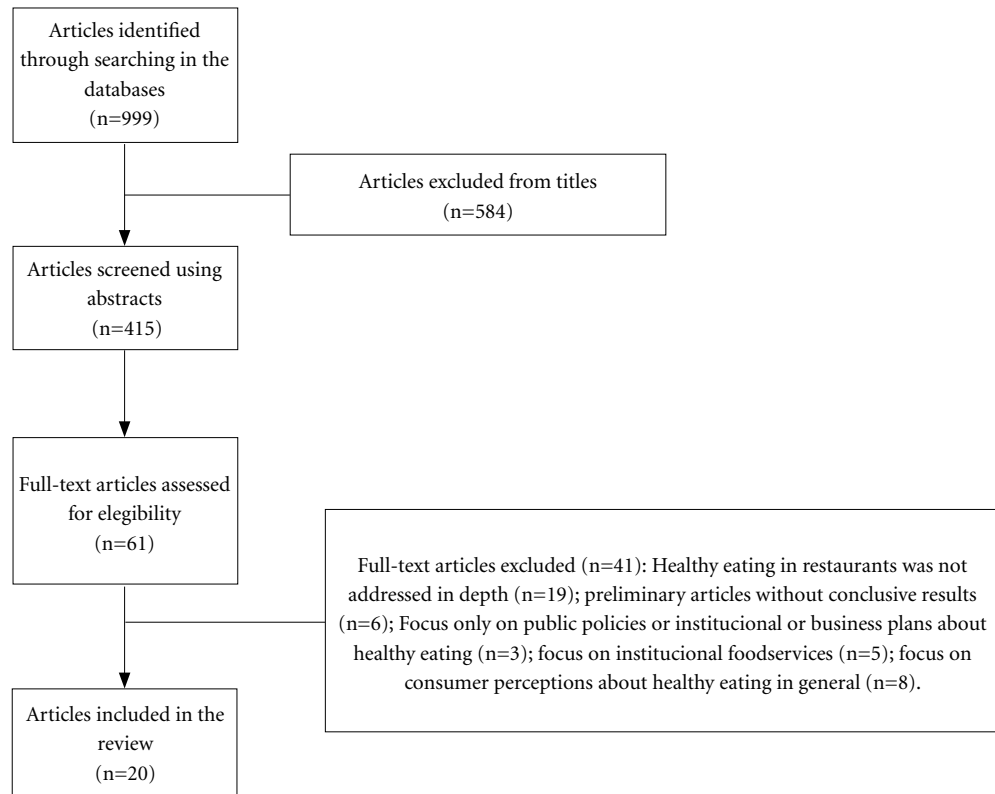
attributes and environmental factors, like food availability in restaurants. For this reason, they pointed out the need to adjust food supply in these establishments. Specifically, inclusion of health-friendly options in menus was a recurrent topic, mentioning fruits and vegetables as a regular example<sup>4,18,20-25</sup>. Predominantly, concern was expressed about providing meals that contribute to wellness, given the close relationship between food consumption and health.

Other food supply modifications were justified by the link between high intake of specific nutrients and prevalence of chronic diseases. For this reason, reduction of unhealthy options in menus was recommended in different studies. Particularly, an important percentage of documents referred to the need to include meals with a low calorie count due to the obesity epidemic. According to the articles, low calorie dishes may be included in restaurants' menus through modifying cooking methods<sup>4,20,22,24</sup>, reducing portion size<sup>4,17,19,20,22-24</sup> or adding appetizers with lower calories<sup>4,18,23,24</sup>. Likewise, sugar reduction in meals offered in these establishments was discussed<sup>4,17,20,22,26,27</sup>. On the other hand, reduction of sodium and saturated fat was mentioned repeatedly due to the high prevalence of cardiovascular disease in the population<sup>4,20,24,27-29</sup>. For example, the study led by Bagwell proposed to eliminate salt shakers from the tables and reduce salt addition during cooking<sup>20</sup>. In this way, it was highlighted that restaurants may contribute to the prevention of prevalent chronic diseases.

### Promotion of healthy choices

According to the documents reviewed, it is crucial not only to modify the food supply, but also to favor healthy decisions by consumers in restaurants. Specifically, the articles referred to strategies such as providing information at points of sale, events and sales promotions. In terms of information to promote healthy choices, menu labeling to show nutrition facts was recurrently mentioned<sup>17-19,21-23,30-33</sup>. This considers that awareness of calorie content of meals would influence mindful food choices. Also, informative slogans to highlight healthier items<sup>18,22</sup>, communication through information technologies<sup>18,21</sup> and logos to promote nutritious food were suggested<sup>18,19,22,34</sup>. Alternatively, only one study referred to verbal guidelines given by servers as a communication tactic<sup>25</sup>.

Regarding events and sales promotions to facilitate healthier behaviors in restaurants, a small-



**Figure 1.** Selection process of the articles.

Source: Author's data.

er number of publications referred to these strategies. In the case of events, local initiatives with awards to “healthy” caterers<sup>20</sup> and competitions around better food choices between customers<sup>30</sup> were mentioned. Regarding sales promotion, the literature referred to interventions in means of payment<sup>19</sup>, lower prices for nutritious food<sup>22</sup> and product bundling<sup>18,21-23</sup> – all to persuade consumers to make healthier choices.

