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Drivers of Food Choice and Associated Factors  
in the Context of the Nutrition Transition in South India

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in the Context of the Nutrition Transition in South India

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An abstract of  
A thesis submitted to the Faculty of the  
Rollins School of Public Health of Emory University  
in partial fulfillment of the requirements for the degree of  
Master of Public Health  
in Hubert Department of Global Health  
2020

## Abstract

### Drivers of Food Choice and Associated Factors in the Context of the Nutrition Transition in South India

By Asha Nadabar

**Objective:** To identify the drivers of food choice associated with preferences for local or non-local (national or global) food items and to assess the familiarity and consumption of local, national, and global food items in the context of the nutrition transition in Vijayapura, India.

**Study Design:** Adult males and females aged 18 years or older ( $n$  936) in Vijayapura, India completed a cross-sectional survey, which included a socioeconomic module and food choice module.

**Methods:** Descriptive statistics, t-tests, chi-square tests, and Fisher's exact tests were used to examine familiarity and consumption of local, national, and global food items, as well as drivers of food choice, by sex and food category. Logistic regression was also conducted to evaluate associations between sociodemographic indicators and the most salient driver of food choice identified.

**Results:** Across the six food categories, local/traditional food items were the most frequently consumed items by both males and females. When presented with alternative conditions, including taste, hunger, and health, the majority of participants still opted for the local food option versus national or global options. A comparison of the most frequently eaten item and selection given the alternative choice scenario showed that most people's choices would reflect a difference in preference from local to non-local or non-local to local food items with little evidence of sex differences. There was variation in selection from local to nonlocal or vice versa depending on the combination of scenario and food category. Accessibility was reported as the prominent driver of food choice, with taste and healthfulness as the next most reported reasons.

**Conclusion:** The drivers of food choice and associated factors in a globalizing remote district in India reflects the phase of the nutrition transition. As India faces the dual burden of diseases, understanding the changing food environment can help address the growing nutrition-related non-communicable disease burden in the country through informed health promotion efforts.

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## **Acknowledgements**

I would like to express my sincere gratitude to my thesis advisor, Dr. Solveig Cunningham, who introduced me to the Drivers of Food Choice project and gave me the opportunity to engage with the research. Her knowledge and constructive feedback have been invaluable during this process and without her guidance and support, this thesis would not have been possible.

I would like to thank the entire study team in Vijayapura, India. To Dr. Shailaja Patil, I am grateful for your input and guidance as I navigated the data. To Mr. Manjunath D.M., I appreciate your help throughout the data management process and for answering my many questions.

I would like to thank my friends who have supported me and kept me going throughout my time at the Rollins School of Public Health.

Last but not least, I would like to thank my family who have been unwavering in their encouragement and support from the very beginning.

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## INTRODUCTION

Malnutrition affects all areas of the world, however, low- and middle-income countries (LMICs) are encountering the dual burden of disease, or the coexistence of undernutrition and overnutrition within individuals, households, and populations (Delisle, 2008). In India, malnutrition is the major risk factor for mortality in children under the age of five in every state and the primary risk factor for health loss among all age groups (India State-Level Disease Burden Initiative Malnutrition Collaborators, 2019). In recent years, India has been experiencing a nutrition transition due to urbanization and globalization, which has resulted in diets shifting away from traditional staple foods and toward global foods that are more prevalent in “westernized” diets and characterized by a higher intake of refined sugars and fats and lower intake of complex carbohydrates (Gayathri, Ruchi, & Mohan, 2017; Misra, Singhal, et al., 2011). Through globalization, people in India have experienced greater exposure and access to global foods (Misra, Singhal, et al., 2011). Of serious concern is the strong association established between “westernized” diets and prevalence of nutrition-related non-communicable diseases (NCDs) (Gayathri et al., 2017; Misra, Singhal, et al., 2011). In India, the nutrition transition has been linked with increased levels of nutrition-related NCDs and the country’s dual burden of disease (Misra, Singhal, et al., 2011).

The food environment is associated with a rise in NCDs, with some noting the disparities in health outcomes based on the nutritional environment (Glanz, Sallis, Saelens, & Frank, 2005). The food environment, including availability, accessibility, and affordability of foods, has an effect on individuals’ food decisions since food choices play a key role in the nutritional content of what is bought, cooked, and consumed by a household (Herforth & Ahmed, 2015). People eat and drink multiple times a day, every day, and thus engage in food decision making frequently. Food behaviors, such as food preparation, storage, and eating habits, then feed into the food choice



decisions (Sobal & Bisogni, 2009). Studies have observed gender differences in food intake and food choice across several countries, however, it is unclear if these findings would be consistent in India given the shift in diet and eating behaviors (Wardle et al., 2004; Westenhoefer, 2005).

Considering the implications of the nutrition transition on food choice, exploration of relationships between sociodemographic variables and drivers of food choice can help provide timely context to the nutritional climate in India. Understanding components of decision-making regarding food choice, and any associations by household factors, can help inform future health promotion efforts regarding nutrition, as well as the Public Distribution System of India, which currently serves to address food insecurity through distribution of food essentials (George & McKay, 2019).

### ***Study Purpose***

The purpose of this study was to identify the proximate drivers of food choice that are associated with selecting local versus non-local foods from 6 different food categories among adult men and women in rural and urban households in Vijayapura, India, and to assess their familiarity and consumption of local, national, and global food items in the context of the nutrition transition. Food choice decisions involve a variety of factors that may differ in findings from studies conducted in other countries, and in the context of the changing nutrition environment in India, it is important to examine these factors. Existing research on the nutrition transition in India has largely focused on metropolitan areas. The remote district of Vijayapura in South India provides an opportunity to examine the food choices and associated factors in a setting undergoing economic development and globalization. To that end, we examined gender differences in drivers of food choice, as well as familiarity and consumption of food items from different food categories. Other socioeconomic factors, such as income, educational level, and caste, and their associations with drivers of food choice were also studied.

## LITERATURE REVIEW

### *Nutrition Transition*

The advancements in agricultural systems, growth of food service sectors, and increasing globalization, particularly in low- and middle-income countries (LMICs), have resulted in a shift in food and beverage consumption and a nutrition transition from infectious diseases to non-communicable diseases (NCDs) (Popkin, 2015). Global free trade has played a major role in economic and dietary changes, including the replacement of traditional staple foods with more processed foods, such as highly refined carbohydrates (Mattei et al., 2012). The shift in disease burden associated with poor nutrition, lack of physical activity, and obesity previously seen in those of higher socioeconomic status are now being seen in lower socioeconomic populations (Popkin, 2004).

### *Health Implications*

While all countries are affected by some form of malnutrition, LMICs are increasingly facing the double burden of malnutrition, or the coexistence of undernutrition and overnutrition within individuals, households, and populations (Delisle, 2008; Jayalakshmi & Kannan, 2019; WHO, 2019). Previous research in India has found a positive association between high socioeconomic status and overweight, as well as higher prevalence of undernutrition in rural areas and among the lower socioeconomic groups compared to a higher prevalence of overweight in urban areas (P. Griffiths & Bentley, 2005; P. L. Griffiths & Bentley, 2001; Kulkarni, Kulkarni, & Gaiha, 2017). Malnutrition is the major risk factor for mortality in children under the age of five in every state in India and the primary risk factor for health loss among all age groups (India State-Level Disease Burden Initiative Malnutrition Collaborators, 2019).

The growing burden of NCDs in LMICs have raised the awareness of these conditions on a global policy level and in 2010, NCDs accounted for 235 million disability-adjusted life years (DALYs), with a DALY representing one lost year of healthy life, compared to the 222 million DALYs for communicable diseases in India (World Economic Forum & Harvard School of Public Health, 2014). Of all the countries in the world, India experiences the highest loss of potentially productive years because of deaths due to cardiovascular disease (Srinath Reddy, Shah, Varghese, & Ramadoss, 2005).

In 2016, NCDs accounted for approximately 63% of all deaths in India with 26% of those attributable to communicable, maternal, perinatal, and nutritional conditions (WHO, 2018). Food and nutritional status, including obesity, is associated with prevalence of elevated blood pressure, dyslipidemia, and diabetes (Dua, Bhuker, Sharma, Dhall, & Kapoor, 2014; World Cancer Research Fund International, 2014). In addition to being risk factors for nutrition-related NCDs, these health conditions are also causes of illnesses. In the past few decades, there has been an increase in caloric consumption of meat, sugar, oils, and fats, as well as processed foods, in LMICs (World Cancer Research Fund International, 2014). In addition to this shift in dietary pattern, changes in food security systems have affected the risk of developing nutrition-related NCDs in these regions.

