Drivers of Food Choice in the Context of the Nutrition Transition in Delhi, India

by

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Drivers of Food Choice within the Context of the Nutrition Transition in Delhi, India

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Drivers of Food Choice in Delhi

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Authorship: CB, LMJ, VG, and DK conceived the research question. CB, LMJ, VG, DK, and HW contributed to the study design. VG, DK, and CB collected the data. CB analyzed the data with support from LMJ and HW. CB drafted the manuscript. All authors provided substantive feedback on the manuscript and approved the final version.

Ethics: This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the UNC Institutional Review Board, Harvard Institutional Review Board, and PHFI Ethics Committee. Written informed consent was obtained from all subjects/patients.
Abstract

Objective: Diet-related non-communicable diseases (NCDs) are increasing in India. Decisions relating to diet are complex and vary across cultural, contextual, and personal factors. The aim of this study was to understand the factors that influence the process of food decision-making in households in urban India to inform dietary behavior change interventions to prevent NCDs.

Design: Semi-structured interviews were conducted between September and November 2016. Interviews were transcribed verbatim and translated, then analyzed using an iterative, constant comparative process and grounded theory. At the end of the interviews, participants were also asked to sort 12 a priori hypothesized drivers of food into categories of “always,” “sometimes,” and “never” influence their food choice.

Setting: Delhi, India.

Subjects: Interviews were conducted with 38 women age 20-35.

Results: Preliminary qualitative analysis exposed three themes: 1) routinization/habit, 2) family influence, and 3) avoidance of “outside” (e.g. away-from-home) and “junk” food. Responses from the pile sort activity revealed that food safety and health most often influence food choice, while marketing and advertisements least often influence food choice. No significant relationship existed between body mass index and degree of influence on food choice for any driver in the pile sort activity. However, there was a significant (p<0.05) relationship between wealth and degree of influence of health, attitudes and cultural beliefs, and hunger on food choice.

Conclusions: Young adult women in Delhi seem to rely on routine, habits and perceptions about “outside” and “junk” food established in childhood, taste preferences of the husband and children, and food safety/health when making choices about food. These aspects of decision-making should be targeted in future interventions aimed at improving dietary intake in this population.

Keywords: Food choice, Nutrition transition, Non-communicable diseases, Urban, Qualitative methods

Introduction

Nutrition transition in India

With increasing income and urbanization, diets tend to shift towards being higher in saturated fat, sugar, and refined foods and lower in fiber, a process oft referred to as the “nutrition transition”(1). Accompanied by increasingly sedentary lifestyles, this nutrition transition is associated with high levels of chronic diseases(1). This shift has already occurred in high-income countries and is advancing in most middle- and low-income countries. The nutrition transition in India is largely consistent with observations of this process; consumption of energy-dense, processed foods is increasing, as well as
milk, egg, chicken, fish, edible oils, salted snacks, and prepared sweets, while consumption of fiber is declining\(^2-5\). While carbohydrates still account for a large proportion of total energy intake—73% in rural areas and 68% in urban areas\(^2\)—within cereals, coarse grains (millet, barley, sorghum, and maize) are being replaced with refined grains (wheat and rice), and within edible oils, groundnut oil is being replaced with palm and soybean oil\(^5\).

**Epidemiological transition from communicable to non-communicable disease in India**

This nutrition transition has been accompanied by an epidemiological transition from under-nutrition to over-nutrition. Data from the National Family Health Survey (NFHS-3) in India indicate that the problem of overweight/obesity is emerging as a significant nutrition issue for reproductive-aged women (19-49 years); the prevalence in 2005 was 26.7% in urban areas and 8.7% in rural areas\(^6\). Data from multiple sources suggest that a health transition encompassing an increase in morbidity and decrease in mortality has been observed in all geographical regions of India\(^7,8\). Data from India’s National Sample Survey Organization (NSSO) indicate that between 1995-1996 and 2004, the crude morbidly rate increased by more than 60% in rural populations and 90% in urban populations, and this increase is almost exclusively contributed by the rise in non-communicable diseases (NCDs) and earlier onset of NCDs in India\(^9,10\). In contrast to high-income countries where the burden of non-communicable diseases has replaced the burden of communicable diseases, in middle-income countries such as India, communicable diseases continue to be important public health issues\(^8,11\). Prior studies have brought to light the phenomenon of the dual burden of disease and its linkages with the epidemiological transition\(^8\). In rural India, the burden of non-communicable diseases increased from 35.9 to 54.9%, and the burden of communicable diseases declined from 47.7 to 22.1%, from the 1970s to the mid-1990s\(^12\). Thus, policies and interventions targeting key risk factors for NCDs, such as dietary intake, are urgently needed in this nation.