#### **Barriers against healthy eating promotion in restaurants**

Although the literature reported different initiatives to encourage healthy eating in restaurants, the obstacles were clearly highlighted, specifically barriers associated with consumer perception and profitability of healthier food supply. Some of the articles discussed the low popularity of and

reduced demand for healthy foods among clients due to less pleasant flavor<sup>17,19,20,22</sup>. To illustrate this, Newson et al.<sup>4</sup> asserted that healthy choices are often linked to the perception of less taste, less satiety and higher price. Given this trend, several establishments assume that providing this type of food will harm their profits<sup>22,34</sup>, even more so if foods with lower nutritional quality have a higher profit margin<sup>25,26</sup>. In fact, one study indicated a potential conflict between health promotion and profit generation in food outlets<sup>35</sup>. For instance, offering healthy ingredients represents a higher cost that not all customers are willing to pay for<sup>17,20</sup>. Similarly, reducing portion sizes may affect price and restaurants' incomes as well<sup>20,25</sup>. However, other authors asserted that healthy eating promotion may be commercially interesting, considering a new market of health-conscious consumers<sup>34</sup>.

**Chart 1.** Articles included in the review.

Bagwell S. Healthier catering initiatives in London, UK: an effective tool for encouraging healthier consumption behaviour? <i>Critical Public Health</i> . 2014;24(1):35–46.
Skov LR, Lourenço S, Hansen GL, Mikkelsen BE, Schofield C. Choice architecture as a means to change eating behaviour in self-service settings: a systematic review. <i>Obesity Reviews</i> . 2013;14:187–96.
Martins A, Pacheco da Costa R, Marino M, RataicheskG. Overweight/obesity is associated with food choices related to rice and beans, colors of salads, and portion size among consumers at a restaurant serving buffet-by-weight in Brazil. <i>Appetite</i> ; 2012;59(2):305–11.
Papies E, Veling H. Healthy dining. Subtle diet reminders at the point of purchase increase low-calorie food choices among both chronic and current dieters. <i>Appetite</i> ; 2013;61:1–7.
Kang J, Jun J, Arendt S. Understanding customers' healthy food choices at casual dining restaurants: Using the Value – Attitude – Behavior model. <i>International Journal of Hospitality Management</i> ;2015;48:12–21.
Crixell S, Friedman B, Fisher D, Biediger-Friedman L. Improving Children's Menus in Community Restaurants: Best Food for Families, Infants, and Toddlers (Best Food FITS) Intervention, South Central Texas, 2010 - 2014. <i>Preventing Chronic Disease: Public Health Research, Practice and Policy</i> . 2014;11: E223:1–12.
Choi J, Zhao J. Consumers' behaviors when eating out. Does eating out change consumers' intention to eat healthily? <i>British Food Journal</i> . 2014;116(3):494–509.
Caraher M, O'Keefe E, Lloyd S, Madelin T. The planning system and fast food outlets in London: lessons for health promotion practice. <i>Revista Portuguesa de Saúde Pública</i> ; 2013;31(1):49–57.
Newson R, Maas R, Beijersbergen A, Carlson L, Rosenbloom C. International consumer insights into the desires and barriers of diners in choosing healthy restaurant meals. <i>Food Quality and Preference</i> ;2015;43:63–70.
Sinclair S, Cooper M, Mansfield E. The Influence of Menu Labeling on Calories Selected or Consumed: A Systematic Review and Meta-Analysis. <i>Journal of the Academy Nutrition and Dietetics</i> ; 2014;114(9):1375–88.
Edwards J. The foodservice industry: Eating out is more than just a meal. <i>Quality and Preference</i> ; 2013;27(2):223–229.
Lee-kwan S, Goedkoop S, Yong R, Batorsky B, Hoffman V, Jeffries J, Hamouda M, Gittelsohn J. Development and implementation of the Baltimore healthy carry-outs feasibility trial: process evaluation results. <i>Bio Med Central Public Health</i> . 2013;13:638:2–9.
Hanratty B, Milton B, Ashton M, Whitehead M. “McDonalds and KFC, it's never going to happen”: the challenges of working with food outlets to tackle the obesogenic environment. <i>Journal Public Health</i> . 2012;34(4):548–554.
Anzman-Frasca S, Dawes F, Sliwa S, Dolan P, Nelson M, Washburn K, Economos C. Healthier side dishes at restaurants: an analysis of children's perspectives, menu content, and energy impacts. <i>Journal of Behavioral Nutrition and Physical Activity</i> . 2014;11(1):1–12
Martínez-Donate A, Riggall A, Meinen A, Malecki K, Escaron A, Hall B, Menzies A, Garske G, Nieto J, Nitzke S. Evaluation of a pilot healthy eating intervention in restaurants and food stores of a rural community: a randomized community trial. <i>Bio Med Central Public Health</i> . 2015;15:136:1–12.
Elbel B. Consumer Estimation of Recommended and Actual Calories at Fast Food Restaurants. <i>Obesity</i> . 2011;19(10):1971–1978.
KleefE, Broek O, Trijp H. Exploiting the Spur of the Moment to Enhance Healthy Consumption: Verbal Prompting to Increase Fruit Choices in a Self-Service Restaurant. <i>Applied Psychology: Health and Well - Being</i> . 2015;7(2):149–166.
Batada A, Bruening M, Marchlewicz E, Story M, Wootan M. Poor Nutrition on the Menu: Children's Meals at America's Top Chain Restaurants. 2012;8(3):251–255.
Bedard K, Kuhn P. Micro-marketing healthier choices: Effects of personalized ordering suggestions on restaurant purchases. <i>Journal of Health Economics</i> ; 2015;39:106–122.
Chen R, Smyser M, Chan N, Ta M, Saelens B, Krieger J. Changes in awareness and use of calorie information after mandatory menu labeling in restaurants in King County, Washington. <i>American Journal of Public Health</i> ; 2015;105(3):546–553.