### ***Nutrition Transition in India***

In recent years, India has been experiencing a nutrition transition due to urbanization and globalization, which has resulted in diets changing toward higher intake of refined carbohydrates and fat and lower intake of complex carbohydrates (Gayathri et al., 2017). Over a 20 year period, nationally representative surveys in India have shown a decrease in diets high in cereals, pulses, and fiber to one with an increase in consumption of meat products, fats, and oils (Satija et al., 2015). This trend, along with decreased physical activity, has been associated with increasing levels of

obesity, metabolic syndrome, type 2 diabetes mellitus, and coronary heart disease among Indians, especially urban and high-income rural residents (Misra, Singhal, et al., 2011; Popkin, Horton, Kim, Mahal, & Shuigao, 2001).

As India tackles the double burden of malnutrition, the issues of the nutrition transition are also played out on a household level. A study in Karnataka, India, found that food practices, food-related gender norms, and household resources were associated with children's weight, and also found a positive association between a mother's BMI and child's weight, suggesting the role of diet and eating habits in the home environment (Raskind, Patil, Haardorfer, & Cunningham, 2018). Findings also show that children from higher socioeconomic families weighed more than their lower socioeconomic counterparts and children attending private schools weighed more than those who went to government schools (Misra, Shah, et al., 2011; Raskind et al., 2018). In a study of LMICs, lower socioeconomic groups consumed less fruits, vegetables, fiber, and fish than higher socioeconomic groups, and the higher socioeconomic groups consumed more fats, salts, and processed foods than the lower socioeconomic groups (Allen et al., 2017).

People in India have had a rise in disposable income as a result of the economic growth in the country. This has helped drive the consumption and accessibility of highly processed foods, which have higher proportions of saturated fat, oil, and sugar (Bishwajit, 2015). Media and advertising have also been attributed with influencing adolescents' dietary behaviors, as well as the increase in consumption of prepared foods during the nutrition transition (Misra, Shah, et al., 2011; Misra, Singhal, et al., 2011). Among high socioeconomic status families, children with pocket money indulge in 'junk food' and this may lead poor eating habits from consistent, unhealthy food choices (Misra, Shah, et al., 2011). In urban cities, working parents who do not have time to prepare food would provide fast food options for their children (Misra, Shah, et al., 2011). Examining what

conditions result in selection of local versus non-local food items in an area undergoing urbanization and economic development in India will provide a better understanding of the nutrition transition as it is occurring.

### ***Food Choices***

While nutrition-related health conditions and NCDs are often focused on individual level factors, such as diet and physical activity, it is important to note the influences of the social and built environments that can affect an individual's access to healthy foods (Glanz et al., 2005). Food choices can be affected by the community nutrition environment, or availability and accessibility of food outlets including grocery stores, and the consumer nutrition environment, or the availability and cost of healthy food items (Glanz, Sallis, Saelens, & Frank, 2007). Studies on the nutritional environment have noted that some health outcomes may be explained by disparities in the availability, quality, and cost of food items. Studies have found that in less affluent neighborhoods, fast food options, including poorer quality, processed foods, are more readily available than grocery stores, which makes healthful foods less accessible (Glanz et al., 2005). In low income neighborhoods, there is also decreased availability of healthful food options and the healthier food items, such as fruits and vegetables, are more expensive (Glanz et al., 2007). Considering that taste, followed by cost, are the two most important influences on food decisions, it is crucial to weigh the effect of the nutritional environment (Glanz, Basil, Maibach, Goldberg, & Snyder, 1998). More research is needed to identify whether these influences are also the most important in LMICs with different food environments, such as India.

There are various factors that are involved in choosing foods. Individual physiological factors, such as personal taste and aversions, and resources, including financial assets and time, also dictate a person's food choice (Furst, Connors, Bisogni, Sobal, & Falk, 1996). Over time, people

account for these factors and develop their own personal food systems, which are the mental processes that affect food choices, and involves categorizing foods and eating situations, assessing values for particular eating situations, and balancing competing values (Connors, Bisogni, Sobal, & Devine, 2001).

Studies on food intake modelling have looked at how the eating behaviors of people eating around others can affect the individual's own eating behaviors. Research has found that when a participant is eating with an actor who is instructed to eat a lot of food versus eat very little food, the study participant follows a similar eating behavior and eats more with the high-intake actor and eats less with the low-intake actor (Robinson, Blissett, & Higgs, 2013). One explanation for this behavior is that people look to external environmental cues in lieu of internal signals of satiety to increase or decrease eating, which suggests the influence of social factors on eating behaviors (Herman, Roth, & Polivy, 2003). These social factors can also be seen at a household level. Families that use food to assuage their child's negative feelings may be associated with long-term weight gain and poor eating habits (Rodgers et al., 2013). Maternal instrumental feeding practices are associated with increases in a child's BMI over time and the emotional eating behaviors in children are associated with overweight (Rodgers et al., 2013).

A study examining the effect of eating behaviors as it related to dyads and a person's familiarity with their co-participant found that both men and women eating with familiar co-participants ate more than individuals paired with unfamiliar co-participants (Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007). The participant's gender was also associated with food consumption, indicating that the social facilitation of eating was stronger among men than among women (Salvy et al., 2007). There are also differences between the genders for what is classified as a food that is

healthy, pleasurable, or convenient, as well as age differences in what foods are considered healthy (Rappoport, Peters, Downey, McCann, & Huff-Corzine, 1993).

Studies looking at gender differences in food intake and food choice have found that women are more likely to have higher intakes of fruits and fiber and lower intakes of salt and fat compared to men (Wardle et al., 2004; Westenhoefer, 2005). Women were also more likely to consider eating healthy important than men, although some research suggests this may be attributed to dieting status and weight control efforts (Wardle et al., 2004; Westenhoefer, 2005). A study conducted in Mysore, India found that women considered food choice factors, including health, sensory appeal, and convenience, as more important than men (Sushma et al., 2014). To identify whether these gender differences apply to other regional contexts in India, more research is necessary.

In addition to the external forces that may influence a person's food choices, it is important to consider how the individual's food decision making occurs. Previously, it was believed that people would make a choice about food only after carefully factoring in all knowledge about price and nutrition. Research now shows that people employ simple heuristics, using limited but important information, such as convenience, sensory appeal, and price in food decision making, as in other human behaviors (Scheibehenne, Miesler, & Todd, 2007; Schulte-Mecklenbeck, Sohn, de Bellis, Martin, & Hertwig, 2013).

In Southeast Asia, the food retail environment has been shifting from traditional open markets and street vendors to supermarkets and convenience stores, which have a higher percentage of ultra-processed, less healthy foods (Wertheim-Heck & Raneri, 2019). A study in Vietnam found that almost all of the participants opted to purchase a majority of their foods at the informal markets with some of the drivers being perceived freshness of produce, price, availability of healthy foods, perceived food safety, and location (Wertheim-Heck & Raneri, 2019). More research is needed to

understand the effects of modernization of the food environment in other Asian countries, such as India.

Various studies conducted in India have examined affordability and socioeconomic status as it relates to food consumption and preferences. Nearly all households in South Delhi, India, shop for some fruits and vegetables at traditional vendors and those that buy these items from a supermarket had a higher income relative to the other households (Finzer et al., 2013). Affordability is a greater factor in fruit and vegetable consumption in these households than accessibility, and for health reasons, a little over a quarter of households would be willing to pay more for organic produce (Finzer et al., 2013). A study conducted in Tamil Nadu, India, found that rural and urban households with a higher income and higher educational level preferred the low saturated fats oils over traditional oils, such as peanut or coconut oil (Govindaraj & Suryaprakash, 2013). In contrast, the households of lower socioeconomic status consumed the lower priced, high saturated fat oils (Govindaraj & Suryaprakash, 2013). An examination of the drivers of food choice, such as price and health, for regularly consumed foods in a region of India currently experiencing globalization and a changing food environment is key to understanding the nutrition transition in India.

## **CONCEPTUAL FRAMEWORK**

The nutrition transition taking place in India has been associated with shifts in dietary patterns and eating behaviors away from traditional and local staples to global foods, which are rich in refined carbohydrates, sugar, and fat (Gayathri et al., 2017; Misra, Singhal, et al., 2011). These food choice behaviors have been linked to various individual and contextual factors, including age, gender, income, and education. People of higher socioeconomic status have greater accessibility and availability to healthful food options compared to those of lower socioeconomic status (Glanz et al.,



2005). The disproportionate accessibility and availability of healthful food options may extend more generally to local and non-local (national or global) foods as well. This in turn can result in variations in familiarity of food items if some are more readily available in markets than others.

Local food items that people have grown up seeing while shopping for groceries and eaten at home are likely to be more salient than national or global food items that may have only recently become available in stores, such as national or global packaged snacks or non-native fruits and vegetables. Over the past few decades, mass media, including television series and movies, has been attributed with facilitating the introduction of national and global foods to a larger audience who may not have previously encountered those items in person (Gayathri et al., 2017). In addition, advertising about food in India tends to be focused on marketing non-local products, especially global foods (Misra, Shah, et al., 2011). While global food products may be featured in advertisements due to their novelty, local foods that are already part of people's daily diets are not as likely to be featured in marketing efforts.

