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Poverty Amid Plenty: Resource scarcity, aspirational consumption, relative deprivation, and mental health in India

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Abstract

Poverty Amid Plenty: Resource scarcity, aspirational consumption, relative deprivation, and mental health in India

By Amanda Maxfield

Interest in the relationship between food insecurity, water insecurity, and mental health has grown substantially in recent years, but critical gaps in the literature persist. First, few studies assess food and water insecurity simultaneously, particularly in urban areas. As a result, it is not clear whether food and water scarcity have independent, iterative, or overlapping effects on mental wellbeing. In the same vein, few studies examine whether intrahousehold disparities in water insecurity mirror intrahousehold disparities in food distribution.

Second, most research on resource insecurity and mental health has focused on documenting general associations, with few attempts being made to identify more proximate mechanisms. For example, food insecurity and mental wellbeing may be linked because food scarcities beget undernutrition, and evidence suggests that undernutrition increases one's risk of common mental disorders. Alternatively, because food scarcities force households to alter the types and quantities of the foods they consume, food insecurity may lead to a reduction in the consumption of socioculturally significant foods. This, in turn, could contribute to feelings of isolation, shame, and powerlessness that ultimately result in depression, anxiety, or stress.

This dissertation attempts to address these gaps using data collected during 11 months of fieldwork with mothers, fathers, and adolescents (13-17 years) living in the slums of Jaipur, India. It examines whether the relationship between water insecurity and mental health exists when adjusting for food insecurity. And it tests whether gender- and age-based disparities characterize intrahousehold reports of food and water scarcity. In addition, it determines whether access to socioculturally significant foods—specifically, prestige foods—also varies with gender and age. Finally, it examines whether prestigious food consumption might mediate the relationship between food insecurity and mental health while controlling for measures of wealth and malnutrition.

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This project evolved into a much larger undertaking than I could have ever imagined; the intended number of interviews nearly tripled, and an initial handful of field sites ballooned to include large swathes of Jaipur. The endeavor was successful in large part because of the incredible effort, determination, and patience displayed by my amazing research assistants. Surendra, Kaushaliya, Bharat, Manish, and Payal—to say that this project would not have been possible without you is by no means an overstatement. Thank you so much for agreeing to follow me all over the city, at all hours, and in scorching heat. I will be forever grateful for your company, ideas, and enthusiasm in the face of tiring and sometimes uncomfortable work.

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Introduction

Overview

According to current estimates, over 800 million people worldwide face chronic hunger (FAO, 2017), and as many as 1.8 billion use unsafe water (Onda et al., 2012). It is well established that these inadequacies pose a substantial global threat to physical health in the form of malnutrition and infectious disease (FA0, 2017; Prüss-Ustün et al., 2015). However, food and water scarcity also have profound implications for mental wellbeing as inadequate resource access has been repeatedly linked with symptoms of common mental disorders (forthcoming Tribble, Maxfield, and Hadley; Weaver and Hadley, 2009; Wutich and Brewis, 2014)[1].

Interest in the relationship between resource insecurity and mental health has grown sharply in recent years. A systematic review by Hadley and Weaver in 2009 yielded just 27 studies on food insecurity and mental health, of which 11 were qualitative and 16 were quantitative. In contrast, a meta-analysis conducted only a decade later, and with stricter inclusion criteria, identified over 180 quantitative papers alone (forthcoming analysis through 2018; Tribble, Maxfield, and Hadley). Although no comparable analysis has been published for the water insecurity-mental health relationship, qualitative observations suggest a similar trend.[2]

[1]Throughout the rest of this dissertation "mental health" and "mental wellbeing" are used to describe any combination of symptoms related to anxiety disorders and depressive disorders. The phrase common mental disorders (CMD) is only used when describing studies that explicitly frame their results as such. This decision reflects the fact that few observational studies on resource insecurity assess the existence of CMD in a clinical setting or ask respondents about previous clinical diagnoses. Instead, most studies assess *risk* for CMD or "probable" CMD (Tribble, Maxfield, and Haley forthcoming). Alternatively, some studies (including this dissertation) use psychological distress as an outcome variable, which is generally taken to be a composite of symptoms present in depressive and anxiety disorders (e.g., see the Hopkins Symptom Checklist). Still others purport to tap "negative [emotional] experiences," "psycho-emotional distress," or culture-bound illness constructs. Thus, although all of these measures clearly touch upon a related constellation of symptoms tied to CMD and, in doing so, warrant being discussed as part of the same pool of evidence, their diversity nonetheless makes "mental health" and "mental wellbeing" slightly more appropriate descriptions.

[2] But see Wutich and Brewis (2014) for an overview of the water insecurity literature.

Despite this proliferation of studies, notable gaps in the literature persist. First, the pathways connecting resource insecurity to mental health remain unclear (Hadley and Weaver, 2009; Weaver et al., 2014). Most studies to date have focused on documenting broad associations rather than testing more proximate mechanisms (forthcoming Tribble, Maxfield, and Hadley). However, there is reason to believe that relative deprivation may pay a role (Hadley and Patil, 2006; Cole and Tembo, 2011; Frongillo et al., 2017; Frongillo et al., 2018). Second, few studies have used experience-based scales to examine intrahousehold differences in food and water scarcity (Hadley and Crooks, 2012; Wutich and Brewis, 2014), despite the noted superiority of such measures for capturing the true resource insecurity burden (Hadley and Wutich, 2009). Research on intrahousehold food disparities has relied almost exclusively on anthropometric and nutritional indicators despite recognition that food's social meaning is a critical site for household allocation decisions (Harris-Fry et al., 2017; Haddad et al. 1996). In view of this, gender- and age-based differences in the resource insecurity-mental health relationship are not well documented or understood (Hadley and Crooks, 2012; Wutich and Brewis, 2014). Third, comparative data from India is extremely limited, even as the country accounts for a quarter of the world's undernutrition burden (FAO, 2017) and hosts the largest global percentage of people facing severe annual water scarcity (Mekonnen and Hoekstra, 2016). In the same vein, a global sampling bias toward agricultural communities makes it possible that any observed associations along the water-food-mental health nexus actually differ across the urban-rural divide (forthcoming Tribble, Maxfield, and Hadley; Wutich and Brewis, 2014).