## Discussion

This review provides updated literature regarding healthy eating in restaurants and research opportunities. For instance, minimal research was

found in Latin American countries. In fact, one study pointed out that even though U.S. research has provided information on the topic, other countries may face unique food environment issues<sup>8</sup>. Given differences in economy and cul-

ture, it is imperative to study these environments in different contexts. However, developing valid scales and instruments for evaluation is part of the challenge. For example, in the review, there were not specific tools reported. In contrast, the literature about institutional foodservices refers to the “Nutrition Environments Survey” (NEMRS) as a valid checklist to evaluate healthy eating promotion<sup>36-39</sup>. Nevertheless, that survey has different versions, and one of them already is used in restaurants<sup>40</sup>. Although there are numerous studies about healthy diets in institutional food services like workplaces, gardens, hospitals, among others<sup>41-44</sup>, still there are few in restaurants, despite higher decision-making power of the consumer in these establishments. Therefore, characterizing and intervening in food supply in restaurants represents a research opportunity.

Regarding the findings, some of them are congruent with public health concerns and other scientific evidence. In the case of calorie reduction in restaurants’ meals, this strategy is justified by findings about obesogenic factors. For example, previous studies emphasize that eating away from home impacts caloric intake and weight gain<sup>45-47</sup>. This explains the relationship between obesity and environmental aspects<sup>48</sup>. Given that overweight and obesity are common and serious problems nowadays<sup>49</sup>, intervention over calorie count in restaurants may contribute to the solution.

The prevalence in non-communicable diseases (NCDs) explained our findings in reference to interventions in sugar, sodium and saturated fat in restaurants’ meals. In 2015, WHO reported that 38 million people around the world die each year from conditions such as cardiovascular disease, respiratory disease, diabetes or cancer<sup>50</sup>. Such diseases were caused by inadequate eating habits among other factors<sup>51</sup>. That is why diet has become an important factor to prevent these diseases. There is enough evidence about the relationship between excess salt intake and cardiovascular disease<sup>52-54</sup>, or about high-sugar consumption and cellular deterioration, diabetes and cardiovascular disease<sup>55-57</sup>. For this reason, the Global Action Plan for the Prevention and Control of NCDs describes the need to regulate sugar, sodium and saturated fat in population diet<sup>58</sup>. Therefore, food supply modifications regarding these nutrients are fundamental to respond to public health concerns.

Increased availability of fruits and vegetables in restaurants’ menus may promote healthier population eating patterns. Consumption of

fruits and vegetables is recognized as part of a healthy diet. A balanced diet is recognized as fundamental for maintaining health. The Scientific Report of the Dietary Guidelines for the United States, in 2015, considered healthy eating as one of the pillars of well-being during life<sup>9</sup>. In the case of fruits and vegetables, they are associated with numerous health benefits. For example, they are rich in fiber that favors gastrointestinal well-being and reduces absorption of nutrients like carbohydrates<sup>62</sup>. Similarly, fruits and vegetables provide secondary metabolites with antioxidants and vasodilator effects<sup>59-61</sup> that are crucial to cardiovascular performance. In light of these benefits, the recurrent allusion to the importance fruits and vegetables’ availability in restaurants is validated.

Despite awareness of the relevance of a healthy diet, the findings showed a misalignment with recent definitions of healthy eating. Today, the definitions include an approach to both food and nutrients aimed at optimizing health, which not only addresses the consumption of fruits and vegetables and discourages the consumption of food sources with nutrients related to disease. It is also necessary to include healthy fats, whole grains, nuts and water and moderate alcohol consumption<sup>63-66</sup>. In our literature review, only one article referred to healthy fats, whole grains and water<sup>20</sup>. In fact, the principal focus was fruits and vegetables. Thus, there is room for progress to a holistic approach about what healthy eating may be in restaurants.

Our findings point out not only the importance of food supply modification in restaurants, but also the promotion of healthy food choices. Particularly, it is recommended that food establishments provide support, access to information and opportunities to make healthy decisions. An example of this kind of support is the menu-labeling strategy. In 2006, the State of New York in the U.S. made calorie labels compulsory in certain restaurant chains<sup>67</sup>. Nevertheless, the findings about its effectiveness are still ambiguous<sup>68-70</sup>. Different tactics to promote healthier food decisions in restaurants still need to be studied, even more in the case of countries where there is no such regulation.