We expect that the different avenues of exposure to local and non-local foods associated with familiarity of the food items are also similarly associated with consumption of those foods. If people have seen a food item in various aspects of their life, such as a relative's house or at the store, they may be more likely to have tried the food at some point as well. The drivers of food choice play an important role in understanding how people go from learning about and seeing a food item to trying it. Taste, healthfulness, accessibility, satiety, and price are drivers of food choice that we hypothesize will vary in level of importance for food decision-making depending on the food group of the item. In turn, identifying the drivers of food choice may help to explain food consumption behaviors with preferences for local or non-local food items and the conditions under which people shift from one category to the other.

The food environment and food choice factors have also been associated with gender differences. In the literature, these gender differences have largely focused on food items and food behaviors more broadly and have yet to be examined closely in the context of local versus non-local foods and shifts between the two categories. Food-related gender norms have linked traditional household duties, such as cooking, primarily to women and a positive association between a mother's weight and a child's BMI, suggests the role of the shared food environment on diet and eating behaviors (Rajivan, 1999; Raskind et al., 2018). In regard to food consumption, women were more likely to eat fruits and fiber compared to men, whereas men consumed more fat and salt (Wardle et al., 2004; Westenhoefer, 2005). We expect that gender differences in the importance of certain drivers of food choice, such as healthfulness and convenience, to hold true, although they may depend on the food groups.

## **DATA & METHODS**

### ***Study Setting & Population***

The data for this study were collected over 8 months in 2019 from an urban and rural community located in Vijayapura district in the state of Karnataka, India. The district of Vijayapura has a population of 2,177,331 with 76.95% of people living in rural villages (Census, 2011). Vijayapura City has a population of 327,427 and the village of Ukkali has a population of 8,519 (Census, 2011). Study participants were drawn from a representative sample of households in the rural village of Ukkali and the urban city of Vijayapura. From each household, the adult household head and another adult household member were invited to participate in the study. Of the 487 households selected, there were 427 adult participants from the rural households and 509 adult

participants from the urban households interviewed with the socioeconomic and food choice modules.

### ***Survey Instrument***

The survey included a sociodemographic module and a food choice module. The sociodemographic module was comprised of questions regarding age, sex, education, occupation, household socioeconomic status, and eligibility for the Public Distribution System, the Indian food security system. Based on previous research, a database of over 1000 foods and beverages available in Vijayapura was created and these items were categorized into 6 groups: a) fruits and vegetables, b) cereals and pulses, c) snacks, d) animal products, e) oils, sweeteners, condiments, and f) drinks. From the database, 12 of the most common items for each group were selected. Participants were shown 3 randomly selected items from each of the food groups, with one local/traditional food item, one national/mixed food item, and one global/modern food item. For each set of 3 items, respondents were asked which of those they eat most frequently, and questions related to specific scenarios, such as which of the items they would choose if they had an additional Rs. 250 to spend, wanted something tasty, eat for health reasons, were very hungry, or had very little time to prepare food. As part of the food choice questionnaire, respondents were also asked about their familiarity with the randomly selected food item, including whether they had seen it at home, at the market, advertised on TV, or at a friend's house. Respondents were also asked to identify their main reason for choosing the item they reported as most frequently consumed. The corresponding response options included price, accessibility, satiety, healthfulness, and taste.

### ***Data Collection***

Data were collected by a team of 8 interviewers and 2 supervisors. Data collection took place from January to October of 2019. Since the household head and another adult in the

household, were each interviewed for the study, revisits were occasionally necessary. The interviews began with the socioeconomic module and was then followed up with the food choice module.

One respondent per household, usually the household head, would be interviewed for the socioeconomic module, answering questions about the household and PDS use. Upon conclusion of the socioeconomic module interview, the interviewer would then answer 3 questions regarding the participant's home based on observation.

## ***Variables***

### *Sociodemographic Indicators*

The respondents answered various questions about their sociodemographic characteristics. These variables included age, which was an open response question, and sex was recorded as male or female. A question regarding relation to head of household included the answer options: head, wife/husband, son/daughter, child-in-law, grandchild, parent, grandparent, sibling, parent-in-law, nephew/niece, sibling-in-law, other relative, and servant/others. Marital status was marked as married, widowed, divorced, separated, never married, and other. To capture information about caste, the answer options included: general, other backward caste, scheduled caste, and scheduled tribe. For the religion variable, the categories were Hindu, Muslim, Christian, Jain, Buddhist, None, and Other.

Socioeconomic status was characterized by education, occupation, and income. Education was assessed as never attended, primary school, high school, pre-university course, and degree and above. Occupation was separated into 15 categories comprised of cultivation, herdsman, agricultural wage labor, non-agricultural wage labor, craftsman/independent work, petty shop/small business, organized trade/business of more than five employees, salaried employees, professional, retired, housewife, student, unemployed/looking for work, too young/unfit to work, and other.

Household income was categorized as less than Rs. 5000, Rs. 5000 to 10000, Rs. 10001 to 20000, Rs. 20001 to 30000, and more than Rs. 30001. Information about the source of income was captured as salary from an employment, own business, pension, rent, government welfare programs, waged labor, agriculture income, animal husbandry, or other source.

Other household socioeconomic factors also included in the survey included home ownership, in which participants answered whether they own or rent their house. They were also asked to answer yes or no about whether there is a separate water supply for the house. Type of toilet facility in the house was categorized as no facility, toilet in the house, and shared community latrine facility. Household fuel type most frequently used was reported as electricity, liquified petroleum gas/natural gas, kerosene, and wood. Land ownership status was categorized as neither owned nor leased land, owned land, or leased land for cultivation.

Information was also recorded by the interviewer about the participants' house structure, which was categorized as pucca, kaccha, or semi-pucca. If there was a refrigerator or a television in the participant's house, the response was noted as a yes or no.

#### *Food Choice Indicators*

Food choice indicators explored various measures for foods in the 6 groups: a) fruits and vegetables; b) cereals and pulses; c) snacks; d) animal products; e) oils, sweeteners, condiments; and f) drinks. Within each group, the food items were further sorted into local/traditional, national/mixed, or global/modern categories. A laminated, colored picture card was created for each food item selected from the database and shown to the participants. Prior to each interview, the interviewer randomly selected 3 sets of cards. A set of 3 cards was comprised of one from the local, national, and global categories and each set was from one of the six aforementioned groups.

For each of the 3 preselected sets of cards, participants were asked a series of questions. To identify familiarity of a food item, the participants reported whether they had ever seen the food item: advertised on TV or for sale, a friend or relative had it, available in the market, and have it at home. All applicable responses were recorded. Respondents were also asked, “Have you ever consumed this?” and the answer options were yes (=1) or no (=0).

To determine the food item the participant eats most frequently of the cards shown, they indicated the card for the corresponding food item and their response was noted with the food card number. The main reason for frequent consumption of the food item was categorized as cheap, easy to find, energy, healthy, or tasty. Only one answer option was recorded for this variable per respondent.

To identify the factors that may be associated with respondents' food choices, each participant was to indicate their preference for a given item of the 3 food items considering the provided situations. Participants were asked i) “Of these 3 foods, which one would you buy if you had an additional Rs. 250 to spend?”, ii) “Of these 3 foods, which one would you buy if you want something that tastes good?”, iii) “Which one would you eat for health reasons?”, iv) “Which one would you eat if you were very hungry?”, and v) “Which one would you select if you had very little time to make ready to eat?” Each of the five questions was open response and the item number of the selected food was recorded.

### ***Data Management***

The religion variable initially included the answer options: Hindu, Muslim, Christian, Jain, Buddhist, None, Other. For analysis, a new religion variable was created, clubbing the answer options into 2 groups: 1) Hindu; and 2) Muslim, Jain, and Christian.

The socioeconomic variable, occupation, was condensed down from 15 separate categories comprised of cultivation, herdsman, agricultural wage labor, non-agricultural wage labor, craftsman/independent work, petty shop/small business, organized trade/business of more than five employees, salaried employees, professional, retired, housewife, student, unemployed/looking for work, too young/unfit to work, and other. For analysis, the occupations were clubbed into 6 groups: 1) cultivation, herdsman, agricultural income; 2) nonagricultural income; 3) craftsman, small business, large business; 4) salaried employment, professional; 5) housewife; and 6) other.

Respondents were asked “Have you ever this?” about a specific food item and all applicable answers were marked per food item. The answer options were: i) TV/advertised, ii) friend, iii) market, iv) home, v) no, vi) refused, vii) don’t know. Per “ever\_seen” question, the answers were entered as grouped responses, such as “Friend;Market”, “Home;Market;TV/advertised”, or “Friend;Home;Market”. To separate the answer options for analysis, they were recoded into new variables “seen\_tv”, “seen\_friend”, “seen\_market”, “seen\_home”, “seen\_no”, and “seen\_dontknow”. No participants reported “refused” so a new variable was not needed. The new “seen\_” variables were created for each of the 6 food categories and were coded as yes (=1) and no (=0).