**Drivers of food choice**

Decisions relating to food choice are frequent, complex, multifaceted, and vary over both personal and historical time\(^13\). Furst et al. identified five categories of influences on food choice decisions through in-depth interviews: (1) cultural ideals, (2) personal factors, (3) resources, (4) social factors, and (5) present contexts\(^14\). Cultural ideals are among the most important drivers of food choice, and include judgement of what individuals feel is “right” or “acceptable” to eat. Personal factors include, for example, sensitivity to taste and food preference as well as identities (e.g., gender roles or spousal responsibilities). Resources include, for example, income, kitchen space, and knowledge and cooking skills. Social factors are relationships with family, friends, and co-workers that
may influence food choice decisions. Present contexts include, for example, the built environment (e.g., access to food), mass media, and government policies.

To our knowledge, only one previous study has explored drivers of food choice in the context of India. That study, conducted in rural Kerala, interviewed 13 men and 40 women and found that food choices within the household were strongly influenced by the preferences of husbands and children, as well as cost\(^{(15)}\). Our study aims to expand this line of research to understand the specific influences of food choice decisions among young adult women living in urban India. Food decision-making is a complex process which involves more than the nutrient value of foods. Food choices drive food consumption, which has a strong link to many NCDs associated with the nutrition transition, such as cardiovascular disease, diabetes, and cancer. The change in dietary patterns characteristic of the nutrition transition, and increasing prevalence of NCDs in India, necessitate the acquisition of in-depth knowledge on food-related decisions. Once we gain a deeper understanding of the food decision-making process, this knowledge will inform dietary behavior interventions aimed at curbing the onset of NCDs in the future.

Given that women are the primary household cooks and make most decisions about household food procuring and purchasing,\(^{(15)}\) and that women are more likely to be overweight or obese than men,\(^{(16, 17)}\) the objective of this study was to understand the specific influences of food choice decisions among young adult women living in Delhi. We purposefully selected women from different wealth index strata to ensure accurate representation of these phenomena, which have been shown to be highly dependent on socio-economic status in India\(^{(18)}\). We also explored how women negotiate and balance values relating to food choice decisions by asking them to rank a set of pre-specified values and probe further on why specific values were ranked higher or lower than others. Ultimately this information will be used to design targeted interventions to prevent NCDs in the context of the nutrition transition in urban India.

**Methods**

We used a qualitative, constructionist approach\(^{(19, 20)}\) to identify the drivers of food choice among females ages 20-35 years, who were already participating in a larger prospective cohort study in the urban area of Delhi, India. As compared to the reductionist nature of quantitative analysis, a qualitative, constructionist approach is open-ended and expansive, allowing for “rich expression of the ways people engage in the food choice process, by incorporating the meanings and understandings that they create in their food choice negotiations, including elicitation of the range and strength of the factors affecting food choice”\(^{(14)}\).
Sample population

The Center for Cardiometabolic Risk Reduction in South Asia (CARRS) Surveillance Study is a prospective cohort study that enrolled participants in Delhi into a baseline survey in 2014 and continues to follow these participants annually\(^{21}\). For the overall CARRS study, households were selected using a multi-stage, cluster random sampling technique. Two participants, one male and one non-pregnant female, aged ≥ 20 years old, were selected from each household. Standardized procedures were used to measure height and weight. Data on demographic and socio-economic characteristics (marital status, number of people living in household, household income, education, and occupation), behavioral risk factors (tobacco use, alcohol intake, dietary intake, physical activity, and sleep), and medical history including medications were also collected.

Sampling strategy

For the purposes of this ancillary study, 38 women (20-35 years) were recruited for interviews from the CARRS roster. We used a purposive, convenience sampling technique, identifying females in the CARRS study based on geographic proximity who met criteria based on body mass index (BMI) and wealth index (Table 1) to study whether there were differences across these important variables. BMI was calculated as weight (kg) divided by height-squared (m\(^2\)). Wealth index, which is described in detail elsewhere\(^2\), was derived using principal component analysis based on household amenities (separate cooking room and toilet facilities) and assets (television, refrigerator, washing machine, microwave, mixer-grinder, mobile phone, DVD player, computer, car, motorized bike, and bicycle). Interviews were conducted between September and November 2016.

