



Food choice in low income populations – A review

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ABSTRACT

The vast majority of publications on food acceptability and behavior have considered middle- or high-income populations. However, there is research focused on low-income populations which deserves attention considering that many millions worldwide suffer undernutrition and/or food insecurity. The objective of this review is to highlight what the authors considered to be the most relevant research in the area to thus bring attention to this sensitive area which requires further research. Although there is a certain overlap, the review is classified in the following areas: fruits and vegetables, obesity, food choice, indigenous populations, development of specific food products and, finally, what we consider to be the most promising or necessary research in the field of food choice in low-income populations.

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Introduction

The Food and Agriculture Organization of the United Nations (<http://www.fao.org/hunger/en/>, accessed 04/10/2013) present basic definitions regarding nutrition status:

- **Undernutrition:** The outcome of undernourishment, and/or poor absorption and/or poor biological use of nutrients consumed as a result of repeated infectious disease. It includes being underweight for one's age, too short for one's age (stunted), dangerously thin for one's height (wasted) and deficient in vitamins and minerals (micronutrient malnutrition).

- **Malnutrition:** An abnormal physiological condition caused by inadequate, unbalanced or excessive consumption of macronutrients and/or micronutrients. Malnutrition includes undernutrition and overnutrition as well as micronutrient deficiencies.
- **Food security:** A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Based on this last definition, four food security dimensions can be identified: food availability, economic and physical access to food, food utilization and stability over time. Also, it is interesting to note that food preferences are an important issue when addressing food security.

The title of this review refers to “low-income” (LI) populations as this term is easily understood. There is no universal definition of

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how a person is classified as belonging to a LI household. Some authors defined them as those that received public assistance and/or food aid (Kaufman & Karpati, 2007; Reicks et al., 2003; Sosa, Martínez, Márquez, & Hough, 2008), others according to their neighborhood (Antin & Hunt, 2012; Miewald, Ibanez-Carrasco, & Turner, 2010; Sosa, Flores, et al., 2008), and Hough and Ferraris (2010) according to the school they went to. In some cases actual income was considered; Cassady, Jetter, and Culp (2007) considered the income level which allowed families to receive food stamps and De Steur, Gellynch, Feng, Rutsaert, and Verbeke (2012) considered a yearly income below 40,000 Chinese Yuans. In the present review we have accepted each article's own criteria.

Worldwide, about 870 million people are estimated to have been undernourished (in terms of dietary energy supply) in the period 2010–2012 (FAO, 2012). This represents 12.5% of the global population, or one in eight people. The vast majority of these, 852 million, live in developing countries, where the prevalence of undernourishment is now estimated at 14.9% of the population. Additionally, the negative health consequences of micronutrient deficiencies continue to affect around 2 billion people worldwide; most of which live in developing countries. Although there are controversies on the methodology used to estimate food insecure populations (Weikard & Gabbert, 2010), there is no doubt that their numbers are high and that most of them live in developing countries.

Most of the scientists and research groups working on food acceptability and consumer studies work in developed countries and, quite naturally, focus their efforts on the populations of these countries which are mostly middle to high income. Thus, it is not surprising that the vast majority of publications in this area have considered middle- or high-income populations. However, there is research focused on LI populations which deserves attention. This was recognized by the organizers of the 10th Pangborn Sensory Science Symposium held Rio de Janeiro, Brazil in August 2013 (<http://www.pangborn2013.com>, accessed 01/11/2013), who invited the first author of this article to present a plenary talk "What do we know (and do not know) about food acceptability in LI populations?". This talk was the basis of the present review.

The objective is to highlight what the authors considered to be the most relevant research in the area. To cover this objective we consulted papers published in 23 different journals. These journals covered research in nutrition, public health, preventive medicine, eating disorders, food choice and sociology and food science. Basically we looked at papers published after 2006; however references took us to include some papers published previously. To organize the review we classified it in the following areas: fruits and vegetables, obesity, food choice, indigenous populations and development of specific food products; there is a certain degree of overlap in the classification. We conclude the review with our suggestions for further research.