Food card variables were all coded as string variables with answer options including “AL1”, “BN3”, and “FG2”, to correspond with the food card numbers for each food item. Variables starting with “A” referred to the fruits and vegetables group, “B” with cereals and pulses, “C” with snacks, “D” with animal products, “E” with oils, sweeteners, and condiments, and “F” with drinks. The second letter in the food card corresponded with the food category: L (= local/traditional), N (= national/mixed), and G (=global/modern). The last number on the food card specified which item from a given food group and food category was being selected since there were 4 options per each food group and category combination. These food card variables were converted into numeric

variables. Per food category, we combined all local/traditional items (=1), national/mixed items (=2), and global/modern items (=3). This process was applied to several variables. To identify the most frequently consumed food item, the new numeric variable “eat\_most\*” was created from the string variable “eat\_card\*”. To examine the drivers of food choice indicators, new numeric variables “extraRs\*”, “taste\*”, “health\*”, “hungry\*”, and “time\*” were created from the string variables “fc250\_extra\_cardno\*”, “taste\_cardno\*”, “eat\_healthno\*”, “hungryno\*”, and “timeno\*”, respectively.

Since each respondent only answered food choice questions about 3 food groups, new variables were created to identify of those who responded to each drivers of food choice question, what the participants reported. New variables were created for each food group and food category combination to capture those who responded to the question about the alternative scenarios. For instance, for the question “Of these 3 foods, which one would you buy if you had an additional Rs. 250 to spend?”, the new variable “fruit\_resp\_extra” was created. Then new variables “fruit\_local\_extra”, “fruit\_national\_extra”, and “fruit\_global\_extra” were created to separate the food group responses. This process was applied to create new variables for each food group and food category combination so that the new variables were generated as iterations of “foodgroup\_foodcategory\_driverfoodchoice”.

To assess changes in selection from local to non-local and non-local to local food items, two variables were created for each directionality. For each of the 5 choice scenarios, we calculated the proportion of respondents who chose a local food item as their most frequently consumed item and then chose a non-local food item in an alternative scenario compared to those who chose local food items in each instance. To get variables to compare each directionality for each scenario and each food category, we created 30 variables. The variable “changenonlocal” was created for local to non-



local or local to local selections. Likewise, we also calculated the reverse to get proportion of respondents who chose a non-local food item as their most frequently consumed item and then chose a local food item in an alternative scenario compared to those who chose non-local food items both times. The variable “changelocal” was created for non-local to non-local or non-local to local selections.

To ensure that the dataset contained only adult respondents aged 18 years or older, one observation was excluded from analysis ( $n$  936).

### ***Statistical Analysis***

Descriptive statistics were run to examine the distribution of the variables and identify sociodemographic characteristics of the participants and households, factors when considering food items, and familiarity and consumption of local, national, and global food items. T-tests, Pearson’s chi-square, and Fisher’s exact test, were run to compare differences in familiarity and consumption of local, national, and global food items between males and females, as well as preference for non-local (national/mixed or global/modern) food items versus local/traditional food items and whether they differ depending on the food category. Logistic regression was used to examine if individual and contextual variables were associated with the proximate driver of food choice identified as most salient from the descriptive statistics. A logistic regression model was conducted for each of the 6 food categories. The variables included in the multivariate logistic regression models were age, sex, education, household income, rural/urban location, caste, and religion. The analyses were conducted using statistical analysis software Stata, version 16.0.

## RESULTS

### *Sociodemographic Characteristics*

The adults in the study had a mean age of 45 years old and about 52% were women. Nearly 32% never attended school, 28.4% worked in the agricultural sector, and 73.2% identified as Hindu. Individual level sociodemographic statistics can be seen in Table 1. The average household size was approximately 6 people and about 50% of households owned land. Most families had a monthly household income between INR 5000-10000 (32.4%) and over 53% had a monthly household income of more than INR 10000. The majority of families owned their house (84.6%) and had a separate water supply to their house (88.1%). Household level sociodemographic indicators can be found in Table 2.

### *Food Familiarity & Consumption*

Across local and national food categories, food items were most seen for sale at the market or had it at home by both sexes. Among the local/traditional food and beverage items shown, women reported having ever seen fruits and vegetables (100% v. 90.8%) and cereals and pulses (89.8% v. 75%) at the market significantly more than men. Women also saw fruits and vegetables (96.5% v. 80.8%), cereals and pulses (98.8% v. 95.2%), and oils, sweeteners, and condiments (98.5% v. 89.4%) at home significantly more than men. Snacks (75.6% v. 84.3%) and drinks (62.6% v. 71.6%) were reported to be seen at the market significantly less by women than men.

Among national/mixed food and beverage items, women reported having ever seen items from all 6 food categories at home significantly more than men. For items seen at friend's or relative's place, women reported having seen snacks (4.4% v. 1.3%) and animal products (5.3% v. 1.1%) significantly more than men. Men also reported having ever seen oils, sweeteners, and condiments (0% v. 3.5%) significantly less than women.

Among global/modern food and beverage items, women reported having ever seen fruits and vegetables (3.5% v. 0.4%), cereals and pulses (18.4% v. 4.8%), snacks (13.1% v. 2.1%), drinks (8.9% v. 3.2%), and oils, sweeteners, and condiments (7.1% v. 1.1%) advertised on TV or for sale significantly more than men. Men reported having ever seen drinks (45.7% v. 33.5%) and oils, sweeteners, and condiments (48.9% v. 32.8%) at the market significantly more than women. Of the food and beverage items seen at home, women reported having ever seen fruits and vegetables (14.7% v. 7.9%), cereals and pulses (30.6,% v.16.9%), and snacks (34.6% v. 23.4%) significantly more than men.

For the food and beverage items that respondents reported as having ever consumed, women reported having ever consumed national/mixed fruits and vegetables (100% v. 97.8%) significantly more than men. Men reported having ever consumed national/mixed drinks (90.8% v. 78.7%) and global/modern oils, sweeteners, and condiments (19.6% v. 8.6%) significantly more than women. Overall, consumption of local/traditional items was highest for all 6 categories with national/mixed food and beverage items as the second most ever consumed as seen in Figure 1.

Across the 6 food groups, the most frequently eaten item reported was local/traditional with no significant differences between men and women. Figure 2 visually shows this as well with the overall distribution for most frequently eaten local/traditional item at least 80% for all 6 food categories. Additional statistics on the ever seen, ever consumed, and most frequently eaten variables are shown in Table 3.

### ***Food Choice***

The main reason for choosing the most frequently eaten item was that it was easy to find and this applied to fruits and vegetables (50.5%), cereals and pulses (82.9%), animal products (41.7%), drinks (44.3%), and oils, sweeteners, and condiments (56.6%). Only snacks had a different

primary reason, which was taste (53.7%), and easy to find (43.9%) as its second reason. The complete statistics of reasons for choosing the most frequently eaten item, by food category, can be found in Table 4.

We observed significant associations between gender and selecting “easy to find” foods as the main reason for choosing the most frequently eaten item. Men were less likely to consider “easy to find” as the main reason for choosing snacks [OR=0.47, 95% (0.31, 0.71)], animal products [OR=0.31, 95% (0.19, 0.50)], drinks [OR=0.36, 95% (0.25, 0.53)], and oils, sweeteners, and condiments [OR=0.23, 95% (0.14, 0.39)] than women. Full logistic regression analysis can be found in Table 5.

Given the scenario that the respondent had an additional INR 250 to spend on cereals and pulses, women were less likely to choose a local/traditional item (45.5% v. 55.6%) than men. Women were more likely to choose a national/mixed (34.8% v. 32.8%) or global/modern (19.7% v. 11.6%) item from the cereals and pulses group than men with an additional INR 250. Women were more likely to choose a local/traditional (55.9% v. 52.4%) item from the fruits and vegetables group and also more likely to choose a local/traditional (61.5% v. 55.9%) item from the drinks category if they wanted something tasty compared to men. When choosing something tasty from the fruits and vegetables category, men were more likely to choose a national/mixed (43.7% v. 43.2%) food item or a global/modern (3.9% v. 0.9%) item than women. Similarly, men were also more likely to choose a national/mixed (40.2% v. 37.8%) item or a global/modern (3.9% v. 0.7%) item from the drinks category compared to women. When feeling very hungry, women were less likely to choose a local/traditional food item (56.0% v. 67.2%) among the cereals and pulses than men. Among the cereals and pulses, women were more likely to choose a national/mixed (27.4% v. 22.3%) item or a global/modern (16.7% v. 10.5%) item when feeling very hungry compared to men. If respondents

had little time to prepare food, men were more likely to choose a local/traditional (61.6% v. 44.6%) item from the cereals and pulses category than women. Of the cereals and pulses, men were less likely to choose a national/mixed (22.5% v. 32.9%) or global/modern (15.9% v. 22.5%) food item if they had little time for food preparation compared to women. Proportions for each situation, by gender and food category, can be found in Table 6.

