

# Unhealthy Fat in Street and Snack Foods in Low-Socioeconomic Settings in India: A Case Study of the Food Environments of Rural Villages and an Urban Slum

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## ABSTRACT

**Objective:** To describe the food environment in rural villages and an urban slum setting in India with reference to commercially available unbranded packaged snacks and street foods sold by vendors, and to analyze the type and quantity of fat in these foods.

**Design:** Cross-sectional.

**Setting:** Two low-income villages in Haryana and an urban slum in Delhi.

**Participants:** Street vendors (n = 44) were surveyed and the nutritional content of snacks (n = 49) sold by vendors was analyzed.

**Main Outcome Measures:** Vendors' awareness and perception of fats and oils, as well as the type of snacks sold, along with the content and quality of fat present in the snacks.

**Analysis:** Descriptive statistics of vendor survey and gas chromatography to measure fatty acid content in snacks.

**Results:** A variety of snacks were sold, including those in unlabeled transparent packages and open glass jars. Mean fat content in snacks was 28.8 g per 100-g serving in rural settings and 29.6 g per 100-g serving in urban settings. Sampled oils contained high levels of saturated fats (25% to 69% total fatty acids) and trans fats (0.1% to 30% of total fatty acids).

**Conclusions and Implications:** Interventions need to target the manufacturers of oils and fats used in freshly prepared products to improve the quality of foods available in the food environment of low-socioeconomic groups in India.

**Key Words:** trans fatty acids, fatty acids, food environment, snacks, low- or middle-income country (*J Nutr Educ Behav.* 2016; ■:1-11.)

Accepted November 28, 2015.

## INTRODUCTION

What people eat depends not only on individual and cultural factors but also on their surrounding food envi-

ronment.<sup>1</sup> The food environment is one of the major domains in which policies can intervene to improve the availability, affordability, and acceptability of healthier food.<sup>2</sup> By improving

nutrition labeling, offering healthier foods, setting standards in public institutions, using economic tools to address food affordability, restricting food advertising, improving the quality of the food supply, and setting incentives and rules to create a healthy retail environment, the food environment can better support consumers to make healthier food choices.<sup>2</sup>

Most research on food environments has been conducted in the US and other high-income countries.<sup>1</sup> In the US, studies have shown that lower-socioeconomic communities tend to be characterized by the high availability of convenience and energy-dense foods of little nutritional value and the low availability of fresh produce and other nutritious foods.<sup>3,4</sup> Barriers to access can make it difficult for people to choose healthy food.<sup>5-7</sup> How-

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*Conflict of Interest Disclosure:* The authors' conflict of interest disclosures can be found online with this article on [www.jneb.org](http://www.jneb.org).

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<http://dx.doi.org/10.1016/j.jneb.2015.11.006>

ever, there is a paucity of research assessing the food environments of low-socioeconomic status (SES) settings in low-income (defined as those with a gross national income per capita of  $\leq$  \$1,045 in 2013) and middle-income countries (defined as those with a gross national income per capita of  $>$  \$1,045 but  $<$  \$12,746) (LMICs). Therefore, it is important to examine the situation in LMICs, because little is known about the nature of their food environments.

Many LMICs worldwide are currently undergoing a nutrition transition: a shift from traditional dietary patterns toward a more Western diet consisting of energy-dense foods high in fat, sugar, and salt.<sup>8-10</sup> The transition, which has been linked to a rise in diet-related noncommunicable diseases, is rooted in globalization.<sup>11</sup> As a result, many countries now face a double burden of diet-related diseases in which undernutrition and overnutrition coexist, even within the same household (HH).<sup>12-14</sup>

Although the dietary intakes of lower-socioeconomic groups in LMICs are often limited by the scarcity of food, it may no longer be the main factor affecting energy intakes in some settings; instead, the availability of cheap, energy-dense foods, including those from street vendors, may result in increased energy intake.<sup>15</sup> Street and snack foods have become a significant source of food for many people in LMICs as people migrate from rural to urban areas.<sup>16</sup> In particular, low-income populations often depend almost exclusively on food prepared by street vendors.<sup>16</sup> Unfortunately, many vendors sell food of suboptimal nutritional quality.<sup>15</sup> A study conducted in India found that migrant and urban men consumed a higher proportion of energy from fat and saturated fat than do rural men, which suggests a shift toward a lower-quality diet after migration.<sup>17</sup> In the absence of a diversified, nutrient-dense diet, there may be a propensity for overconsumption leading to overweight and obesity but a simultaneous failure to meet micronutrient requirements.<sup>18</sup>