One may assume that healthy eating is not, in a strict sense, an issue that should be addressed by restaurants. Food establishments create conditions for food consumption. Consequently, they are responsible for these conditions and their impact on collective health. In fact, the Ottawa Charter states that health promotion is not only the responsibility of the health sector, and that

actions from other economic and social sectors are required<sup>71</sup>. Similarly, other authors remark that it is crucial that the foodservice industry take responsibility for the health of customers<sup>1</sup>. However, deep work with the population and their perceptions about healthy food is also required. Restaurants can help in this effort as well. For example, developing appealing healthy dishes may affect perceptions. Nowadays, taste is well known as a decision-making trigger for food choices<sup>72-79</sup>. Therefore, attractive healthy meals may positively influence their consumption and perceptions. On the other hand, restaurants could profitably help clients make healthier choices, considering a higher demand of healthy options recently<sup>80,81</sup>. In other words, a collective effort is necessary with benefits for customers and restaurants.

Even though this study provides updated research on healthy eating in restaurants, it has limitations as well. Particularly, we did not evaluate methods and designs of the studies included. Future studies are needed to explore the integrity of measures and study designs in this field. Similarly, we did not include documents about public policies on this topic. However, it is well known that still there are opportunities for governments to regulate marketing in restaurants

and create healthier food environments<sup>65,82-84</sup>. Nowadays, restaurants are recognized as ideal settings to promote health. In fact, they are part of future lines of research in reports like the U.S. Nutrition Research Plan 2016–2021 or the Scientific Report of the U.S. Dietary Guidelines, from 2015<sup>9,85</sup>. Therefore, with the dominant subjects identified, research in Latin America may also establish an academic agenda to explore the topic in our countries.

## Conclusion

The literature review presented three dominant subjects regarding healthy eating in restaurants, specifically, food supply modifications, promotion of healthy choices and barriers against healthy eating in these establishments. So far, food environments and restaurants have been principally studied in countries like the United States or the United Kingdom, while there is a need to research them more in Latin American countries. The studies examined pointed out the importance of different strategies to promote healthier food environments, given their impact on collective health.

## Collaborations

M Diaz Beltran designed the literature review search strategy, led and conducted paper collection, analyzed the selected documents, wrote different drafts of the manuscript and oversaw the submission process. YM Hernandez Romero conducted the literature search, led consolidation of information on tables and summaries, analyzed the documents and assisted with the manuscript. All authors approved the final document.

## Acknowledgements

We thank Professor Luz Nayibe Vargas, member of the research group “Food, Nutrition and Health” at Pontificia Universidad Javeriana, who gave feedback about the preliminary findings. We also thank Professor Jonathon Day at Purdue University for reviewing the final draft of this manuscript in English.

Funding for this research was provided by Pontificia Universidad Javeriana in Bogotá, Colombia. This publication is part of the study “Healthy eating in restaurants with higher sales in Bogotá: A qualitative analysis of the information available on the web”.