Across all food groups, we observed differences in the proportion of participants who switched their preference from local to non-local (national/mixed or global/mixed) and non-local to local food items compared to those who chose the same category in both instances, when comparing reported responses to participants' most frequently eaten food item and their selected food item given the alternative choice scenario. Women were more likely to switch from a local to nonlocal (52.6% v. 41.9%) food item if they had an additional INR 250 to spend on cereals and pulses than men. Men were more likely to switch from a non-local to local (50.0% v. 9.5%) item from the cereals and pulses category if they were feeling very hungry compared to women. If there was little time to prepare food, women were more likely to switch from a local to non-local item in the cereals and pulses (52.2% v. 35.8%) group and the drinks (24.1% v. 16.7%) category. The summary of changes in preference from local to non-local and non-local to local food items, by gender and food category, is shown in Table 7.

## **DISCUSSION**

This study identified the drivers of food choice for 6 food categories among adult men and women in Vijayapura district, India, which is undergoing a nutrition transition due to globalization and economic development. For local/traditional, national/mixed, and global/modern categories, there were 6 food groups: a) fruits and vegetables, b) cereals and pulses, c) snacks, d) animal

products, e) oils, sweeteners, condiments, and f) drinks. We examined the conditions under which local versus non-local (national/mixed and global/modern) food and beverage items from the 6 food categories were selected. To assess if local versus non-local food selections would vary under 5 different choice scenarios and by gender, we asked respondents to select a local or non-local food item given each of the 5 situations: if they had an additional Rs. 250 to spend, wanted something tasty, eat for health reasons, were very hungry, or had very little time to prepare food.

For all food categories, local food items were the most frequently consumed items and when we presented the alternative scenarios, most men and women still preferred the local food items over the non-local options. For each of the 6 food categories, we calculated the proportion of respondents who chose a local food item as their most frequently consumed item and then chose a non-local food item in an alternative scenario compared to those who chose local food items in each instance. We also calculated the reverse to get proportion of respondents who chose a non-local food item as their most frequently consumed item and then chose a local food item for an alternative scenario compared to those who chose non-local food items both times. We examined these proportions and found that a higher proportion of people altered their choice from local to non-local food items if they had an additional INR 250 or wanted something tasty than from non-local to local food items. On the other hand, a higher proportion of people changed their selection from non-local to local food items if they wanted something healthy compared to changing from local to non-local food items.

Gender differences in altering selection from local to non-local or non-local to local were only statistically significant for 4 combinations of food groups and scenarios. Women were significantly more likely to switch from local to non-local cereals and pulses if they had an additional INR 250 or if they had little time to prepare food than men. Also, women were significantly more

likely to shift from local to non-local drinks if they had little time to prepare food than men. Men were significantly more likely to switch from non-local to local cereals and pulses when feeling very hungry compared to women. Since the non-local food items tend to be more processed than local food items, this change in preference from local to non-local items among women may be attributed to convenience as more of these products become available in rural areas. One study in India found that when it comes to food choice, women find convenience more important than men (Sushma et al., 2014). Men and women were also found to have different classifications for food that is considered convenient (Rappoport et al., 1993).

Assessment of familiarity and consumption of the food and beverage items found that women were significantly more likely to have ever seen local/traditional, national/mixed, or global/modern food items at home compared to men in each of the food categories. For local/traditional and national/mixed fruits and vegetables, and local/traditional cereals and pulses, women were significantly more likely to have ever seen them at the market than men. In contrast, men were significantly more likely to have ever seen local/traditional snacks and drinks, as well as global/modern drinks and oils, sweeteners, and condiments, at the market compared to women. These results may be due to household gender roles where women are more likely to be the ones cooking and therefore have greater awareness of the items at home, whereas men in this setting tend to be the ones to go to the market. This aligns with research which shows that women typically spend more time on household maintenance, such as cooking, than men (Rajivan, 1999). On the other hand, the men seemed to notice the more processed food items compared to women. Further investigation is needed to understand the gender differences in familiarity of food items and why they differ between common settings.

Of the global/modern food and beverage items, women were significantly more likely to have ever seen items from all food categories, except animal products, advertised on TV or for sale compared to men. This food-related gender difference may be due to the men working primarily outside the home while the women are indoors and may see advertisements during the day on TV. Overall, there was a higher proportions of men and women who had seen global/modern (0.4-13.1%) food and beverage items advertised on TV or for sale compared to local/traditional (0-1.4%) or national/mixed (0-3.5%) food items. Previous research from India has also observed the use of advertising for non-local, processed foods, especially by transnational fast food and soft drinks companies, and attributed mass media with influencing the process of food globalization (Gayathri et al., 2017; Misra, Shah, et al., 2011). This may also explain why only a small proportion of men or women reported having ever seen any local/traditional or national/mixed food category item advertised on TV.

Men were significantly more likely to have ever consumed national/mixed drinks and global/modern oils, sweeteners, and condiments than women. In contrast, women were significantly more likely to have ever consumed national/mixed fruits and vegetables. These gender differences coincide with previous studies that reported women consumed more nutritious foods, such as fruits and fiber, and less fat compared to men (Rathi, Riddell, & Worsley, 2017; Wardle et al., 2004; Westenhoefer, 2005).

Accessibility was reported as the main reason for choosing the most frequently eaten item for all food categories except animal products. This may be due to lack of access to animal products for many people in India until the recent globalization of diets, even if they would have liked to eat it (Shaikh, Patil, Halli, Ramakrishnan, & Cunningham, 2016). Selecting ease of access as the main reason for choosing the most frequently eaten item differed by gender. Women were more likely to



consider accessibility as the main reason for choosing snacks, animal products, drinks, and oils, sweeteners, and condiments than men. As mentioned in regard to food selection, gender differences have been attributed to convenience (Rappoport et al., 1993; Sushma et al., 2014). This may also explain how access, as an extension of convenience, is also factored into women's food decision-making.

Taste and healthfulness were the next most reported reasons for choosing the most frequently eaten item across the food groups. These findings contrast with previous research conducted in the United States found taste and cost to be the primary and secondary influences on food decisions, respectively (Glanz et al., 1998). This sheds light on global differences in food choices and warrants further research.

### ***Limitations***

This study is subject to a few limitations. Firstly, it was a cross-sectional design so we cannot make causal inferences. An experimental or longitudinal study would be necessary to determine causality of food choice relationships. A second limitation is that the results are only generalizable to the adult men and women of the households from Vijayapura City and the rural village of Ukkali in Karnataka, India, who were eligible to participate in the study. The experience of the nutrition transition for those in Vijayapura district are not intended to be comparable to those in metropolitan cities. Another limitation was that by grouping the specific food items into local/traditional, national/mixed, and global/modern food categories for analysis and dropped the details of each food item. For the purposes of this study, the broader categories were sufficient to answer the research questions, however, future research can compare individual food items with other variables to see if there was variation within food categories as well.

### ***Strengths***

While other studies have examined shifts in food consumption over time in a population, this study provided a more detailed look at food choice factors and conditions under which respondents would alter their food item selection. Furthermore, we selected the food cards used in the food choice module from a database of over 1000 foods and beverages available in Vijayapura and based on preliminary work. This helped to narrow down the list to the most common items for the study. Lastly, this study also expands the scope of knowledge on food choice in India. As the majority of the existing literature has focused on U.S. populations, it is unclear whether these findings apply to other settings. Due to the undergoing globalization and economic development in Vijayapura district, it is an ideal location to assess drivers of food choice and food consumption behaviors.

### ***Conclusions***

Food consumption behaviors among adult men and women in Vijayapura indicate that local food items are the most frequently consumed and also the preferred option in the majority of the alternative choice scenarios. Switching from local to non-local food items versus staying with a local food option occurred at higher proportion if people had additional money or wanted something tasty. On the other hand, switching from non-local to local food versus staying with a non-local option occurred at a higher proportion if people wanted something healthy. Accessibility, taste, and healthfulness were the top 3 drivers of food choice. In the context of the nutrition transition in India, it is important to consider how these factors can be incorporated in health promotion efforts, such as increasing access to healthy foods, in Vijayapura. Future research can follow-up with these study participants to examine the effects of the nutrition transition on their food choice behaviors through a longitudinal study or a repeated cross-sectional survey to see if and how respondents'

answers change over time. Another direction would be to assess whether there are differences in association for the food choice factors, familiarity, and consumption by rural or urban location. Qualitative research to understand the gender differences identified in this study and explore possible societal and cultural influences on food decision-making may help provide a more complete picture of why they would choose a local versus non-local item, how they decide to try a new food item, and how they make healthy food decisions. As remote districts in India like Vijayapura experience the nutrition transition, understanding drivers of food choice and changing dietary habits can help address the growing burden of nutrition-related NCDs in India.