Semi-structured interviews

From a list of eligible participants, women were purposively selected based on convenience (e.g., in proximal geographic areas) and were contacted by researchers at the Public Health Foundation of India via telephone to schedule the home visit. Prior to conducting the interview at the participant’s home, trained interviewers discussed the consent form and acquired the participant’s informed consent. The interview guide (Appendix A) was adapted from a previous study on drivers of food choice among women and men residing in Kerala, India\(^{15}\). The initial interview script was pilot tested with three women of the same demographics as the study population. Analysis of these pilot interviews identified key issues and concepts that were used to revise the interview guide prior to use in the field. Each field interview was conducted in the home of the participant and lasted 20-40 minutes. With the permission of the respondent, all interviews were audio-recorded. Interviews were conducted by trained nutritionists (DK and VG) in the participant’s native language (Hindi) with the exception of one
interview conducted by CB in English. Audio recordings were transcribed verbatim and translated to English by a hired, trained translator and English transcripts were verified by DK and VG.

Each interview began with a 24-hour dietary recall to elicit information about participants’ typical diet. The recall was followed by a question on whether the previous day’s intake was typical and if not, how this differed from the participant’s regular diet. The core of each interview consisted of open-ended prompts about why the participant decided to consume each food mentioned during the recall. After the pilot tests, more specific prompts about cost, physical environment, health, family members, and media were added to the guide. Further questions attempted to discern whether the participant’s current diet was similar or different from their diet during childhood. At the end of the interview, participants were asked to complete a pile sort activity, wherein they classified twelve a priori hypothesized drivers of food choice into categories of “always influences food choice,” “sometimes influences food choice,” and “never influences food choice.” The twelve drivers in the pile sort activity were as follows: Hunger/Appetite, Taste, Cost of Food/Income, Time Available, Mood, Knowledge About Food, Cooking Skills, Health, Food Safety, Packaging/Labeling, Marketing/Advertisements, Attitudes/Beliefs about certain foods (including cultural beliefs/traditions).

Data analysis

Analysis of the qualitative data was ongoing throughout the study using an iterative, constant comparative process and Dedoose software, a secure, cloud-based application. The research team leads underwent extensive one-on-one training in qualitative methods prior to the study. The research team members read and reviewed transcripts individually, followed by a group meeting to discuss emergent codes, categories, concepts, and themes. The first review and meeting occurred early in the analysis process, after the transcription of the three pilot interviews, to ensure the quality of the data and to allow for any necessary adjustments to the interview guide. An initial codebook was created with codes borrowed from the study on food choices by Furst et al. After this first meeting and development of an initial codebook, CB individually coded subsequent transcripts, in batches of 3-4 each, followed by additional meetings and adjustment of the interview guide and/or codebook as needed. Inductive codes were added to the initial codebook as additional concepts emerged from the interview transcripts. Using the constant comparative method to implement a grounded theoretical approach to data analysis, original categories arising from the interviews were applied to the cumulative data and revised multiple times until there was group consensus about their fit. Once all transcripts were coded by CB and individually reviewed by LMJ,
the team finalized emergent themes and evaluated whether or not themes differed by important sample characteristics.

Analysis of the quantitative data, including demographic and socio-economic characteristics of the participants and results of the pile sort activity, was conducted using Microsoft Excel 2013 (Microsoft Corporation, Redmond, WA) and SAS version 9.4 (SAS Institute, Cary, NC). Descriptive, univariate statistics were used to present socio-demographic characteristics. Values are percent (n) and mean (SD) unless otherwise indicated. Differences in pile sort rankings (always, sometimes, or never) across tertiles of body mass index (BMI) and wealth index were tested using Fisher’s exact tests. P<0.05 was considered statistically significant.

Results

The stratification of study participants by BMI and wealth index tertile is demonstrated in Table 1. The demographic characteristics of the participants are described in Table 2. Average age of participants was 29.47, with the youngest being 20 and the eldest 35. Of the 38 participants, four were employed as skilled manual laborers, one was formally employed as a homeopathic doctor, and one woman was a student.

Table 1. Sample selection for women aged 20-35 years participating in CARRS (n=38).