This dissertation addresses these gaps using data collected during two projects. The first project took place in the summer of 2013 and involved data collection among school-going adolescents in a remote, midsized city in southern India (Chapter 2). It was part of a larger study

on dietary change and overweight conceptualized long before this dissertation's primary research questions about resource insecurity, deprivation, and mental health were articulated. However, major themes, methods, and findings from that study were foundational to the design and analysis of the second project.

The second study was conducted among slum-dwelling households in Jaipur, a major city in northern India, between 2016 and 2017. It involved three stages of data collection, ending with a cross-sectional survey. The results from that project constitute the other three chapters included in this dissertation (Chapters 1, 3, 4).

Each chapter takes the form of a self-contained research paper. But all four include background information and discussion that, though not essential for understanding the other three, ultimately enrich the overall picture of resource insecurity, relative deprivation, and mental wellbeing in India. For example, Chapter 2 discusses how large-scale processes impact cultural models of food prestige among Indian adolescents, but Chapter 3 considers how those models interface with age- and gender-specific food preferences. Where Chapter 1 follows in the footsteps of more traditional academic inquiry by documenting gender- and age-based disparities in material resource deprivation, Chapter 3 analyzes whether food's social meaning might also be unequally distributed within households. Similarly, where Chapter 1 tests differences in the predictive power of water and food insecurity for mental health, Chapter 4 moves one step further to ask whether disparities in prestigious food consumption predict psychological wellbeing beyond that explained by those more traditional measures of deprivation. Yet readers wanting an overview of the historical, politico-economic, and sociocultural reasons for a given food's prestige would find that information in Chapters 2 and 3. Thus, although the four chapters can be read in any sequence or

even in isolation, the order in which they are presented offers readers the smoothest and most informed tour of the overall project.

The following introduction is divided into four major sections. The first provides an overview of the disciplinary and theoretical foundations central to this project. While each Chapter delves more deeply into the specific mechanisms under study (e.g., Chapter 4 examines relative deprivation), this first section describes perspectives and approaches within anthropology that inform all four. The second section discusses what food and water insecurity actually mean and how they might be measured. The third section includes background information on India structured around four topics: India's chronic food insecurity problem, evidence for the relationship between resource insecurity and mental health in India, the state of the literature on intrahousehold food allocation in India, and the material realities of life in India's slums. The last section describes each of the four papers, highlighting the ways in which the introductory material described here interfaces with the questions addressed within them.

Anthropological foundations

This dissertation is informed by ideas and methods characteristic of biocultural anthropology—an integrative approach to studying human variation that draws on multiple other anthropological subdisciplines (e.g., biological, cultural, medical, psychological, cognitive). The precise meaning of the term "biocultural" and its application have varied over time and between individual anthropologists (Wiley and Cullin, 2016). The "biological" component, in particular, takes different forms depending on one's research agenda. Some anthropologists focus on the physiological and evolutionary foundations for human culture and behavior (Smith, 2013). Others frame human biology and culture as a set of intertwined and adaptive modes via which humans are able to cope with varied environmental conditions—those conditions themselves being an

outcome of biological (ecology) and social factors (Wiley, 1992). On the other hand, biocultural anthropologists concerned with population health tend to engage with biology predominately as an outcome of particular material and social conditions, and thus a marker of wellbeing (Goodman and Leatherman, 1998). This approach generally emphasizes the role that politico-economic forces at the global and local level have in shaping the material realities that work to constrain or enable individuals and thereby impact human biology. A final, more recent perspective bids researchers consider the psychological processes that connect biology and culture (Hruschka et al., 2005). Its proponents argue that politico-economic processes influence individual biology via more than just changes to economic or social circumstances; they shape sociocultural values and individual perception. In other words, culture "gets under the skin" via both material conditions and one's understanding of them.

This dissertation aligns most closely with the final conceptualization—a politico-economic approach to biocultural anthropology that centers the role the mind plays in connecting culture and wellbeing.[3] Notably, however, the meaning and application of "culture" within this approach differs sharply from other fields with which the subdiscipline shares topical similarities. For example, significant overlaps exist between epidemiological research and health-oriented biocultural studies, particularly where researchers employ quantitative approaches. Academics from both disciplines are fundamentally concerned with the connections between individual variation and differing health outcomes. However, epidemiological approaches for measuring culture are almost always more limited. Epidemiologists and other public health scientists

[3] This does not mean that other perspectives within biocultural anthropology are irrelevant to the questions addressed here. For example, although my research does not engage heavily with evolutionary theory, the hypotheses put forward in Chapter 4 are informed by the physiological mechanisms that underlie status-associated mental health outcomes, and these are present in humans precisely because of our evolutionary history (Sapolsky, 2005).

generally assess culture using dummy variables for ethnicity, caste, race, or nationality (Hruschka, 2009; Kohrt et al., 2009). In these instances, it is generally assumed that culture is homogenous within a given group and whatever cultural variation is important for health can be captured (or "controlled for") with simple membership-based variables. Alternatively, culture is invoked as an explanation for any remaining variation in wellbeing not attributable to standard demographic and socioeconomic measures (e.g., income, education, gender) (Hruschka, 2009; Kohrt et al., 2009). Unfortunately, little is gained theoretically or practically from the conclusion that a loosely articulated and abstract entity or some automatic characteristic of group membership is to blame for messy statistical results that diverge from expectation. These approaches are suspect not only because they fail to account for individual variation, but because they fool researchers into thinking that health disparities between groups are cultural when the disparities are more often tied to structural inequalities and material deprivation (Farmer, 2001).