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## TABLES & FIGURES

**Table 1.** Sociodemographic characteristics of adults in Vijayapura, India (*n* 936)

<b>Characteristic</b>	<b>% or mean value</b>	<b>95% CI</b>
<b>Age</b> (years)	45.0	44.4, 45.7
<b>Sex</b>		
Male	48.4%	45.2, 51.6
Female	51.6%	48.4, 54.8
<b>Education</b>		
Never attended	31.7%	28.8, 34.8
Pre/primary school	22.4%	19.9, 25.2
High school	16.6%	14.3, 19.1
PUC/Diploma	12.4%	10.4, 14.7
Degree and above	16.9%	14.6, 19.4
<b>Occupation</b>		
Cultivation, herdsman, agricultural wage labor	28.4%	25.6, 31.4
Non-agricultural wage labor	10.7%	8.9, 12.8
Craftsman, small business, large business	13.2%	11.2, 15.6
Salaried employees, professional	17.2%	14.9, 19.8
Housewife	26.2%	23.5, 29.1
Others	4.3%	3.1, 5.8
<b>Religion</b>		
Hindu	73.2%	70.4, 76.0
Muslim, Christian, Jain	26.7%	24.0, 29.7

**Table 2.** Characteristics of households in Vijayapura, India (*n* 487)

<b>Characteristic</b>	<b>% or mean value</b>	<b>95% CI</b>
<b>Household size</b>	5.7	5.5, 5.9
<b>Monthly household income (INR)</b>		
Less than Rs. 5000/-	14.4%	11.5, 17.8
Between Rs. 5000 to 10000/-	32.4%	28.4, 36.7
Between Rs. 10001 to 20000/-	23.8%	20.2, 27.8
Between Rs. 20001 to 30000/-	10.5%	8.0, 13.5
More than Rs. 30000/-	18.9%	15.6, 22.6
<b>Owns house</b>	84.6%	81.1, 87.5
<b>Owns land</b>	50.3%	45.9, 54.7
<b>Separate water supply</b>	88.1%	84.9, 90.7

INR = Indian Rupees



**Table 3.** Familiarity and consumption of local, national, and global food items among adults in Vijayapura, India, by sex

Characteristic	Fruits & vegetables (%)		Cereals & pulses (%)		Snacks (%)		Animal products (%)		Oils, sweeteners, condiments (%)		Drinks (%)	
	W <i>n</i> 231	M <i>n</i> 229	W <i>n</i> 255	M <i>n</i> 248	W <i>n</i> 275	M <i>n</i> 235	W <i>n</i> 209	M <i>n</i> 177	W <i>n</i> 198	M <i>n</i> 188	W <i>n</i> 281	M <i>n</i> 282
<b>Ever seen</b>												
<b>Local/traditional</b>												
Advertised on TV/for sale	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.4	0.0
Had it with a friend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	1.1	0.0
Seen it at market	100.0	90.8*	89.8	75.0*	75.6	84.3*	86.1	79.7	86.4	80.9	62.6	71.6*
Seen it at home	96.5	80.8*	98.8	95.2*	93.8	90.6	82.8	76.8	98.5	89.4*	91.8	89.7
<b>National/mixed</b>												
Advertised on TV/for sale	0.0	0.0	0.0	0.0	1.1	0.0	1.4	0.0	3.5	0.0*	1.1	0.0
Had it with a friend	0.4	0.0	0.8	0.8	4.4	1.3*	5.3	1.1*	0.0	0.0	0.0	0.0
Seen it at market	98.7	95.6*	95.4	91.5	90.9	90.6	70.3	78.0	87.9	89.4	95.4	97.5
Seen it at home	76.2	60.7*	53.7	42.3*	55.3	41.3*	27.8	17.5*	50.5	33.0*	43.8	20.3*
<b>Global/modern</b>												
Advertised on TV/for sale	3.5	0.4*	18.4	4.8*	13.1	2.1*	1.9	0.6	7.1	1.1*	8.9	3.2*
Had it with a friend	0.4	0.0	0.4	0.0	1.5	0.0	1.4	0.6	0.5	0.0	0.4	0.4
Seen it at market	39.8	45.0	51.8	54.8	75.3	74.0	77.0	74.0	32.8	48.9*	33.5	45.7*
Seen it at home	14.7	7.9*	30.6	16.9*	34.6	23.4*	16.8	11.9	7.6	4.8	7.1	5.7
<b>Ever consumed</b>												
Local/traditional	99.1	100.0	100.0	100.0	99.6	99.6	88.5	93.8	100.0	99.5	98.2	99.7
National/mixed	100.0	97.8*	81.0	85.5	85.1	84.3	53.1	55.9	76.0	77.8	78.7	90.8*
Global/modern	17.3	17.0	32.2	28.6	51.3	43.0	53.1	53.7	8.6	19.6*	9.3	22.3
<b>Most frequently eaten</b>												
Local/traditional	89.2	87.4	91.8	91.9	81.5	87.1	79.8	84.6	96.5	92.0	87.5	83.0
National/mixed	10.4	12.6	6.7	6.9	17.8	12.5	10.3	9.1	3.0	7.5	12.1	15.6
Global/modern	0.4	0.0	1.6	1.2	0.7	0.4	9.9	6.3	0.5	0.5	0.4	1.4

W = woman; M = man

\* $p < 0.05$

**Table 4.** Reason for choosing most frequently eaten item among adults in Vijayapura, India

<b>Characteristic</b>	<b>Fruits &amp; vegetables (%)</b>	<b>Cereals &amp; pulses (%)</b>	<b>Snacks (%)</b>	<b>Animal products (%)</b>	<b>Oils, sweeteners, condiments (%)</b>	<b>Drinks (%)</b>
	<i>n</i> 460	<i>n</i> 503	<i>n</i> 510	<i>n</i> 386	<i>n</i> 386	<i>n</i> 563
Cheap	1.7	1.0	0.6	1.3	1.6	1.2
Easy to find	50.5	82.9	43.9	41.7	56.6	44.3
Energy	2.6	3.4	0.6	12.2	1.6	1.4
Healthy	22.1	7.8	0.8	28.0	3.6	26.6
Tasty	22.6	4.8	53.7	15.3	35.4	26.1
Other	0.4	0.2	0.0	0.3	1.0	0.0
None eaten	0.0	0.0	0.4	1.3	0.3	0.4

*Note:* Each respondent was asked about 3 randomly selected food groups, therefore the total number of respondents per food group is noted under each food group.

**Table 5.** Individual and contextual factors associated with choosing “easy to find” foods among adults in Vijayapura, India, by food group. OR and 95% CI from logistic regression models for each food group.

Characteristic	Fruits & vegetables	Cereals & pulses	Snacks	Animal products	Oils, sweeteners, condiments	Drinks
	<i>n</i> 459	<i>n</i> 503	<i>n</i> 508	<i>n</i> 380	<i>n</i> 383	<i>n</i> 559
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
<b>Sex</b> (ref. Female)						
Male	0.84 (0.54,1.31)	0.61 (0.35, 1.06)	0.47 (0.31, 0.71)*	0.31 (0.19, 0.50)*	0.23 (0.14, 0.39)*	0.36 (0.25, 0.53)*
<b>Age</b> (years)	1.01 (0.98, 1.04)	0.99 (0.96, 1.02)	1.03 (1.00, 1.04)*	1.00 (0.97, 1.02)	1.00 (0.98, 1.03)	1.00 (0.98, 1.02)
<b>Education</b> (ref. never attended)						
Pre/primary school	0.77 (0.44, 1.34)	1.77 (0.85, 3.71)	1.72 (1.02, 2.88)*	1.19 (0.64, 2.23)	0.86 (0.45, 1.64)	1.11 (0.67, 1.84)
High school	0.77 (0.42, 1.40)	2.08 (0.86, 5.04)	1.46 (0.81, 2.62)	1.05 (0.51, 2.18)	0.45 (0.21, 0.93)*	1.07 (0.60, 1.90)
PUC/Diploma	0.95 (0.45, 2.01)	0.87 (0.36, 2.10)	2.84 (1.40, 5.77)*	1.32 (0.59, 2.94)	1.11 (0.46, 2.72)	1.57 (0.81, 3.06)
Degree and above	0.73 (0.36, 1.49)	0.56 (0.23, 1.37)	2.64 (1.30, 5.38)*	1.31 (0.57, 3.05)	0.75 (0.32, 1.76)	1.14 (0.59, 2.20)
<b>Monthly household income</b> (ref. INR 5001/- to 10000/-)						
Less than Rs. 5000/-	1.53 (0.82, 2.88)	1.59 (0.71, 3.58)	0.77 (0.42, 1.43)	0.98 (0.48, 1.99)	0.81 (0.38, 1.73)	1.21 (0.66, 2.20)
Rs. 10001 to 20000/-	0.67 (0.38, 1.19)	1.05 (0.53, 2.07)	0.98 (0.57, 1.68)	0.96 (0.51, 1.82)	0.68 (0.36, 1.31)	0.96 (0.58, 1.60)
Rs. 20001 to 30000/-	0.48 (0.22, 1.04)	2.24 (0.77, 6.49)	0.96 (0.47, 1.97)	0.94 (0.41, 2.16)	1.03 (0.42, 2.54)	0.80 (0.41, 1.59)
More than Rs. 30000/-	0.56 (0.28, 1.12)	0.56 (0.23, 1.37)	0.85 (0.44, 1.65)	0.66 (0.29, 1.53)	0.92 (0.40, 2.11)	0.73 (0.39, 1.36)
<b>Location</b> (ref. Rural)						
Urban	1.35 (0.79, 2.31)	1.21 (0.62, 2.36)	0.50 (0.30, 0.82)*	1.64 (0.91, 2.96)	1.23 (0.68, 2.22)	1.12 (0.68, 1.83)
<b>Religion</b> (ref. Hindu)						
Muslim, Christian, Jain	0.98 (0.59, 1.62)	1.00 (0.52, 1.93)	0.87 (0.54, 1.41)	1.26 (0.68, 2.32)	1.63 (0.90, 2.94)	1.12 (0.69, 1.81)
<b>Caste</b> (ref. General)						
Other backward class	1.03 (0.60, 1.79)	1.28 (0.65, 2.51)	0.74 (0.44, 1.24)	0.98 (0.54, 1.78)	0.51 (0.27, 0.97)*	0.77 (0.47, 1.25)
Scheduled caste	0.79 (0.42, 1.48)	1.02 (0.46, 2.27)	0.64 (0.34, 1.18)	1.21 (0.59, 2.49)	0.66 (0.32, 1.38)	1.05 (0.60, 1.85)
Scheduled tribe	1	--	--	1	1	1