## References

- Mikkelsen BE. Images of foodscapes: Introduction to foodscape studies and their application in the study of healthy eating out-of-home environments. *Perspect Public Health* 2011; 131(5):209-216.
- American Institute for Cancer Research. *Americans Spending Half of Every Dollar Going out to Eat*. Pagina 1/1 [Internet] [citado 2016 Dic 15] Disponible en: [http://www.aicr.org/cancer-research-update/2016/02\\_10/cru\\_Americans\\_Spending\\_Half\\_of\\_Every\\_Dollar\\_Going\\_Out\\_to\\_Eat.html?referrer=https://www.google.com/](http://www.aicr.org/cancer-research-update/2016/02_10/cru_Americans_Spending_Half_of_Every_Dollar_Going_Out_to_Eat.html?referrer=https://www.google.com/).
- Bezerra I, Souza A, Pereira R, Sichieri R. Consumption of foods away from home in Brazil. *Rev Saude Publica* 2013; 47(Supl. 1):200-211.
- Newson R, Maas R, Beijersbergen A, Carlson L, Rosenbloom C. International consumer insights into the desires and barriers of diners in choosing healthy restaurant meals. *Food Quality and Preference* 2015; 43:63-70.
- Lin B-H, Morrison R. *Food and Nutrient Intake Data: Looking at the Nutritional Quality of Foods Eaten at Home and Away From Home*. USDA. [Internet]. 2012 [citado 2016 Dic 15]; 10(2):1-2. Disponible en: <https://www.ers.usda.gov/amber-waves/2012/june/data-feature-food-and-nutrient-intake-data/>
- World Health Organization (WHO). *Diet and physical activity for health. European Charter on counteracting obesity*. World Health Organization Europe [Internet]. European Ministerial Conference on Counteracting Obesity. 15-17 Noviembre 2006. [citado 2016 Dic 15]. Disponible en: [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0006/96459/E90143.pdf](http://www.euro.who.int/__data/assets/pdf_file/0006/96459/E90143.pdf)
- Townshend T, Lake A. Obesogenic urban form: Theory, policy and practice. *Health & Place* 2009; 15(4):909-916.
- Minaker L, Shuh A, Olstad D, Engler-Stringer R, Black J, Mah C. Retail food environments research in Canada: A scoping review. *Can J Public Health* 2016; 107(Supl. 1):s4-s13.
- Dietary Guidelines Advisory Committee. *Scientific Report of the 2015 Dietary Guidelines Advisory Committee. Office of Disease Prevention*. [Internet]. 2015. [citado 2016 Dic 15]. Disponible: <https://health.gov/dietaryguidelines/committee/>
- Rush E, Cairncross C, Williams M, Tseng M, Copping-T, McLennan S, Latimer K. Project Energize: intervention development and 10 years of progress in preventing childhood obesity. *BMC Research Notes* 2016; 9(1):2-7.
- Poscia A, Moscato U, La Milia D, Milovanovic S, Stojanovic J, Borghini A, Collamati A, Ricciardi W, Magnavita N. Workplace health promotion for older workers: a systematic literature review. *BMC Health Services Research* 2016; 16(Supl. 5):415-479.
- McNaughton S, Crawford D, Ball K, Salmon J. Understanding determinants of nutrition, physical activity and quality of life among older adults: the Wellbeing, Eating and Exercise for a Long Life (WELL) study. *Health Qual Life Outcomes* 2012; 10:109.
- Academia Nacional de Medicina. *Guías Alimentarias y de Actividad Física* [Internet]. Intersiste. México; 2015. 1-188 p. [citado 2016 Dic 15]. Disponible: [https://ods.od.nih.gov/pubs/2015\\_DGAC\\_Scientific\\_Report\\_ODS\\_Compiled\\_DS\\_Statements.pdf](https://ods.od.nih.gov/pubs/2015_DGAC_Scientific_Report_ODS_Compiled_DS_Statements.pdf)
- Argentina. Ministerio de Salud de la Nación. *Guías Alimentarias para la Población Argentina*. [Internet]. Buenos Aires, Argentina; 2016. 259 p. [citado 2016 Dic 15]. Disponible en: [http://www.msal.gov.ar/images/stories/bes/graficos/0000000817cnt-2016-04\\_Guia\\_Alimentaria\\_completa\\_web.pdf](http://www.msal.gov.ar/images/stories/bes/graficos/0000000817cnt-2016-04_Guia_Alimentaria_completa_web.pdf)
- Instituto Colombiano de Bienestar Familiar (ICBF), Organización de las Naciones Unidas para la Alimentación y Agricultura (FAO). *Guías Alimentarias Basadas en Alimentos para la Población Colombiana Mayor de 2 años*. Documento técnico. [Internet]. Bogotá, Colombia; 2015. 314 p [citado 2016 Dic 15]. Disponible en: <https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VS/PP/SNA/guias-alimentarias-basadas-en-alimentos.pdf>
- Engler-Stringer R, Le H, Gerrard A, Muhajarine N. The community and consumer food environment and children's diet: a systematic review. *BMC Public Health* 2014; 14(1):522.
- Caraher M, O'Keefe E, Lloyd S, Madelin T. The planning system and fast food outlets in London: lessons for health promotion practice. *Revista Portuguesa de Saúde Pública* 2013; 31(1):49-57.
- Martínez-Donate A, Riggall A, Meinen A, Malecki K, Escaron A, Hall B, Menzies A, Garske G, Nieto J, Nitzke S. Evaluation of a pilot healthy eating intervention in restaurants and food stores of a rural community: a randomized community trial. *BMC Public Health* 2015; 15:136.
- Skov LR, Lourenço S, Hansen GL, Mikkelsen BE, Schofield C. Choice architecture as a means to change eating behaviour in self-service settings: a systematic review. *Obesity Reviews* 2013; 14(3):187-196.
- Bagwell S. Healthier catering initiatives in London, UK: an effective tool for encouraging healthier consumption behaviour? *Critical Public Health* 2014; 24(1):35-46.
- Bedard K, Kuhn P. Micro-marketing healthier choices: Effects of personalized ordering suggestions on restaurant purchases. *J Health Econ* 2015; 39:106-122.
- Lee-kwan S, Goedkoop S, Yong R, Batorsky B, Hoffman V, Jeffries J, Hamouda M, Gittelsohn J. Development and implementation of the Baltimore healthy carry-outs feasibility trial: process evaluation results. *BMC Public Health* 2013; 13:638.
- Anzman-Frasca S, Dawes F, Sliwa S, Dolan P, Nelson M, Washburn K, Economos C. Healthier side dishes at restaurants: an analysis of children's perspectives, menu content, and energy impacts. *Int J Behav Nutr Phys Act* 2014; 11(1):1-12
- Martins A, Pacheco da Costa R, Marino M, Rataichesck G. Overweight/obesity is associated with food choices related to rice and beans, colors of salads, and portion size among consumers at a restaurant serving buffet-by-weight in Brazil. *Appetite* 2012; 59(2):305-311.