<table>
<thead>
<tr>
<th>Wealth Index</th>
<th>Tertile 1</th>
<th>Tertile 2</th>
<th>Tertile 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI 18.5-24.9 kg/m²</td>
<td>n=6</td>
<td>n=6</td>
<td>n=6</td>
</tr>
<tr>
<td>BMI ≥25 kg/m²</td>
<td>n=6</td>
<td>n=6</td>
<td>n=8</td>
</tr>
</tbody>
</table>

Preliminary qualitative analysis revealed three main themes: routinization/habit, family influence, and avoidance of “outside” (e.g. away-from-home) and “junk” food. The first theme relates to the fact that most participants do not consciously make food choices, rather they consume the foods they do because that is what they have always done. Consumption is not so much a decision as it is a habit or routine. The theme of routinization/habit appeared most often in interviews when women were talking about food preparation. Participants often expressed their routinization during their 24-hour recalls, when they would use language such as “in breakfast I always have chapati and vegetable” rather than describing their meals in past tense. This subtle language indicated a habitual nature to meal preparation and consumption. Some participants even explicitly admitted to a routine by describing “fixed” meals: “We have fix food preparations, therefore we won’t think much before preparing food” and “I Prepare food in [the] same way daily. Chapati and vegetable is fixed for lunch and breakfast.” Many participants mentioned that food habits from their childhood have led to persistent patterns of food choice in adulthood: “…we are used to having such kind of foods. We have
Table 2. Demographic characteristics of study participants (n=38)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percent (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age; mean (SD)</td>
<td>29.47 (4.27)</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>94.7 (36)</td>
</tr>
<tr>
<td>Muslim</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>Christian</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>Highest education level attained</td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>Literate, no formal education</td>
<td>5.26 (2)</td>
</tr>
<tr>
<td>Primary school</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>High school</td>
<td>21.1 (8)</td>
</tr>
<tr>
<td>Secondary school</td>
<td>26.3 (10)</td>
</tr>
<tr>
<td>University graduate</td>
<td>31.6 (12)</td>
</tr>
<tr>
<td>Professional degree/post graduate</td>
<td>10.5 (4)</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td>84.2 (32)</td>
</tr>
<tr>
<td>Employed</td>
<td>13.2 (5)</td>
</tr>
<tr>
<td>Student</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>Estimated total household income per month, ₹</td>
<td></td>
</tr>
<tr>
<td>3,000-10,000</td>
<td>23.7 (9)</td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>39.5 (15)</td>
</tr>
<tr>
<td>20,001-30,000</td>
<td>18.4 (7)</td>
</tr>
<tr>
<td>30,001-40,000</td>
<td>2.63 (1)</td>
</tr>
<tr>
<td>40,001-50,000</td>
<td>7.89 (3)</td>
</tr>
<tr>
<td>&gt;50,000</td>
<td>5.26 (2)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>2.63 (1)</td>
</tr>
</tbody>
</table>

parathas and rotis and subzis in my diet now, so we are used to it...these chapatis and subzis, this is the routine of my life, from childhood. So I’m used to it.” Often, food items that are currently prepared and consumed by participants have been instilled since childhood as staples in their diets.

Participants also frequently cited their husband, children, or mother-in-law as influencing their food choices. Many women said that their husband or mother-in-law makes decisions about food procurement and he or she is the person who buys ingredients from the market: “My mother-in-law decide for food and drinks for home. We never interfere in that. It’s easy for my mother-in-law to buy food from near local market.” However, family members were most influential at the stage of food preparation. The majority of interview participants reported that food preferences of the husband and children were the most dominant determining what they cook each day: “Yes we have joint family...mainly men and kids are important, whatever they like we cook. I eat everything, so whatever
my kids and husband like, I cook.” It seemed that women would sacrifice their own preferences for those of the husband or children: “We need to think for everyone’s choice. And kids are most important. So we first fulfill their food choices then think about self.”

The third emerging theme was the general aversion to “outside” (e.g. away-from-home) and “junk” food. While this is not an overt driver of food choice, it appeared in nearly every transcript when participants were asked about which foods were unhealthy. The terms “outside food” and “junk food” are mostly used to describe snacks purchased from street vendors, many of which are fried. Reported snacks included pakoras (fried potatoes), samosa (a triangular pastry fried in ghee or oil, filled with spiced vegetables or meat), and golgappa (fried puff-pastry balls filled with spiced mashed potato, spiced water, and tamarind juice). One participant summarized this idea: “Obviously, junk food is unhealthy, one should eat it limited. We also eat very less of it. I can’t say it a meal, just as snacks.”