*Note:* Each respondent was asked about 3 randomly selected food groups, therefore the total number of respondents per food group is noted under each food group. Of the reasons for choosing the most frequently eaten item, easy to find foods was selected for analysis as the most salient response.

INR = Indian Rupees

\* $p < 0.05$

**Table 6.** Preference for local, national, or global food items among adults in Vijayapura, India, by different choice scenarios

Characteristic	Fruits & vegetables (%)		Cereals & pulses (%)		Snacks (%)		Animal products (%)		Oils, sweeteners, condiments (%)		Drinks (%)	
	W <i>n</i> 231	M <i>n</i> 229	W <i>n</i> 255	M <i>n</i> 248	W <i>n</i> 275	M <i>n</i> 235	W <i>n</i> 209	M <i>n</i> 177	W <i>n</i> 198	M <i>n</i> 188	W <i>n</i> 281	M <i>n</i> 282
<b>Scenario: if...</b>												
<b>...had an additional Rs. 250</b>												
Local/traditional	49.1	54.2	45.5	55.6*	55.6	59.5	57.6	64.0	69.9	72.1	37.1	39.7
National/mixed	47.4	42.7	34.8	32.8*	34.5	30.0	23.4	20.7	24.7	24.0	60.9	57.0
Global/modern	3.5	3.1	19.7	11.6*	9.9	10.5	19.0	15.2	5.4	3.9	2.0	3.3
<b>...wanted something tasty</b>												
Local/traditional	55.9	52.4*	56.5	64.4	65.7	68.8	58.3	67.8	66.5	65.0	61.5	55.9*
National/mixed	43.2	43.7*	32.2	30.4	72.0	27.7	76.8	20.7	29.3	31.1	37.8	40.2*
Global/modern	0.9	3.9*	11.4	5.3	6.3	3.5	81.4	11.5	4.3	3.9	0.7	3.9*
<b>...wanted something healthy</b>												
Local/traditional	49.8	53.9	59.2	54.7	64.9	70.7	76.0	82.2	65.8	62.4	56.4	52.7
National/mixed	43.7	41.7	37.7	44.1	28.6	19.7	13.0	9.2	30.5	28.7	41.8	43.8
Global/modern	6.5	4.4	3.1	1.2	6.5	9.6	11.1	8.6	3.7	9.0	1.8	3.6
<b>...very hungry</b>												
Local/traditional	42.5	39.6	56.0	67.2*	72.2	77.6	65.8	72.1	58.9	65.1	69.1	72.9
National/mixed	51.8	58.1	27.4	22.3*	21.9	19.3	16.3	17.0	33.9	25.6	30.9	26.1
Global/modern	5.7	2.3	16.7	10.5*	5.9	3.1	17.9	10.9	7.2	9.3	0.0	1.1
<b>...had little time to prepare food</b>												
Local/traditional	46.7	43.5	44.6	61.6*	71.2	77.2	68.8	77.8	56.6	65.6	71.6	76.5
National/mixed	47.6	54.4	32.9	22.5*	21.7	16.7	12.2	9.3	36.6	25.6	28.0	21.7
Global/modern	5.7	2.2	22.5	15.9*	7.1	6.1	19.1	13.0	6.9	8.8	0.4	1.8

*Note:* Each respondent was asked about 3 randomly selected food groups, therefore the total number of respondents per food group is noted under each food group.

W = woman; M = man

\* $p < 0.05$

**Table 7.** Change in preference from local to non-local (versus local to local) or non-local to local (versus non-local to non-local) food items among adults in Vijayapura, India, by different choice scenarios

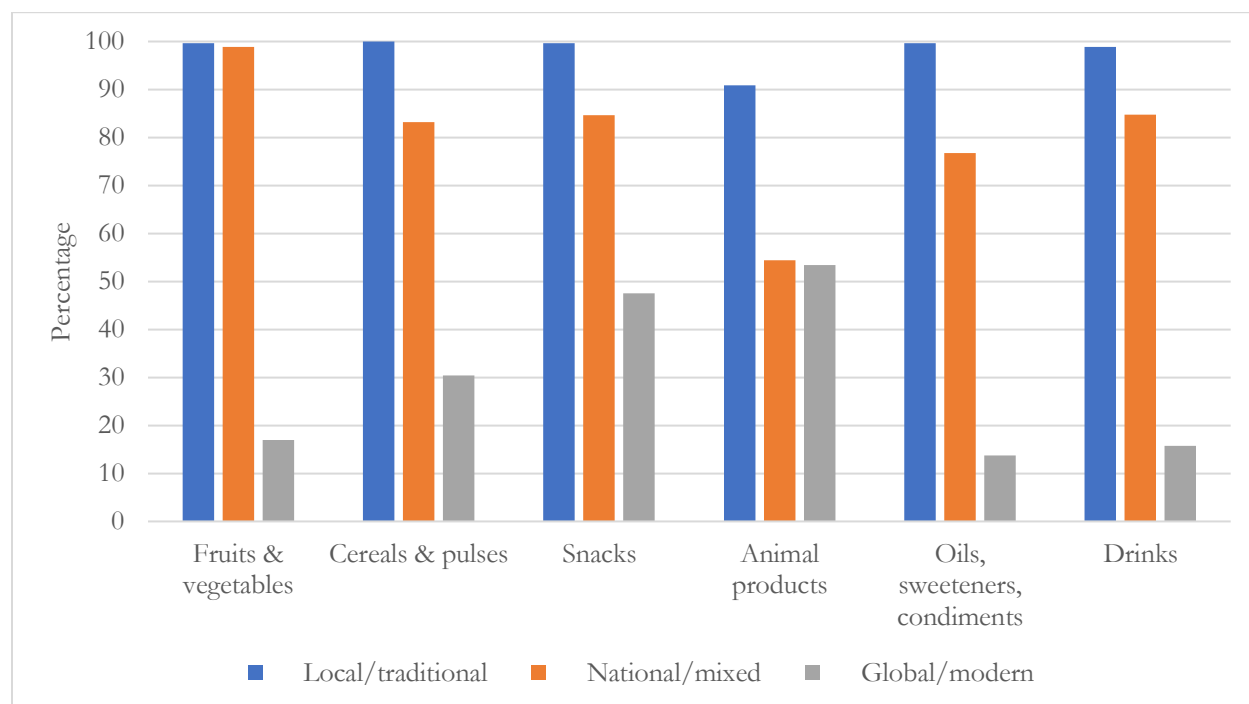
Characteristic	Fruits & vegetables (%)		Cereals & pulses (%)		Snacks (%)		Animal products (%)		Oils, sweeteners, condiments (%)		Drinks (%)	
	W <i>n</i> 231	M <i>n</i> 229	W <i>n</i> 255	M <i>n</i> 248	W <i>n</i> 275	M <i>n</i> 235	W <i>n</i> 209	M <i>n</i> 177	W <i>n</i> 198	M <i>n</i> 188	W <i>n</i> 281	M <i>n</i> 282
<b>Would change selection if...</b>												
<b>...had an additional Rs. 250</b>												
Local to non-local	46.8	41.9	52.6	41.9*	40.9	38.3	30.4	26.8	27.9	23.9	58.4	53.3
Non-local to local	16.0	27.6	25.0	23.5	40.8	46.2	8.6	12.0	14.3	33.3	8.6	6.3
<b>...want something tasty</b>												
Local to non-local	40.0	42.0	39.7	32.6	27.7	25.3	30.8	23.8	32.6	32.3	32.5	34.3
Non-local to local	20.8	13.8	14.3	30.0	37.3	28.6	13.2	22.2	42.9	40.0	20.0	8.3
<b>...want something healthy</b>												
Local to non-local	47.1	45.3	40.2	44.1	31.5	25.6	17.3	12.9	33.3	35.2	40.2	41.6
Non-local to local	24.0	48.3	52.4	40.0	49.0	48.1	51.2	53.8	42.9	40.0	31.4	25.0
<b>...very hungry</b>												
Local to non-local	55.2	57.2	39.8	31.3	22.3	17.2	23.2	20.7	39.3	32.5	26.3	20.3
Non-local to local	24.0	17.9	9.5	50.0*	48.0	43.3	17.6	32.0	14.3	41.7	37.1	39.6
<b>...had little time to prepare food</b>												
Local to non-local	52.5	53.2	52.2	35.8*	21.7	17.7	21.9	14.6	41.7	31.0	24.1	16.7*
Non-local to local	40.0	20.7	9.5	31.6	40.0	43.3	27.3	36.0	14.3	3.3	41.2	43.8