In contrast, biocultural anthropologists working from a psychological perspective locate culture within the mind and usually operationalize the concept via cultural models (e.g., Dressler and Bindon, 2000; Gravlee et al., 2005; McDade et al., 2007; Read-Wahidi et al., 2017; Sweet, 2010). First articulated by cognitive anthropologists, cultural models are socially transmitted schema for the content and structure of cultural domains—sets of beliefs, things, and ideas that are somehow linked within the minds of informants; cultural models dictate which elements belong to a domain (content) and how those elements relate to each other (structure) (D'Andrade and Straus 1992). Importantly, cultural models have motivational force; that is, they "set forth goals (both conscious and unconscious) and elicit or include desires" (D'Andrade and Straus, 1992, pg. 3). Consequently, cultural models can help explain why human motivations are not derived exclusively from physiological needs (e.g., using food to satisfy only hunger and water to satisfy

only thirst) (D'Andrade and Straus, 1992). Individual behavior can be discussed as both a reaction to material circumstances (e.g., resource deprivation) and an outcome of internalized cognitive structures (i.e., culture) that shape individual perceptions of those circumstances.

Thus, informed by psychological and politico-economic approaches to biocultural anthropology, this project examines not just inequalities but perceived inequalities. It considers not just deprivation but the large-scale changes and local cultural histories that shape the dimensions along which people judge their deprivation. Finally, it assesses how individual experiences within the environments produced by those processes impact wellbeing. These goals are realized using a distinctly anthropological approach to culture in addition to several methods pioneered by the discipline.

Resource insecurity: definitions and measurement

Food insecurity and its measurement

Food security rests on four pillars: availability, access, utilization, and stability (FAO, 2006). Availability refers to the aggregate food supply at both global and local levels, including those food resources derived from agricultural production, trade deals, foreign aid, and community stockpiles (FAO, 2006). Access describes the multiple mechanisms preventing or enabling individual control over food resources, including income disparities, market dynamics, infrastructural failures, cultural norms, and intrahousehold allocation decisions (FAO, 2006). Utilization is affected by individual knowledge, preparation practices, health status, and hygiene because these can all impact the degree to which the nutritional benefits of otherwise accessible foodstuffs are actually realized (FAO, 2006). Threats to the final pillar, stability, undercut food security even where the other three pillars are seemingly established. Availability, access, and

utilization are threatened by seasonal variations in crop yield, climate change, price volatility, and household-level shocks to financial solvency (FAO, 2006).

Throughout much of human history, availability has been a key stumbling block to population food security (Brown and Konner, 1987; Scrimshaw, 1987). Among foragers, seasonal variation led to repeated food shortages (Brown and Konner, 1987). In agricultural communities, ecological drivers of famine like drought and blight were major causes of hunger, starvation, and malnutrition (Scrimshaw, 1987). Popular and mass media discussions about food security continue to hinge on availability issues, particularly the pressures that future global population growth might bring. Even contemporary academic interest in food security can be traced to the world food crises of 1972-74 and 2007-08, which were largely supply-side problems (Hadley and Crooks, 2012). Indeed, the 1972-74 crisis spurred discussions that resulted in the original, though availability-oriented, definition of food security (FAO, 2006).

However, while climate change, war and related humanitarian crises, land competition from non-food industries, and 'westernizing diets' will continue to strain global food supplies, the human population has not yet outstripped the world's carrying capacity (Godfray et al., 2010; Hadley and Crooks, 2012). Major agricultural advancements during the eighteenth century coupled with more recent developments from the Green Revolution have significantly attenuated food availability problems at the global level (Barrett, 2010; Godfray et al., 2010; Pritchard et al., 2013). As such, contemporary food insecurity is rarely about true shortfalls in supply; rather, it reflects food's inequitable distribution (Barrett, 2010; Sen, 1982). As Sen (1982) argues, hunger occurs when an individual cannot command sufficient food via his or her exchange entitlements—whether those are derived from trade, labor, production, inheritance, or other claims to legal ownership (e.g., social security systems). In other words, both famine and day-to-day food

insecurity are as much a result of socioeconomic disadvantage as they are outcomes of absolute food scarcity.

Early efforts to quantify food security focused on supply-side indicators, which only gauge food availability (Barrett, 2010). For example, researchers compared the overall calorie needs of a population to the total energy supplied by local agricultural products. The shortfall in the latter as compared to the former was taken as an indicator of food scarcity. Unfortunately, these measures hide substantial within country variability in food access (Barrett, 2010). That is, even if overall food-energy production is sufficient, large swathes of the population within a given region, community, or set of households might nonetheless be food insecure.

Recognizing these disparities in access, more recent efforts have shifted toward demand-side indicators (Barrett, 2010). In general, these measures assess the gap between an individual's projected need and their capacity to satisfy it. For example, one method calculates the income necessary to buy a basket of foodstuffs sufficient to meet individual calorie needs (Coates, 2013; Pritchard et al., 2013). Households making less are deemed food insecure.[4] Many countries set the purchasing power necessary to afford a given basket of foodstuffs as their national poverty line (Webb et al., 2006; Pritchard et al. 2013).[5] In this sense, then, income-based estimates of food access assume that the number of food insecure households is the same as the number that are poor (Banerjee and Duflo, 2007).

Unfortunately, the multi-dimensional nature of food access means that poverty-based estimates still leave a large concept-to-measurement gap (Coates, 2013). For example, poverty line

[4] Some poverty line indicators look at household expenditure rather than income. Nonetheless, the expenditure-based poverty line is similarly set based on that necessary to purchase a pre-defined basket of foodstuffs and goods.
[5] India calculates its poverty line in this manner (Sen, 2005).

calculations are often lower than that which is necessary to actually purchase essential foodstuffs (Bapat, 2009). This can occur for a variety of reasons including regional price fluctuations, an inability for poor households to avail bulk discounts, transportation costs to reach fair-priced markets, and breakdowns in food subsidy entitlements that would normally lower the projected cost of staple items (Bapat, 2009). Moreover, poverty line calculations do not account for dietary restrictions, food preferences, or the ability to eat a socially appropriate diet. For example, Maillot et al. (2010) showed that French consumers could eat a nutritionally adequate diet at low cost, but that the most cost-limited plan violated dietary social norms. Model specifications that aligned the diet with mainstream consumption practices dramatically increased its cost (Malliot et al., 2010). In other words, even where poverty line cut-offs are sufficient for individuals to fulfill their basic calorie and nutrient requirements, the resultant diets often lack any resemblance to a socially acceptable one. Thus, many households falling above local poverty lines are nonetheless food insecure (Bapat, 2009; Pritchard et al., 2014).