25. Kleef E, Broek O, Trijp H. Exploiting the Spur of the Moment to Enhance Healthy Consumption: Verbal Prompting to Increase Fruit Choices in a Self-Service Restaurant. *Applied Psychology: Health and Well-Being* 2015; 7(2):149-166.
26. Crixell S, Friedman B, Fisher D, Biediger-Friedman L. Improving Children's Menus in Community Restaurants: Best Food for Families, Infants, and Toddlers (Best Food FITS) Intervention, South Central Texas, 2010-2014. *Prev Chronic Dis* 2014; 11:E223.
27. Choi J, Zhao J. Consumers' behaviors when eating out. Does eating out change consumers' intention to eat healthily? *British Food Journal*. 2014; 116(3):494-509.
28. Batada A, Bruening M, Marchlewicz E, Story M, Wootan M. Poor Nutrition on the Menu: Children's Meals at America's Top Chain Restaurants. *Childhood Obes* 2012; 8(3):251-255.
29. Edwards J. The foodservice industry: Eating out is more than just a meal. *Quality and Preference* 2013; 27(2):223-229.
30. Kang J, Jun J, Arendt S. Understanding customers' healthy food choices at casual dining restaurants: Using the Value - Attitude - Behavior model. *International Journal of Hospitality Management* 2015; 48:12-21.
31. Elbel B. Consumer Estimation of Recommended and Actual Calories at Fast Food Restaurants. *Obesity* 2011; 19(10):1971-1978
32. Sinclair S, Cooper M, Mansfield E. The Influence of Menu Labeling on Calories Selected or Consumed: A Systematic Review and Meta-Analysis. *Journal of the Academy Nutrition and Dietetics* 2014; 114(9):1375-1388.
33. Chen R, Smyser M, Chan N, Ta M, Saelens B, Krieger J. Changes in awareness and use of calorie information after mandatory menu labeling in restaurants in King County, Washington. *Am J Public Health* 2015; 105(3):546-553.
34. Papiés E, Veling H. Healthy dining. Subtle diet reminders at the point of purchase increase low-calorie food choices among both chronic and current dieters. *Appetite* 2013; 61(1):1-7.
35. Hanratty B, Milton B, Ashton M, Whitehead M. "McDonalds and KFC, it's never going to happen": the challenges of working with food outlets to tackle the obesogenic environment. *J Public Health* 2012; 34(4):548-554.
36. Saelens B, Glanz K, Sallis J, Frank L. Nutrition Environment Measures Study in Restaurants (NEMS-R) Development and Evaluation. *J Prevent Med* 2007; 32(4):273-281.
37. Lesser L, Hunnes D, Reyes P, Arab L, Ryan G, Brook R, Choen D. Assessment of Food Offerings and Marketing Strategies in the Food-Service Venues at California Children's Hospitals. *Academic Pediatrics Association* 2012; 12(1):62-67.
38. Tseng M, DeGreef K, Fishler M, Gipson R, Koyano K, Neill D. Assessment of a University Campus Food Environment, California, 2015. *Preventing Chronic Disease*. [Internet]. 2016. [citado 2016 Dic 15]; 13:150455. Disponible en: [http://www.cdc.gov/pcd/issues/2016/15\\_0455.htm](http://www.cdc.gov/pcd/issues/2016/15_0455.htm)
39. Carins J, Rundle-Thiele S. Fighting to eat healthfully: measurements of the military food environment. *Journal of Social Marketing* 2014; 4(3):223-239.
40. Wang J, Engler-Stringer R, Muhajarine N. Assessing the Consumer Food Environment in Restaurants by Neighbourhood Distress Level across Saskatoon, Saskatchewan. *Canadian Journal of Dietetic Practice and Research* 2016; 77(1):9-16.
41. Geaney F, Harrington J, Fitzgerald A, Perry I. The impact of a workplace catering initiative on dietary intakes of salt and other nutrients: a pilot study. *Public Health Nutrition* 2011; 14(8):1345-1349.
42. Stites S, Singletary S, Menasha A, Cooblall C, Hantula D, Axelrod S, Figueredo V, Phipps E. Pre-ordering lunch at work. Results of the what to eat for lunch study. *Appetite* 2015; 84:88-97.
43. Donohoe C, McGurk M. Promoting Healthy Snack and Beverage Choices in Hawai'i Worksites: The Choose Healthy Now! Pilot Project. *Hawai'i Journal of Medicine Public Health* 2014; 73(11):365-371.
44. Olstad D, Lieffers J, Raine K, McCargar L. Implementing the Alberta nutrition guidelines for children and youth in a recreational facility. *Revue Canadienne de la Pratique et de la Recherche en Diététique* 2011; 72(4):177.
45. Lachat C, Nago E, Verstraeten R, Roberfroid D, Van Camp J, Kolsteren P. Eating out of home and its association with dietary intake: a systematic review of the evidence. *Obesity Reviews* 2011; 13(4):329-346.
46. McGuire S, Todd J, Mancino L, Lin B, Jessica E. *The impact of food away from home on adult diet quality, ERR-90*. United States Department of Agriculture. [Internet]. 2010. Economic Research Service. [citado 2016 Dic 15]. Disponible en: [https://www.ers.usda.gov/webdocs/publications/err90/8170\\_err90\\_1.pdf](https://www.ers.usda.gov/webdocs/publications/err90/8170_err90_1.pdf)
47. Ruopeng A. Beverage Consumption in Relation to Discretionary Food Intake and Diet Quality among US Adults, 2003 to 2012. *J Acad Nutr Diet* 2015; 116(1):28-37.
48. Jaime P, Duran A, Sarti F, Lock K. Investigating environmental determinants of diet, physical activity, and overweight among adults in Sao Paulo, Brazil. *Journal of Urban Health* 2011; 88(3):567-581.
49. Cleobury L, Tapper K. Reasons for eating "unhealthy" snacks in overweight and obese males and females. *Journal of Human Nutrition and Dietetics* 2014; 27(4):333-341.
50. World Health Organization (WHO). *Noncommunicable diseases* [Internet]. WHO; 2015. [citado 2016 Dic 15]. Disponible en: <http://www.who.int/mediacentre/factsheets/fs355/en/>
51. World Health Organization (WHO). *Informe sobre la situación de las enfermedades no transmisibles* [Internet]. WHO; 2010. Vol. 11. [citado 2016 Dic 15]. Disponible en: [http://apps.who.int/iris/bitstream/10665/149296/1/WHO\\_NMH\\_NVI\\_15.1\\_spa.pdf](http://apps.who.int/iris/bitstream/10665/149296/1/WHO_NMH_NVI_15.1_spa.pdf)