In contrast to the Western convention that “junk food” describes packaged, ready-to-eat, ultra-processed foods(27), the participants rarely considered the biscuits they consume with tea as “junk food” despite being packaged items high in added sugar. Participants generally labeled all outside foods as unhealthy and all food prepared in the home as healthy. For example, one participant said, “I always cook healthy food.” When asked if they thought the previous day’s intake in the 24-hour recall was healthy, nearly every women replied yes.

Pile Sort Activity

Results of the pile sort activity are summarized in Table 3. One participant refused to place Health in any category, so there were only 37 total responses for that driver. This participant, who was from the lowest wealth index tertile, stated that she did not understand the concept of “health,” despite the interviewer’s multiple attempts to explain it, and therefore did not know how to categorize it. Food

| Table 3. Results of pile sort activity as percent (n) of participants |
|-----------------------------------|------------------|------------------|
| Driver | Influences Choice of Food |  |
| | Always | Sometimes | Never |
| Food Safety | 81.6% (31) | 15.8% (6) | 2.6% (1) |
| Health | 78.4% (29) | 10.8% (4) | 10.8% (4) |
| Taste | 68.4% (26) | 18.4% (7) | 13.2% (5) |
| Knowledge | 65.8% (26) | 21.1% (8) | 13.2% (5) |
| Attitudes | 52.6% (20) | 15.8% (6) | 31.6% (12) |
| Time | 47.4% (18) | 34.2% (13) | 18.4% (7) |
| Cost | 42.1% (16) | 23.7% (9) | 34.2% (13) |
| Cooking Skills | 42.1% (16) | 39.5% (15) | 18.4% (7) |
| Packaging | 34.2% (13) | 31.6% (12) | 34.2% (13) |
| Hunger | 31.6% (12) | 52.6% (20) | 15.8% (6) |
| Mood | 28.9% (11) | 57.9% (22) | 15.8% (6) |
| Marketing | 10.5% (4) | 36.8% (14) | 52.6% (20) |
Safety and Health were the most influential on participants’ food choice, with 81.6% and 78.4% of participants placing these drivers in the “always” category, respectively. Marketing/Advertisements was the least influential driver of food choice, with 52.6% of participants reporting that this “never” influences their food choice and only 10.5% saying it “always” influences their food choice. When probed specifically about the influence of marketing during interviews, no participant said that it influenced her. Results of the pile sort activity stratified by BMI and wealth index tertile are presented in Figure 1. There was no significant association between BMI category and degree of influence of any driver on food choice, although Health was on the cusp of significance (p=0.0510). There was a significant, positive relationship between wealth index tertile and the degree of influence of Health, Attitudes/Beliefs, and Hunger (p=0.0007, p=0.0025, p=0.0493 respectively) on food choice. Those in the highest wealth index tertile were more likely to say Health, Attitudes/Beliefs, and Hunger always influence their food choice.

Figure 1. Pile sort activity responses graphed by BMI category (panel A) and wealth index tertile (panel B).

* indicates p-value ≤ 0.05
Discussion

This study found that among young women living in Delhi, food choices occur at three stages: procurement, preparation, and consumption. Responsibility for procurement was frequently in the hands of the mother-in-law or husband, but even when women purchased food it was done with family preferences in mind. Women nearly always emphasized the desires of spouses and children when discussing food preparation decisions. The strong influence of husband and child preferences at each stage of food choice is consistent with findings by Daivadanam et al. in rural Kerala\textsuperscript{(15)}. Additionally, food preparation and consumption adhered closely to routine or habit. This is consistent with Furst et al.’s category of cultural ideals, which are formed and established within the context of the life course, so that standards for food choice are internalized and imprinted on people’s consciousness\textsuperscript{(14)}. These influences inform and shape people’s personal systems, including unconsciously functioning strategies that may occur in a food-related choice situation. As evidenced by the interviews in this study, women often do not make conscious decisions about what they eat, with some study participants even explicitly admitting they do not think about their food decisions.

Our participants were often knowledgeable about the health effects of refined oil consumption specifically, which was surprising. Overconsumption of sugar or salt was never mentioned when inquired about unhealthy foods. Furthermore, participants rarely commented on the health benefits of fruits and vegetables. Interestingly, the pile sort activity identified food safety as a primary driver of food choice, and this may explain the low consumption of fresh fruits and vegetables. Food safety is a rising concern in Delhi, where poor agricultural, manufacturing, and hygiene practices contribute to a high rate of produce contamination with pesticide residues and heavy metals\textsuperscript{(28)}.  