Anthropometric indicators are another common class of demand-side measure (Barrett, 2010; Coates, 2013). These primarily include body mass index (BMI), triceps skinfold thickness (TSF), mid-upper arm circumference (MUAC), stunting (low height-for-age), and wasting (low weight-for-height). Individuals with scores falling below standardized cut-offs are considered undernourished. Given that undernutrition presupposes insufficient calorie or nutrient consumption, individuals with poor anthropometric indicators are presumably both hungry and food insecure. Indeed, reports by international research and relief agencies on the global hunger burden often derive, in part, from anthropometric measures.[6] Unfortunately, there are substantial problems with extrapolating from indices like BMI to food insecurity. First, the paucity of

[6] For example, see the UNDP Sustainable Development Goals and the Global Hunger Index.

ancestry-specific reference curves complicates interpopulation comparisons of these indicators (Hruschka et al., 2014), with several researchers suggesting that standardized cut-offs are inaccurate for Indian samples, specifically (Panagariya, 2013; Yajnik, 2004). More importantly, anthropometric indicators predominately assess protein-energy malnutrition.[7] Yet individuals can suffer from micronutrient undernutrition even while obtaining sufficient energy intakes (Eckhardt, 2006). In the same vein, the overlap between food insecurity and overnutrition (excess calorie consumption) is increasingly common, such that individuals may be overweight or obese yet still be food insecure (Eckhardt, 2006; Franklin et al., 2012). But anthropometric indicators cannot tease apart overnutrition caused by deprivation from that caused by dietary choice.

Food consumption measures can partially address these problems because they allow for estimates of micronutrient intake. Standardized versions include the Food Consumption Score (FCS) (WFP, 2008) and Household Dietary Diversity Score (HDDS) (Swindale and Bilinsky, 2006). These tools ask respondents about the foods they consumed within the past 24 hours or the frequency with which they ate items from different food groups within the past one week. Scores are calculated based on different weights assigned to particular food groups or based on the overall number of food groups consumed. Researchers may further attempt to estimate total consumption of specific micronutrients based on published averages for different food items. However, food consumption measures are ultimately poor estimators of food security. First, they are not actually direct measures of micronutrient undernutrition (Day et al., 2001). Participant recall errors and problems estimating the nutrient content of any given meal mean that the FCS and HDDS can easily misclassify individuals as undernourished or healthy. Moreover, people with low FCS or HDDS scores are not necessarily food insecure; dietary preferences are bound to inflate or deflate

[7] Micronutrient undernutrition can cause stunting.

the presence of certain food groups within any particular person's diet, and this can occur independently of food scarcity.

Both anthropometric indicators and food consumption measures are fundamentally restricted to assessments of nutritional adequacy, meaning they cannot measure food security in its fullest sense (Hadley and Crooks, 2012). Returning to the FAO (1996) definition, food insecurity is a much broader concept than poor nutrition or hunger. Yet these measures lead researchers to focus on food insecurity's physical consequences, while ignoring its social (e.g. isolation, stigmatization) and psychological repercussions (anxiety, depression, stress) (Hadley and Crooks, 2012). Thus, in many ways, a focus on nutritional indicators conflates definition and outcome (Hadley and Crooks, 2012).

The newest class of food security measures are experience-based scales. These "third generation" tools are far more likely to capture the true food insecurity burden than poverty- or nutrition-oriented measures, because they ask about the existence of food inadequacies from an individual's own perspective (Coates, 2006; Hadley and Wutich, 2009). At their most basic, experienced-based tools entail single-item indicators. Individuals might be asked whether they recently experienced hunger or whether their household was unable to purchase sufficient food. However, single-item tools neglect key experiences associated with resource insecurity, like the worry antecedent to outright shortages (Coates, 2013; Hadley and Wutich, 2009).

As such, multi-question measures are increasingly popular for their ability to gauge severity (Hadley and Crooks, 2012; Coates et al., 2006; Webb et al., 2006). Questions are often derived from the coping strategies that food insecure households use to mitigate scarcity, including forgoing preferred or healthy foods and skipping meals (Coates et al., 2006; Radimer et al., 1992). Because these scale items can generally be ordered according to severity, the number of questions

to which individuals respond affirmatively is indicative of the gravity of the food insecurity they experience (Ballard et al., 2013). In this sense, experience-based tools can evaluate not only who suffers but how they suffer (Coates et al., 2006). Although locally developed experience-based measures are arguably ideal (Hadley and Wutich, 2009), the ostensibly universal experiences attending food insecurity mean that cross-culturally validated scales are possible (Coates et al., 2006). Two of the most popular experience-based measures include the Household Food Insecurity Access Scale (HFIAS) (Coates et al., 2007) and the Food Insecurity Experience Scale (FIES) (Ballard et al., 2013).

Water insecurity and its measurement

As with food security, water security depends on overall availability, individual access, and actual utilization (Webb and Iskandarani, 1998).[8] Availability describes aggregate supply, while access depends on a variety of factors from market dynamics to infrastructural inequities (Webb and Iskandarani, 1998). Even where availability and access are ensured, water security hangs on utilization, a dimension shaped by potability, the opportunity costs of water acquisition, and personal sanitation knowledge (Webb and Iskandarani, 1998).