*Note:* Each respondent was asked about 3 randomly selected food groups, therefore the total number of respondents per food group is noted under each food group. Change in preference refers to the calculated proportion of respondents who chose a local food item as their most frequently consumed item and then chose a non-local food item in an alternative scenario compared to those who chose local food items in each instance, and likewise with change from non-local to local food items. Non-local = national/mixed or global/modern

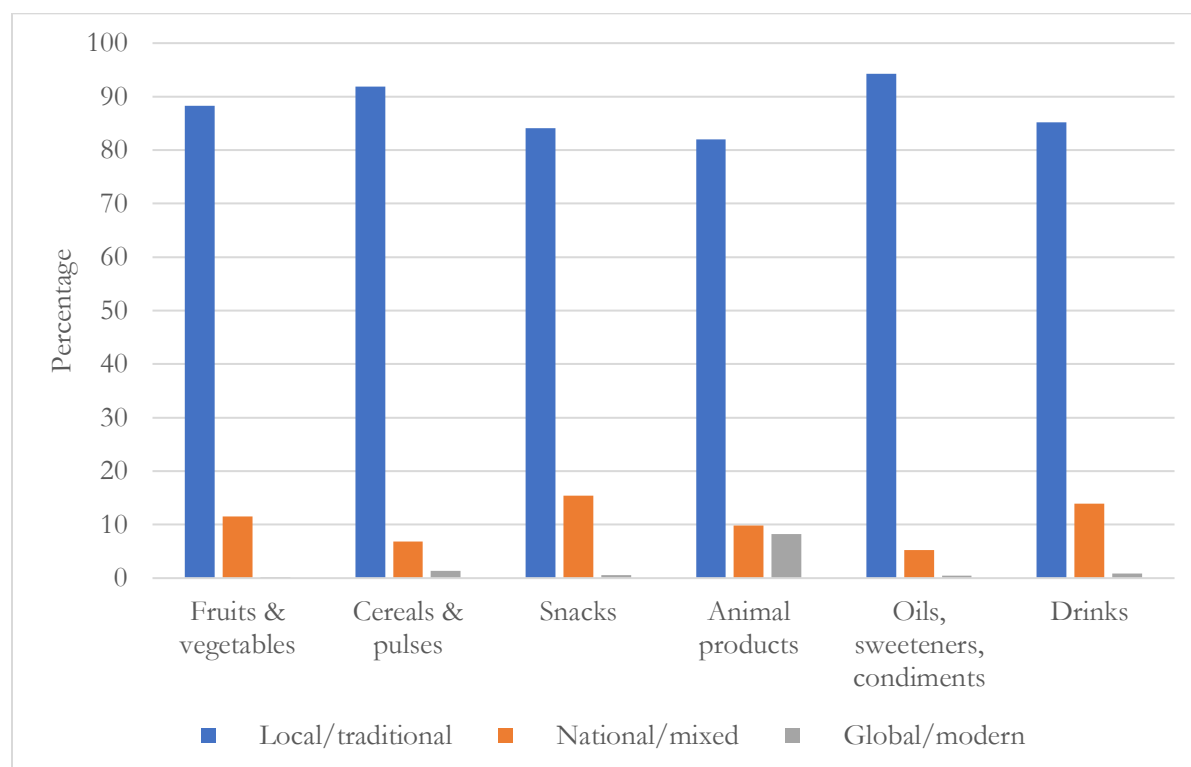
W = woman; M = man

\* $p < 0.05$

**Figure 1.** Proportion of ever consumed food item among adults in Vijayapura, India, by food group



**Figure 2.** Proportion of most frequently eaten food item among adults in Vijayapura, India, by food group



## APPENDIX

**Table 8.** Food card number with food item name

FOOD CATEGORY	FOOD CARD NUMBER	LOCAL FOOD ITEMS		FOOD CARD NUMBER	NATIONAL FOOD ITEMS		FOOD CARD NUMBER	GLOBAL FOOD ITEMS
FRUITS & VEGETABLES	AL1	BANANA		AN1	CORN		AG1	DRAGON FRUITS
	AL2	BER		AN2	POTATO		AG2	KIWI
	AL3	GREEN LEAFY VEGETABLES (SPINACH/FENUGREEK)		AN3	APPLE		AG3	BROCCOLI
	AL4	LADIES FINGER		AN4	ORANGE		AG4	RED AND YELLOW BELL PEPPER
CEREALS & PULSES	BL1	RICE		BN1	MULTIGRAIN FLOUR		BG1	BREAKFAST CEREALS
	BL2	MILLETS (BAJRA/JOWAR)		BN2	RAJMA		BG2	OATS/ MASALA OATS
	BL3	PEANUTS		BN3	CHICKPEAS		BG3	BUNS/BREADS
	BL4	DAL		BN4	OTHER NUTS (ALMOND/PISTA)		BG4	PASTA
SNACKS	CL1	INDIAN SWEETS (LADDU/BARFI/PEDA)		CN1	CHIPS		CG1	PIZZA/BURGER
	CL2	CHAKLI		CN2	WADAPAV		CG2	PASTRIES
	CL3	POHA		CN3	CHATS (BHELPURI/PAANIPURI)		CG3	NOODLES
	CL4	CHIWDA		CN4	INDIAN SWEETS (RASMALI/RASAGULLA)		CG4	CHOCOLATES

FOOD CATEGORY	FOOD CARD NUMBER	LOCAL FOOD ITEMS		FOOD CARD NUMBER	NATIONAL FOOD ITEMS		FOOD CARD NUMBER	GLOBAL FOOD ITEMS
<b>ANIMAL PRODUCTS</b>	<b>DL1</b>	MILK		<b>DN1</b>	KULFI		<b>DG1</b>	ICE CREAM
	<b>DL2</b>	CURD		<b>DN2</b>	CHICKEN/MEAT/ SEAFOOD		<b>DG2</b>	FLAVORED MILK
	<b>DL3</b>	BUTTER/GHEE		<b>DN3</b>	CHEESE		<b>DG3</b>	FROZEN CHICKEN NUGGETS/PRAWNS
	<b>DL4</b>	EGGS		<b>DN4</b>	PANEER		<b>DG4</b>	CREAM/MILK POWDER
<b>OILS, SWEETENERS, CONDIMENTS</b>	<b>EL1</b>	SALT		<b>EN1</b>	SAUCE		<b>EG1</b>	CHILLI SAUCE/ DARK SOY SAUCE
	<b>EL2</b>	CHUTNEY/PICKLES		<b>EN2</b>	FRUIT JAM		<b>EG2</b>	MAYONAISE
	<b>EL3</b>	OILS		<b>EN3</b>	MASALA PACKETS		<b>EG3</b>	PEANUT BUTTER
	<b>EL4</b>	SUGAR JAGGERY		<b>EN4</b>	HONEY		<b>EG4</b>	SUGAR FREE SWEETNERS
<b>DRINKS</b>	<b>FL1</b>	TEA/COFFEE		<b>FN1</b>	LASSI		<b>FG1</b>	ICED COFFEE
	<b>FL2</b>	NIMBHU PANI		<b>FN2</b>	SOFT DRINKS		<b>FG2</b>	DIET SOFT DRINKS
	<b>FL3</b>	SUGAR CANE JUICE		<b>FN3</b>	COCONUT WATER		<b>FG3</b>	ENERGY SPORT DRINKS
	<b>FL4</b>	BUTTERMILK		<b>FN4</b>	MILKSHAKE		<b>FG4</b>	GREEN TEA