52. Eckel R, Jakicic J, Ard J, De Jesus J, Houston Miller N, Hubbard V, Lee I-M, Lichtenstein AH, Loria CM, Millen BE, Nonas CA, Sacks FM, Smith Junior SC, Svetkey LP, Wadden TA, Yanovski SZ. 2013 AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: A report of the American College of cardiology/ American Heart Association task force on practice guidelines. [Internet] 2013. Vol. 129, American Heart Association. [citado 2016 Dic 15]. Disponible en: <http://circ.ahajournals.org/content/early/2013/11/11/01.cir.0000437740.48606.d1>
53. Kloss L, Meyer J, Graeve L, Vetter W. Sodium intake and its reduction by food reformulation in the European Union-A review. *NFS Journal* 2015; 1:9-19.
54. Baldo M, Rodrigues S, Mill J. High salt intake as a multifaceted cardiovascular disease: new support from cellular and molecular evidence. *Heart Fail Reviews* 2015; 20(4):461-474.
55. Leung C, Laraia B, Needham B, Rehkopf D, Adler N, Lin J, Blackburn EH, Epel ES. Soda and Cell Aging: Associations Between Sugar-Sweetened Beverage Consumption and Leukocyte Telomere Length in Healthy Adults From the National Health and Nutrition Examination Surveys. *Am J Public Health* 2014; 104(12):2425-2431.
56. Stanhope KL. Sugar consumption, metabolic disease and obesity: The state of the controversy. *Crit Rev Clin Lab Sci* 2015; 53(1):52-67.
57. Shearrer GE, Daniels MJ, Toledo-Corral CM, Weigensberg MJ, Spruijt-Metz D, Davis JN. Associations among sugar sweetened beverage intake, visceral fat, and cortisol awakening response in minority youth. *Physiology & Behavior* 2016; 167:188-193.
58. World Health Organization (WHO). *Plan de acción mundial para la prevención y el control de las enfermedades no transmisibles 2013-2020*. [Internet]. 2013. 44 p. [citado 2016 Dic 15]. Disponible en: [http://www.who.int/cardiovascular\\_diseases/15032013\\_updated\\_revised\\_draft\\_action\\_plan\\_spanish.pdf](http://www.who.int/cardiovascular_diseases/15032013_updated_revised_draft_action_plan_spanish.pdf)
59. Zapata S, Piedrahita A, Rojano B. Capacidad atrapadora de radicales oxígeno (orac) y fenoles totales de frutas y hortalizas de Colombia. *Perspectivas en Nutrición Humana* 2014; 16(1):25-36.
60. Quideau S, Deffieux D, Douat-Casassus C, Pouysegur L. Plant polyphenols: chemical properties, biological activities, and synthesis. *Angew Chem Int Ed Engl* 2011; 50(3):586-621.
61. Lara M, Bustos P, Amigo H. Consumo de frutas, verduras y presión arterial. Un estudio poblacional. *Archivos Latinoamericanos de Nutrición* 2015; 65(1):21-26.
62. Grundy M, Edwards C, Mackie A, Gidley M, Butterworth P, Ellis P. Re-evaluation of the mechanisms of dietary fibre and implications for macronutrient bioaccessibility, digestion and postprandial metabolism. *Br J Nutr* 2016; 116(5):816-833
63. Willett WC, Stampfer MJ. Current evidence on healthy eating. *Annual Review Public Health* 2013; 34:77-95.
64. Organización Mundial de la Salud (OMS). *Alimentación Sana* [Internet]. Nota descriptiva N° 394. 2015. [citado 2016 Dic 15]. Disponible en: <http://www.who.int/mediacentre/factsheets/fs394/es/>
65. United States Department of Agriculture (USDA), Department of Health and Human Services (HHS). *Dietary Guidelines for Americans 2015-2020*. 8<sup>th</sup> ed. [Internet]. 2015. [citado 2016 Dic 15]. Disponible en: <http://nindia.org/DietaryguidelinesforIndians-Finaldraft.pdf>
66. Ruxton C, Derbyshire E. The health benefits of whole grains and fibre. *Nutrition. Emerald, Nutrition Food Science* 2016; 44(6):492-519.
67. Vadiveloo M, Dixon L, Elbel B. Consumer purchasing patterns in response to calorie labeling legislation in New York City. *International Journal Behavioral Nutrition Physical Activity* 2011; 8(1):51.
68. Swartz J, Braxton D, Viera A. Calorie menu labeling on quick-service restaurant menus: an updated systematic review of the literature. *International Journal Behavioral Nutrition* 2011; 8(1):135.
69. Kiszko K, Martinez O, Abrams C, Elbel B. The influence of calorie labeling on food orders and consumption: a review of the literature. *Journal Community Health* 2012; 100(2):130-134.
70. Bollinger B, Leslie P, Sorensen A. Calorie posting in chain restaurants. *American Economic Journal Economic Policy* 2011; 3(1):91-128.
71. Conferencia Internacional sobre la Promoción de la Salud. Carta de Ottawa para la Promoción de la Salud [Internet]. *Revista de sanidad e higiene pública* 1987 p. 129. [citado 2016 Mayo 15]. Disponible en: <http://amro.who.int/Spanish/AD/SDE/HS/OttawaCharterSp.pdf>
72. Bezbaruah N, Brunt A. The Influence of Cartoon Character Advertising on Fruit and Vegetable Preferences of 9- to 11-Year-Old Children. *Journal Nutrition Education Behavior* 2012; 44(5):438-441.
73. Olsen A, Ritz C, Kramer L, Møller P. Serving styles of raw snack vegetables. What do children want? *Appetite* 2012; 59(2):556-562.
74. Zeinstra GG, Koelen MA, Kok FJ, de Graaf C. Children's hard-wired aversion to pure vegetable tastes. A "failed" flavour-nutrient learning study. *Appetite* 2009; 52(2):528-530.
75. Laureati M, Pagliarini E, Mojet J, Köster E. Incidental learning and memory for food varied in sweet taste in children. *Food Quality Preference* 2011; 22(3):264-270.
76. Dammann K, Smith C. Food-related Attitudes and Behaviors at Home, School, and Restaurants: Perspectives from Racially Diverse, Urban, Low-income 9- to 13-year-old Children in Minnesota. *Journal Nutrition Education Behavior* 2010; 42(6):389-397.
77. Atik D, Ertekin Z. Children's perception of food and healthy eating: dynamics behind their food preferences. *International Journal Consumer Studies* 2011; 37(1):59-65.
78. Holsten J, Deatrick J, Kumanyika S, Pinto-Martin J, Compber C. Children's food choice process in the home environment. A qualitative descriptive study. *Appetite* 2012; 58(1):64-73.
79. Liem D, Zandstra L. Children's liking and wanting of snack products: Influence of shape and flavour. *Int J Behav Nutr Phys Act* 2009; 6:38.