Ecological pressures remain legitimate threats to water security, perhaps more saliently so than equivalent supply-side issues are for day-to-day food security. Moreover, where drought, aridity, and cyclic fluctuations in rainfall limit water availability, climate change stands to substantially erode overall water supplies in the coming decades (Hanjra and Qureshi, 2010). While a variety of adaptive cultural strategies (e.g., migration), resource governance tactics (e.g., time-of-day restrictions), and technological innovations (e.g., improved hydraulic infrastructure) have been mobilized to address these pressures (Wutich and Brewis, 2014), not all individuals

[8] Though not necessarily identified as a fourth dimension in most discussions of water insecurity (Webb and Iskandarani 1998; Wutich and Brewis 2014), stability is as important for water security as it is for food security.

benefit equally from those efforts. As with food insecurity, household- and individual-level water scarcities arise from inequities in access (Wutich and Brewis, 2014), and these inequities mirror socioeconomic disadvantage.

While tools assessing food security have proliferated, widely accepted and cross-culturally validated water security scales remain rare. Early attempts saw researchers relying on per capita estimates of water availability (Falkenmark et al., 1989). However, these macro-estimates suffer from the same problem as supply-side measures of food security—a limited capacity to understand household- or individual-level disparities in resource distributions. In view of this, water security has been gauged with access-related measures like water source proximity (Tsai et al., 2016) and water source type (Wutich and Ragsdale, 2008), while measures of utilization include questions like total water consumption (Wutich and Ragsdale, 2008). More recently, there have been calls to develop experience- or perception-based measures of water security similar to those now popular in studies of household food security (Hadley and Wutich, 2009). However, despite a resulting surge in the number of researchers developing such scales, few if any of these tools have been deployed outside the original contexts in which they were created (Boateng et al., 2018; Jepson et al., 2017; Stevenson et al., 2012; Tsai et al., 2015). Thus, their cross-cultural applicability and consequent utility in comparative analyses is not known. Researchers studying water insecurity are largely remanded to the creation of context-specific scales at each new study site.

Background information on India

Food scarcity and food insecurity in India

Throughout its history, India experienced a number of major famines (Sen and Drèze, 1991). These often occurred despite large grain stockpiles, and persisted even as neighboring regions remained unaffected (Sen and Drèze, 1991). Most famines were precipitated by major

droughts or other natural disasters that caused declines in crop production, and thereby reduced the demand for agricultural wage labor (Sen and Drèze, 1991). At the same time, panic hoarding and speculative price increases further reduced the exchange value of wages and commodities vis-à-vis food (Sen and Drèze, 1991; Sen, 1977). Thus, food price increases outpaced prevailing wage levels even as the work available for landless farmhands plummeted. On the whole, then, hunger was less a problem of absolute food shortages than of entitlement failures among households dependent on field labor or on the financial solvency of a field-laboring class (Sen, 1977; Sen and Drèze, 1991).

India's facility for famine prevention and relief has progressed substantially since partition (Pritchard et al., 2014; Sen and Drèze, 1991). Several factors have contributed to these improvements, including government-led efforts to stabilize food prices (e.g., preventing interstate foodgrain trade and providing subsidized grains) and new or revamped entitlement protections (e.g., guaranteed public works employment) (Pritchard et al., 2014; Sen and Drèze, 1991). Technological advances from the Green Revolution in the 1960s, such as the development of high-yield cereal varieties less sensitive to climatic fluctuations, have helped stabilize food production levels and contributed to national food surpluses (Pritchard et al., 2014). Indeed, contemporary India now meets its own foodgrain needs, and a large portion of its buffer stocks are bought by the government for subsidized redistribution (Pritchard et al., 2014). In the same vein, the White Revolution boosted India's capacity for milk production, expanding the country's ability to meet the protein needs of its large vegetarian population (Pritchard et al., 2014).

Perhaps unsurprisingly, then, FAO forecasts in 2000 judged India on track to meet the second part of Millennium Development Goal 1: to reduce the number of people suffering from hunger by half between 1990 and 2015 (Pritchard et al., 2014). In fact, a further boon to this goal

occurred just a short while later in 2001, when the Indian Supreme Court decided in favor of a filing that argued the right to food was mandated by the Indian constitution (Pritchard et al., 2014). As part of those proceedings, the court ordered India's national and local governments to take measures that would ensure that right (Pritchard et al., 2014). This included expansions of extant social welfare programs like the Public Distribution System (PDS), the Integrated Child Development Scheme (ICDS), and the Midday Meal Scheme (MDMS) in addition to the development of new programs like the Mahatma Gandhi National Rural Guarantee Scheme (MGNREGS) (Pritchard et al., 2014).[9]

Yet, despite the agricultural capacity to feed its population (in absolute caloric terms), a booming economy, a diverse set of social welfare programs, and optimistic forecasts by international bodies and academic experts alike, India's undernutrition rates did not improve in line with expectation (Pritchard et al., 2014). As explained by Pritchard et al. (2014), models derived from other countries predict average annual reductions in childhood underweight-for-age proportional to half a nation's GDP growth rate over the same period. For example, an average GDP increase of 4% would be expected to yield a 2% decline in childhood underweight. However, over the 15-year period between 1990 and 2005, childhood underweight in India fell by just 10% even as the projected total reduction topped 27% (Pritchard et al., 2014). Thus, although the frequency and severity of outright famines have declined, hunger and undernutrition continue to afflict large swathes of India's population.

[9] The PDS provides subsidized wheat, rice, sugar, oil, and kerosene via Fair Price Shops. The ICDS provides supplementary feeding programs for undernourished children ages 0-6 years old. Services are offered through ICDS centers (Anganwadi). MDMS provides lunches to children attending government (public) schools on the days the children are present. MGNREGS guarantees 100 days of unskilled employment and minimum wage compensation to at least 1 person in all rural households; where no jobs are available, an unemployment allowance is provided instead (Pritchard et al., 2014).