![Responses by Wealth Index](image-url)
It is curious that health and food safety were rarely mentioned during the open-ended segment of interviews, and yet these two drivers were most often cited as “always influencing food choice” in the pile sort activity. Participants did not bring up the notion of health or food safety without direct prompting. Concern about food safety may be underlying much of the food decisions Delhi women make without them being aware of its influence. On the other hand, quantitative results from the pile sort activity were consistent with interview responses regarding influence taste. Taste was often declared as highly influential with food choice, whether it was the preference of the participant herself or of her family members.

Nearly every participant denied any influence of television advertisements or other media on their food choices when asked in both the open-ended interview and the pile sort activity. Studies have shown that marketing has a huge influence on food choice, especially as people move towards processed foods, but most people are unaware of their own susceptibility to the media influence others. People generally acknowledge that external elements advertising influence others, but deny the influence of these elements on their own behavior\(^\text{(29)}\). In fact, marketing works best when people are not conscious of it, since when people realize they are being marketed to, they can form a negative connection. Therefore, the uniform denial of our participants to the influence of marketing and advertising on their food choices may be a testament to the power of media to formulate a decision subconsciously.

The only direct reference to the nutrition transition came when participants were questioned about how their diets today differ from childhood. Some answers hinted at the effect of globalization on the increased availability of processed foods in markets. However, these statements were all made in the context of food during festival periods, when consumption of sugary and fried foods traditionally increases: “We don’t have time now days to prepare all this at home and also every sweet and savoury food items are easily available in market” and “Earlier my mother in law or my mother used to prepare...sweet and savoury snacks. But I don’t have time and also all the items are easily available in market.” Thus, it is unclear whether the increased availability of processed foods high in saturated fat, sugar, and salt—characteristic of the nutrition transition—is truly playing a role in the daily food decision-making processes in Delhi households. Participants were almost unanimous in their declaration that all outside food was unhealthy, and that all food prepared in the house was healthy. While it may be true that food prepared in the household is healthier than outside food, further analysis is necessary to determine whether traditional Indian cooking techniques are objectively healthy. For instance, several study participants disclosed that they regularly reuse cooking oil, and this practice of
reheating oil leads to the formation of trans fatty acids and saturated fatty acids which have adverse effects on health\textsuperscript{(30)}.

The heightened awareness of health as indicated by the pile sort activity and numerous narrative statements may in fact be protecting the women against the effects of the nutrition transition. The avoidance of fried foods purchased outside the home, which are high in refined oils, is contradictory to the notion of the nutrition transition that diets in India are increasingly high in saturated fats and refined foods. Perhaps our sample population has begun to surpass this stage of the nutrition transition and adopt a new dietary perspective associated with the desire to prevent diseases and prolong health. Additionally, cost did not appear to be a strong influencer of food choice in this study, which may also protect the women against the effects of the nutrition transition. The increased affordability of packaged or ultra-processed products due to globalization would not appeal to these women over health, food safety, or cultural food habits. The growing prevalence of NCDs such as cardiovascular disease and diabetes in India does not, at least among women in Delhi, seem attributable to the purchase of outside, ultra-processed foods high in saturated fat and added sugar. Attention should instead be brought to cooking methods inside the household, since all our study participants prepared the majority of their meals at home.

A key limitation of this study was the use of convenience sampling to recruit participants based on geographical proximity, which may limit the generalizability of our results to the entire Delhi area, and more broadly to urban cities in India. Additionally, there was a rather low response rate, as many participants originally selected for interviews were not home at the time of their scheduled interview, and a few participants refused to be interviewed on site. If the women who were unavailable or unwilling to be interviewed were systematically different from our study participants in terms of food decision-making priorities, this may further limit the generalizability of our results. A strength of this study was the use of a mixed methods approach. As compared to the reductionist nature of quantitative analysis, a qualitative, constructionist approach is open-ended and expansive, allowing for “rich expression of the ways people engage in the food choice process, by incorporating the meanings and understandings that they create in their food choice negotiations, including elicitation of the range and strength of the factors affecting food choice”\textsuperscript{(14)}.