In India, HHs in both urban and rural areas are dealing concomitantly with undernutrition and diet-related noncommunicable diseases, particularly heart disease and diabetes.<sup>19</sup> Urban slum dwellers in India are often

deficient in key nutrients<sup>20</sup> while consuming high intakes of trans fatty acids (TFAs) from hydrogenated oils.<sup>21</sup> These dietary TFAs have adverse effects on blood lipoprotein profiles and coronary heart disease risk affecting individuals and populations. The adverse effects on coronary heart disease are mediated by increases in plasma concentrations of low-density lipoprotein cholesterol and lipoprotein A, and reductions in high-density lipoprotein cholesterol, promotion of inflammation, and endothelial dysfunction.<sup>22</sup> Many Indian snacks have been found to be high in TFA ( $\geq$ 2% of total fatty acids).<sup>23,24</sup> The Government of India recently took steps to limit the amount of TFA in foods by publishing a regulation setting an upper limit of 10% TFA in partially hydrogenated vegetable oils (PHVOs). This regulation was subsequently revised to a 5% limit that will come into effect in August, 2016, in addition to requiring that TFA be labeled on packaged foods.<sup>25,26</sup> However, it is unclear to what extent this regulation will be enforced and what substitutions vendors will make to keep consumers satisfied and maintain product demand despite the changes.

There is currently limited information about the food retail environments of low-socioeconomic groups in LMICs, particularly those living in rural areas and urban slums. Creating healthy public policies and supportive food environments can facilitate access to safe, affordable, nutritious food.<sup>27</sup> To identify which policies might be the most effective in specific settings, it is important to gain a thorough understanding of the existing food environment. Thus, a project was designed that aimed to examine awareness of and use of TFAs and the feasibility of their removal from the Indian food supply chain by integrating perspectives from 3 levels: manufacturers, retailers, and consumers. The current study, which is part of the larger project, describes the retail food environment with a focus on unbranded packaged products and street foods in rural and urban low-SES settings of 2 states in North India. The objectives of this study were to (1) describe the food environment in selected low-SES rural and urban settings in North India with reference to commercially available, unbranded, packaged, ready-to-

eat snacks and street foods sold by vendors; and (2) analyze the type and quantity of fat in these foods to understand the exposure to the population.

## METHODS

This study analyzed the retail food environment in terms of the snacks and street foods available and sampled from the vendors in the low-SES settings in North India. The researchers determined the snack sampling strategy using data obtained from the consumer-level study. This included a survey of the dietary intake patterns with an emphasis on snacking patterns conducted in low-SES HHs (260 HH in each community). The HH surveys included a dietary intake questionnaire as well as 2 24-hour dietary recalls, which were conducted on 2 consecutive days. The dietary questionnaire, in addition to the 24-hour recalls, provided information regarding consumption of commercially prepared snacks, which was then subsequently used to determine the snack sampling strategy. Only unbranded (unlabeled, open, or freshly prepared) snacks from all vendors willing to participate were sampled (details are provided subsequently). Therefore, snacks sampled from the vendors were those consumed (if reported in the 24-hour recall) by participants in the HH survey. The authors obtained ethics approval for the study from the Public Health Foundation of India's Institutional Ethics Committees.

## Setting

The researchers examined the food environments of 3 purposively selected settings, which included 2 rural villages (Sundh and Hasanpur) in the Mevat district of Haryana and an urban slum (Chanderpuri) in the northeast district of Delhi. These communities were selected specifically to examine snacking patterns (through the HH survey) in low-SES settings in 2 adjacent states that typically consume *vanaspati* (PHVO high in TFA) and unbranded snacks made using PHVOs. Before beginning the study, the authors obtained permission to conduct the study from the local leader (a community representative such as the Councilor, *Pradhan*, or *Sarpanch*) of the study areas. The populations of

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