Fruits and vegetables

One of the suggestions of the FAO and WHO (2004) "Fruit and Vegetables for Health Workshop" was that one of the means of lowering the risk of diet-related chronic disease among LI consumers is through increased consumption of fruits and vegetables (F&V). However, in this same Workshop, when analyzing the barriers to F&V consumption, income level was considered a major barrier, either mentioned directly or indirectly, such as high prices, lack of preparation time or poor hygienic conditions. For this reason aspects related to F&V choice were considered as a specific section within this review.

Cassady et al. (2007) worked out the proportion of income spent by LI families on F&V, and how much they would have to spend to meet the Dietary Guidelines for Americans (US

Department of Health and Human Services and US Department of Agriculture, 2005). Cassady et al. (2007) conducted their study in the cities of Los Angeles and Sacramento, California, USA. A family of four shopping in a very LI neighborhood would have to pay on average \$1,688 annually to meet the Dietary Guidelines recommendations of F&V. A family of four using food stamps in California received on average \$3,888 each year to spend on food, and so to meet the Dietary Guidelines would have required $1688/3888 * 100 = 43\%$ of their food stamp budget. Households in the lowest two income quintiles spent an average of \$2,410 each year on food at home, which meant lowest income households would have had to allocate $1688/2410 * 100 = 70\%$ of their food-at-home budget to meet the Dietary Guidelines F&V market basket. At the time both groups were spending approximately 16% of their food budget on F&V. Both the 43% for food-stamp receivers or the 70% for the lowest income population were far beyond what could have been reasonably expected for them to spend on F&V. Our additional thought is that even if they were given the F&V or the money to buy them; would they abandon familiarity, convenience and pleasure to consume more F&V they are not accustomed to?

Drewnowski, Darmon, and Briend (2004) examined the association between diet quality and estimated diet costs in France. Freely chosen diets of 837 French adults were assessed by a dietary history method while mean national food prices for 57 foods were used to estimate diet costs. In their work it was observed that energy costs for oil, margarine, potatoes, sugar, or beans were substantially less than energy costs for lean meat, vegetables, lettuce, or fish. Differences in energy cost between fats and fresh produce were in excess of 1000. These authors also found that, depending on the level of energy intake, each 100g of fats and sweets was associated with a net reduction of €0.05–€0.40 in daily diet costs. In contrast, each additional 100g of F&V was associated with a net increase of €0.18–€0.29 per day in diet costs. We conclude that it is no surprise that LI populations prefer not to eat F&V. Jetter and Cassady (2006) worked out that in Sacramento and Los Angeles a standard market-basket cost was \$194, and the healthier market-basket cost was \$230. The average cost of the healthier market basket was more expensive by \$36 due to higher costs of whole grains, lean ground beef, and skinless poultry. The higher cost of the healthier basket was equal to about 35–40% of LI consumers' food budgets of \$2410 a year. Temple and Steyn (2009) endeavored to answer to what extent and in what way does the pattern of food costs pressure LI black people to consume an unhealthy diet. They priced 55 food items, including healthy options, in three different communities in Cape Town- South Africa. Their main finding was that, on average, the cost of following the healthier option (which included F&V) was 9–12% costlier. However, when comparisons were made in terms of energy cost (cost per 4.18 MJ), many healthier food items, such as brown rice, F&V, and low-fat meat, were as much as 50% more expensive than comparable less healthy items. As a result, these authors reflected that even carefully crafted health promotion messages are likely to achieve, at best, meager success because of the reality of food prices.

Reicks et al. (2003) described the development and implementation of the think aloud method in relation to F&V purchasing behaviors of LI African-American mothers. Women ($n = 70$) were audio taped as they thought aloud while selecting fruits and vegetables during a routine shopping trip. Data were analyzed using content analysis procedures. The method was found to be useful in its ability to provide verbalization data for the majority of the women in the sample that reflected a typical shopping experience. The participants were not excessively affected by the presence of the investigator. The most mentioned categories of verbalizations were: Need/want (for a recipe, meal, snack, on a list, for a child), Cost (considered price per quantity, sale, coupon, thought was

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