This situation is made all the more puzzling by four statistical observations about the period between 1983 and 2005 collectively referred to as the "Indian enigma": 1) mean per capita household expenditure rose; 2) but mean per capita expenditure on food did not increase proportionally[10]; 3) mean per capita calorie consumption actually fell; 4) and declining cereal consumption was the primary driver of that drop in energy intake (Basu and Basole, 2012; Deaton and Drèze 2009; Pritchard et al. 2014). In other words, even though Indians became wealthier, they did not generally direct that wealth toward acquiring more food. And, in fact, the food they did buy provided fewer calories, primarily because people purchased fewer cereals.

A variety of interpretations have been offered for this pattern, but the true explanation probably includes some combination of them. According to the first interpretation, the average Indian household's economic situation has not actually improved, and evidence to the contrary stems from a misleading methodological technicality. More specifically, the basket of goods used to calculate the poverty line has not been appropriately updated, and this makes comparisons with earlier poverty and expenditure estimates inaccurate (Patnaik, 2004; Pritchard et al., 2014). The second interpretation argues that reductions in the proportion of the population engaged in manual labor means actual calorie requirements have also declined. Moreover, public health efforts meant to prevent infectious disease have improved nutrient absorption in poor individuals. In this view, minor food expenditure increases and stagnant or declining food consumption would be expected (Deaton and Dreze, 2009; Pritchard et al., 2014). The third interpretation concludes that household incomes have not kept pace with new and expanding expenditure categories (e.g., education, health, and transportation) in addition to food. That is, food spending would indeed increase more substantially if household budgets were large enough to accommodate all expenditure categories;

[10]In fact, most of that increase occurred between 1983 and 1987. Per capita food expenditure actually declined in urban areas between 1987 and 2005 (Pritchard et al., 2014).

however, as it currently stands, nutritional needs have essentially been sidelined (Basu and Basole, 2012; Pritchard et al., 2014). The fourth interpretation suggests that poor people are not necessarily interested in allocating their financial resources in a way that maximizes calorie consumption. Rather, households are inclined to spend money on more desirable but expensive foods or on non-food items (Banerjee and Duflo, 2011; Pritchard et al., 2014).

Resource insecurity and mental health in India

Though the causes of poor mental health are multifactorial and their consequences numerous, poverty, in particular, exhibits persistent links with CMD (Lund et al., 2010; Patel and Kleinman, 2003). Moreover, this relationship appears cyclical; that is, the stress, social exclusion, malnutrition, and violence common in poverty increase the risk of CMD even as CMD impair the ability of the poor to contend with economic hardship (Lund et al., 2011). Nonetheless, the nature and scope of the relationships between specific aspects of poverty and CMD are less clear. For example, in a systematic review by Lund et al. (2010), variables like social class, housing, socioeconomic status, education, and financial stress were consistent predictors of CMD but results for ostensibly more direct measures like income, employment, and consumption were muddled.

Food insecurity is one dimension of poverty that has received considerable attention in recent years. Several literature reviews find that food inadequacies, unlike other poverty measures, are consistently and positively associated with anxiety and depression (Lund et al., 2010; Weaver and Hadley, 2009; Wutich and Brewis, 2014). Somewhat concurrently, interest in water insecurity has also surged, with results generally indicating that the association between water insecurity and mental health is comparable to that observed for food insecurity (Wutich and Brewis, 2014). However, around half of the studies on food insecurity and mental health conducted to date are

from North America (namely Canada and the United States), while another quarter pertain only to Africa (namely Ethiopia, South Africa, and Uganda) (forthcoming Tribble, Maxfield, Hadley). Because the water insecurity literature is somewhat younger, the global distribution of studies appears generally more diffuse and lacking in all regions.

As a result, despite India's high rates of food and water insecurity, few relevant studies on resource deprivation and mental health are available from the country. Expanding the literature search to the rest of South Asia yields only a handful of additional examples, such that, in total, just 17 quantitative studies pertaining to food insecurity and mental health are available from the region (Table 1). For water insecurity and mental health, the available research is limited to two papers (Table 2). Nonetheless, all but one of the 19 articles report a significant, positive relationship between food or water insecurity and mental wellbeing.

Table 1a. Summary of all quantitative studies from South Asia that test for a relationship between **food insecurity** (e.g., scale measure, hunger, skipping meals) and some measure of mental health (e.g., depression, anxiety, stress, distress, any common mental disorder [CMD]). Cells are highlighted to indicate that a design element of the published study (i.e., country, urbanicity, inclusion criteria, scale use) differed from the project described here in a way that could modify the relationship of interest.

	Study location	**Study site type**	**Respondent type**	**Other inclusion criteria**	**Study design**	**Sampling**	**Independent variable**	**Food insecurity measure**	**Dependent variable**
1	Bangladesh	Rural	Women	Ultra-poor	Quasi-experimental	Multistage selection process to identify ultra-poor	Food insecurity	Scale	Distress; subjective wellbeing
	Jalal et al. 2015 Primary finding: A poverty alleviation program reduced distress and subjective well-being, primarily through improvements to food security								
2	Bangladesh	Urban slum	Women	With child <=5	Cross-sectional	Convenience	Food insecurity	Scale	Common mental disorders
	Khan et al. 2017 Primary finding: Food insecurity had a dose-dependent effect on odds of having a common mental disorder								
3	India	Small town	Women	Pregnant (hunger not assessed postnatally)	Cross-sectional (but from longitudinal study)	Convenience; recruitment via hospital	Hunger	Single: hunger during past 1 month	Depression
	Patel et al. 2002 Primary finding: Hunger predicted relative risk of antenatal depression								
4	India	Rural and peri-urban	Women	None	Cross-sectional	Random	Hunger	Single: hunger during past 3 months	Common mental disorder
	Patel et al. 2006 Primary finding: Hunger predicted a higher risk of having a common mental disorder								
5	India	Rural	Men and women	Elderly (>65)	Cross-sectional	Not clear	Food insecurity	Single; hunger during past 1 month	Depression and suicidal ideation