\textit{Conclusion}

This study found that young women in urban Delhi placed the highest priority on routinization, preferences of the husband and children, and food safety when making decisions about food. Since spouses and children have such clout with the female heads of households, perhaps another study
should investigate drivers of food choice among men and children in urban India, so that interventions can target these demographics. Another important consideration is the habituation of food choices, which may prove difficult to change via behavioral intervention, given that these habits have been instilled in the culture for generations. The fact that these preferences are so ingrained may have made these women more resilient to effects of nutrition transition. Given the prioritization of food safety, dietary interventions to increase consumption of fresh fruits and vegetables in Delhi should ideally be prefaced with widespread efforts to improve safety and sanitation in food production and processing. Women in Delhi seem to already be aware of the negative health effects of consuming fried “junk” foods high in refined oils, but they associate these negative qualities only to food prepared outside the home. This prioritization of health may actually be protecting them against the effects of the nutrition transition phenomenon. Our findings have policy implications regarding the need for dietary interventions to target the healthfulness of traditional food preparation methods within households rather than the purchasing of ultra-processed foods outside the home.
References

16. International Institute for Population Sciences (IIPS) and Macro International (2009)
National Family Health Survey (NFHS-3), India, 2005-06: Delhi. Mumbai: IIPS.


Appendix A: Interview Guide

INTRODUCTION

We’re interested in learning more about why people eat the foods they do.

➢ *From consent form: What we eat may affect our risk of developing diseases like heart disease and diabetes. However, there is little data on what people in Delhi eat and why. The purpose of this research study is to learn about what decisions young women in Delhi make about what to eat and why they make those particular decisions. Given that diseases like heart disease and diabetes are increasing in India, it is important for researchers to know more about how they can help prevent these diseases.*

We’ll first ask you to tell us all the foods and drinks you had in the last 24 hours. Then we’ll have a casual conversation about the reasons you may have chosen the foods and drinks you did. There are no right or wrong answers.

24-HOUR RECALL

1. **What time did you get out of bed yesterday? How long was it before you ate something? What did you eat and drink at that time?** *Collect information on all foods and drinks between this first meal and the last meal or snack before she went to bed yesterday. Also collect information on WHERE and WITH WHOM the food was consumed.*

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Snack</th>
<th>Lunch</th>
<th>Snack</th>
<th>Dinner</th>
<th>Bedtime</th>
</tr>
</thead>
</table>

➢ Probe for beverages as well (e.g. milk, juice, etc.)

➢ If participant responds with “this is what we usually eat…” stop them and ask for yesterday specifically:
“I understand that you usually eat ___, but can you think back to yesterday’s breakfast/lunch/dinner specifically? What other items do you eat? Why is it different on those days?”

DRIVERS OF FOOD CHOICE

For each major meal and snack occasion, ask:

1. Is this what you typically eat at this time of day? [If “No”], how is it different?
   - Go back through each meal, repeat the meal items back to them, then ask this question.

2. What made you choose [name a specific food or drink]? Why do you think you typically eat/drink [name a specific food or drink]? Do all family members typically eat the same food or drink cooked at home?
   - If participant says “we just always have that” then ask: “How long have you been having ___ for breakfast/lunch/dinner? Can you remember a time when you had anything different? [If “yes”], why do you think you changed?”
   - If participant responds with “it depends on what husband/children want” follow up with: “It sounds like it’s important for you to accommodate the food preferences of everyone else in the household, is that right? Do you ever get to choose food based on your own preferences? Tell me about that.”

3. Is that how you typically prepare [name a specific food or drink]? [If “Yes”], why do you prepare it this way? [If “No”], how else do you prepare [name a specific food or drink]? Why?
   - Ask this for each meal, repeat the meal items back to them. If participant does not describe preparation, probe with “Do you sauté it on the stove top? Do you fry it in oil? Do you add any special ingredients?”
   - If participant says they only fry their food sometimes, ask “When you choose to fry it, why? Why don’t you always prepare the food this way?”
   - If participant says “that’s just how we cook,” follow up with: “How long have you been preparing ___ this way? Can you remember a time when you prepared it differently? [If “yes”], why did you change?”

4. Where do you typically buy [name a specific food or drink]? Why?
   - “How are your food and drink choices affected by the neighborhood in which you live? Is it easy to get the food you want in this neighborhood?”
   - If participant says “we just always go to this vendor,” follow up with: “Why do you think you keep going to this vendor? Is there another vendor in this neighborhood? [If “yes”], do they sell
the same items? Why do you not go to that vendor? Do you like the foods you purchase from your vendor? Is it easy to get to this vendor?”