80. Unilever. *Nutrición que atrae Reporte Mundial del Menú Hallazgos del Estudio Global*. Bogotá [Internet] Unilever Food Solution 2012. [citado 2016 Mayo 15]. Disponible: <http://docplayer.es/3890451-Reporte-mundial-del-menu-hallazgos-del-estudio-global-2012-nutricion-que-atrae.html>
81. Chandon P, Wansink B. Does food marketing need to make us fat? A review and solutions. *Nutrition Reviews* 2012; 70(10):571-593.
82. Schramm F, Kottow M. Principios bioéticos en salud pública: limitaciones y propuestas. *Cad Saude Publica* 2001; 17(4):949-956.
83. Brambila-macias J, Shankar B, Capacci S, Mazzocchi M, Perez-cueto F, Verbeke W, Traill WB. Policy interventions to promote healthy eating: A review of what works, what does not, and what is promising. *Food Nutr Bull* 2012; 32(4):365-376.
84. World Health Organization (WHO). *Alimentación Sana* [Internet]. Centro de prensa, Nota descriptiva 394. 2015. [citado 2016 Dic 15]. Disponible en: <http://www.who.int/mediacentre/factsheets/fs394/es/>
85. Interagency Committee on Human Nutrition Research. *National Nutrition Research Roadmap 2016-2021: Advancing Nutrition Research to Improve and Sustain Health*. [Internet] 2016. Interagency Committee on Human Nutrition Research. Washington, DC [serial on the internet] 2016; 176. [citado 2016 Dic 15] Disponible en: [https://www.nal.usda.gov/sites/default/files/fnic\\_uploads/2016-03-30-%20ICHNR%20NNRR%20\(2\).pdf](https://www.nal.usda.gov/sites/default/files/fnic_uploads/2016-03-30-%20ICHNR%20NNRR%20(2).pdf)

---

Article submitted 06/02/2017

Approved 01/06/2017

Final version submitted 03/06/2017

**p. 853**

**where it reads:**

<sup>1</sup> Pontificia Universidad Javeriana. Carrera 7 n° 40-62. Colombia. Purdue University. West Lafayette USA. m-diazb@javeriana.edu.co

**reads up:**

<sup>1</sup> Pontificia Universidad Javeriana. Carrera 7 n° 40-62. Colombia. m-diazb@javeriana.edu.co