	Rajkumar et al. 2009 Primary finding: Hunger predicted a higher risk of depression and suicidal ideation								
6	India	Urban	Men and women	Receiving antiretroviral therapy for HIV	Cross-sectional	Convenience; recruitment via hospital	Food insecurity	Scale	Depression
	Heylen et al. 2015 Primary finding: Moderate-severe food insecurity predicted depression in men but not women								
7	India	Urban	Men and women	HIV positive	Cross-sectional	Convenience; recruitment via hospital	Food insecurity	Scale	Psychological distress
	Kang et al. 2015 Primary finding: Food insecurity predicted worse psychological distress								
8	India	Rural	Women	None	Cross-sectional	Convenience; recruitment via hospital/ clinics	Food insecurity	Single: Skipping meals during past week due to money	Common mental disorder; Daily stress
	Fahey et al. 2016 Primary finding: Food insecurity was associated with higher stress and increased odds of a positive screening for common mental disorders								
9	India	Urban slums	Girls (13-19)	None	Cross-sectional	Random	Food insecurity	Scale	Depression
	Rani et al. 2018 Primary finding: Food insecurity predicted higher depression, anxiety, and psychological distress								
10	India	Urban slums	Men and women	None	Cross-sectional	Random	Food insecurity	Single; Number of times unable to buy enough food during past month	Common mental disorders
	Subbaraman et al. 2014 Primary finding: Experiencing >5 days without sufficient money to buy food during past month predicted a higher likelihood of common mental disorders (note: no significant association for insufficiencies for fewer days)								
11	Nepal	Rural	Women	Postpartum	Cross-sectional	Random (part of cluster-	Food insecurity	Scale	Distress

						randomized trial)			
	Clarke et al. 2014 Primary finding: Food insecurity predicted an increased risk of distress								
12	Pakistan	Rural	Women	Pregnant	Cross-sectional	Random (part of cluster-randomized trail)	Food insecurity	Single; Insufficient money to purchase food for family during past month	Depression
	Maselko et al. 2017 Primary finding: Food insecurity predicted risk of depression								
13	Pakistan	Urban slums	Women	Pregnant	Cross-sectional	Purposive	Food insecurity	Scale	Depression
	Ayuub et al. 2018 Primary finding: Food insecurity predicted a higher risk of depression								
14	Sri Lanka	Welfare camps	Men and women	Internally displaced persons	Cross-sectional	Random	Food insecurity	Single; Number of days without sufficient food for household	Common mental disorders
	Siriwardhana et al. 2013 Primary finding: Food insecurity predicted an increased risk for common mental disorders								
15	Sri Lanka	Urban and rural	Men and women	Focus on conflict zones	Cross-sectional	Random + purposive	Food scarcity/ insufficiency	Unclear; appears to be a single question, but the exact phrasing not specified	Depression and anxiety
	Jayasuriya et al. 2016 Primary finding: Food scarcity was associated with an increased risk of depression and anxiety								
16	Afghanistan	Unclear, probably primarily urban	Women	None (but region is a conflict zone)	Cross-sectional	Random	Food shortage	Unclear; lack of food over past decade	PTSD

	Seino et al. 2008 Primary finding: Experiencing food shortages was positively associated with PTSD								
17[a]	South Asia	Urban and rural	Men and women, Boys and girls (>= 15 years)	None	Cross-sectional	Random (Gallup World Poll)	Food insecurity	Scale	Negative experiences (e.g., worry, sadness, stress)
	Jones et al. 2017 Primary finding: Food insecurity had a dose-dependent effect on odds of negative experiences								

[a]Jones et al. is does not report results broken down by age, gender, or country.

Note: The studies on food insecurity and mental health were drawn from a larger (exhaustive) list of studies compiled for a meta-analysis on food insecurity and mental health that spanned all countries (Table 1). The literature search for that meta-analysis was completed jointly by Amanda Maxfield and Anna Grace Tribble in accordance with PRISMA guidelines. However, the actual contents of Table 1 are derived from a second, separate reading of all relevant studies by Amanda Maxfield.

Table 2. Summary of all quantitative studies from South Asia that test for a relationship between **water insecurity** (e.g., scale measure, perceived water pollution) and some measure of mental health (e.g., depression, anxiety, stress, distress, any common mental disorder [CMD]). Cells are highlighted to indicate that a design element of the published study (i.e., country, urbanicity, inclusion criteria, scale use) differed from the project described here in a way that could modify the relationship of interest.

	Study location	**Study site type**	**Respondent type**	**Other inclusion criteria**	**Study design**	**Sampling**	**Independent variable**	**Water insecurity measure**	**Dependent variable**
1	Nepal	Urban	Women	Postpartum	longitudinal	Convenience; recruitment via hospital	Water insecurity	Scale	Depression
	Aihara 2016 Primary finding: Water insecurity predicted greater odds of depression								
2[a]	India	Urban slum	Men and women	None	Cross-sectional	Random	Water poverty	Single; using <20 liters of water per capita per day	Common mental disorder
	Subbaraman et al. (2014) Primary finding: Severe water poverty was **not** associated with a higher risk for common mental disorders								

[a]Subbaraman et al. (2014) found that paying a high price for water increased one's risk of a common mental disorder (>=200 rupees per 1000 liters). But paying more for water does not necessarily indicate water insecurity *per se*; rather, it indicates a risk for water insecurity. Thus, the above table and study count do not include this finding. Similarly, the same study found no significant relationship between having a household-level water connection and one's risk for a common mental disorder. Again, this does not indicate water insecurity but the potential for water insecurity.

Note: The literature search for studies on water insecurity and mental health was completed by Amanda Maxfield alone (Table 2).