- “I can tell you really like your food vendor, can you tell me how you first found him?”

5. **Who is the main decision maker when it comes to foods and drinks?**

6. **Are there foods or drinks you would like to consume, but don’t? What would it be? Why would you like to eat or drink this?**
   
   - If participant does not understand, rephrase: “Is there a type of food you have wanted to try that you’ve never had before (such as fruits, sweets, street food)? Why do you want to have that? Why have you never had it/what prevented you from consuming it? Do you ever substitute a different food for that one?”
   
   - “Is there anything you wish you could change about your food or what you eat? What about the quantity of food/how much you eat?”

**PERCEPTIONS OF HEALTHFULNESS**

1. **Now I want to hear your thoughts about what is healthy or not healthy to eat. Which of the foods or drinks you consumed yesterday do you consider healthy? What about them makes them healthy? Which ones do you consider unhealthy? What makes these unhealthy?**

2. **What about foods and drinks not on your list? What kinds of food or drink come to mind when you think healthy? Unhealthy?**
   
   - “Are there foods/beverages you consume to feel well/have energy for daily activities?”
   
   - “Tell me what you think you should eat to be as healthy as possible.”
   
   - If participant does not mention a particular food, do NOT probe on it (e.g. fruits & vegetables). Do not mention outside food if participant does not bring it up.

3. **Where do you go for dietary advice or guidance on what to eat?**

4. **Have you ever received dietary advice from a health care provider? Did it influence your food and/or drink choices? Why or why not?**

**PERCEPTIONS OF CHANGES IN FOOD CHOICE OVER TIME**

1. **How has what you eat or drink changed since you were younger? Why do you think it changed (or hasn’t changed)?**
   
   - If participant does not understand, rephrase: “What was eating like when you were a child? What things that you consumed back then still influence your eating today?”
2. Do you think the foods and drinks you typically consume are similar or different from the foods and drinks your parents consumed when they were your age? In what ways are they similar or different?

➢ Keep restating the question. “So you think you eat the same things your parents ate when they were 20-30? Did your parents used to eat ____ [mention items from 24-hour recall]?”

3. We know there are special foods consumed during festivals, but are any of these festival foods consumed year-round? If so, why do think that is?

PERCEPTIONS OF INFLUENCE OF THE SOCIAL AND BUILT ENVIRONMENT

1. How are your food and drink choices affected by your neighbors or coworkers? Do you ever eat with people other than your family? [If “yes”], how do they influence what you eat?

2. How does TV/media/advertisements influence your food and drink choices?

PILE SORT

Please sort the following items under three buckets in which you feel they influence your food and drink choices, starting with the items that never influence your food choices and ending with the items that always influence your choices.

***ASK PARTICIPANTS TO SORT ITEMS IN THIS ORDER***

Bucket 1: Never influence
Bucket 2: Always influence
Bucket 3: Sometimes influence

Of the following items, which ones do you think never influence your food and drink choices?

Allow participant to put those items (if any) into a pile.

Of those items that remain, which ones do you think always influence your food and drink choices?

Allow participant to put those items (if any) into a pile.

So of the remaining items, you think these sometimes influence your food and drink choices?

<table>
<thead>
<tr>
<th>Hunger/Appetite: do you only eat when you’re hungry, or at designated meal times?</th>
<th>Cooking skills: referring to participant’s own ability to cook, if you don’t know how to cook ____ you won’t eat it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taste</td>
<td>Health: when you’re feeling well you eat ____, when you’re unwell you eat ____</td>
</tr>
<tr>
<td>Food safety: if food will make you sick</td>
<td>Cost of food/Income: how much food costs</td>
</tr>
<tr>
<td>Marketing/Advertisements</td>
<td>Packaging/Labeling</td>
</tr>
<tr>
<td>Mood: what you’re craving or how you’re feeling</td>
<td>Time available: if you don’t have the time, will eat something quick or whatever is available</td>
</tr>
<tr>
<td>Knowledge about food: Health concept about food, what you know about nutrition of the food (i.e. fried food)</td>
<td>Attitudes/Beliefs about certain foods (including cultural beliefs/traditions): example: no hot + cold food, no meat + milk, no curd or banana at night</td>
</tr>
</tbody>
</table>