In addition to general data scarcity, the sample characteristics and design elements in many of those studies render it difficult to make comparisons between them. For example, most of the studies pertaining to food insecurity rely on single-item measures of food access (e.g., hunger in the past 1 month) or limit their analyses to specific subgroups that face a variety of material and social stressors not present in the general population (e.g., HIV+ individuals, postpartum women). Moreover, only a single paper on the food insecurity-mental health relationship exists for each of Nepal (Clarke et al., 2014) and Afghanistan (Seino et al., 2008), while Sri Lanka (Jayasuriya et al., 2016; Siriwardhana et al., 2013), Bangladesh (Jalal et al., 2015; Khan et al., 2017) and Pakistan (Ayuub et al., 2018; Maselko et al., 2017) each have just two. Notably, all but two of those studies include only women. Although India boasts a comparative glut of research with eight published studies, half are restricted to either women (Fahey et al., 2016; Patel et al., 2002; Patel et al., 2006) or girls (Rani et al., 2018). Two of the four studies that include both men and women are restricted to HIV+ individuals (Heylen et al., 2015; Kang et al., 2015), while the third includes only the elderly (Rajkumar et al., 2009), and the fourth does not break results down by gender (Subbaraman et al., 2014). In the same vein, the single study capable of examining the relationship between food insecurity and mental health in a general population of men, women, adolescent boys, and adolescent girls does not report results separately by country (South Asia analyzed as a region), gender, or age group (Jones et al., 2017). The two papers on water insecurity and mental health exhibit similar limitations to the studies examining food insecurity. In one study, the sample is restricted to postpartum women (Aihara, 2016). In the other, analyses are not broken down by gender, and the relevant measure is a single question about water usage (i.e., a measured quantity) (Subbaraman et al., 2014).

The distinct lack of studies comparing gender- and age-based differences in the relationship between resource insecurity and mental health would be problematic in any context but is particularly so for India. First, mental disorders often begin in adolescence and are frequently tied to the stressors faced by disadvantaged youth (Patel et al., 2007). Poor mental health outcomes in adolescence may underlie substance abuse, violence, and educational difficulties in adulthood (Patel et al., 2007). India hosts the world's largest youth population (10- to 24-year-olds) (UNFPA, 2014), and, depression is the leading cause of disability-adjusted life years among them (globally) (Gore et al., 2011).[11] Thus, studies aimed at understanding the factors that contribute to common mental disorders in Indian adolescents are sorely needed. Resource insecurity may play a role, but this possibility has received little attention.

Second, it has long been suggested that gendered norms shape the way that resources are distributed within Indian households (Harris-Fry et al., 2017; Haddad et al., 1996). In particular, researchers frequently posit a pro-male bias to resource allocation decisions. And, indeed, evidence indicates a distinct male advantage in domains like education expenditure (Zimmerman, 2012) health care spending (Khera et al., 2014; Saikia and Bora, 2016), and under-5 mortality rates (Guilmoto et al., 2018). However, the evidence for food allocation disparities is somewhat equivocal, and studies on intrahousehold disparities in water allocation are effectively nonexistent. Nonetheless, if allocation disparities exist in populations facing substantial resource pressures, and if mental health is linked with resource insecurity in those settings, then gendered allocation biases could affect the distribution of CMD between men and women or boys and girls.

Intrahousehold food allocation in India

[11] Precise estimates for CMD in Indian youth are a little more difficult to come by. A recent review concluded that, because of varied study designs and sampling strategies, the point prevalence of depression and affective disorders in Indian adolescents ranged from 1.2% to 68% (Grover et al., 2019).

The global evidence for intrahousehold food disparities is mixed (Berti, 2012; Haddad et al., 1996). The variety of control variables, family structures, age ranges, socioeconomic classes, sociocultural contexts, and ecological settings examined make it difficult to consistently compare between them. Varied outcome measures, in particular, render cohesive interpretations of the available literature challenging (Harris-Fry et al., 2017). For example, in a single paper, Gittelsohn (1991) tested for sex biases in seven different food distribution practices and a further four micronutrient indicators; each constituted a different outcome variable, and the evidence for sex-dependent disparities varied between them.[12]

Where studies do find food allocation biases, males tend to be the beneficiaries (Haddad et al., 1996; Harris-Fry et al., 2017). More to the point, the strongest evidence for this pattern probably comes from South Asia (Haddad et al., 1996), with the most well-known review finding tentative evidence for disparities in energy intake between male and female adults (men favored in 2, women favored in 1, and no bias in 3), children (boys favored in 1, girls favored in 0, no bias in 5), and preschoolers (boys favored in 2, girls favored in 0, no bias in 4), but not adolescents (of 4 studies, no bias in any).[13] On the other hand, qualitative research (Madjdian and Bras, 2016) and a more recent review article (Harris-Fry et al., 2017) come down somewhat more firmly in favor of the idea that pro-male food allocation biases exist—at least under certain circumstances. In the same vein, studies that look at indicators unrelated to nutrition (e.g., luxury goods) generally show a more convincing male advantage (Gittelsohn, 1991; Sudo et al., 2006),

[12]The seven mechanisms included serving order, serving method (whether food is offered or requested), second helpings, substitution (offering some individuals less desirable or low-status foods), refusals of food requests, channeling (offering certain foods to particular individuals only), and food quantity (offering some individuals more food overall or more of the desirable and high-status foods) (Gittelsohn, 1991).

[13]These tallies are only for those studies that adjusted energy intakes for activity level and body weight (Haddad et al., 1996).

A number of gender norms prevalent in South Asia probably contribute to these findings. The first relates to the combined effects of the dowry system and patrilocality (Miller, 1997). Despite laws prohibiting dowry, the practice persists in many areas. Ensuring a high-status marriage partner for one's daughter requires substantial wealth transfers to the prospective husband's family in addition to major expenditures on the wedding itself (Chorghade et al., 2006; Miller, 1997). At the same time, patrilocal marriage patterns mean that girls spend most of their productive years in service of their husbands' families (Miller, 1997). Moreover, because of patrilocality, it is generally imagined that sons, not daughters, will be financially responsible for the care of aged parents (Chorghade et al., 2006; Miller, 1997). Thus, for many households, daughters represent a looming financial burden; feeding young girls is not necessarily costly in the short term, but female children are ultimately a long-term financial sink (Chorghade et al., 2006; Miller, 1997). An exceedingly bleak but cogent description of this thought process is recounted by Jatrana (2003) based on conversations with the mother of three daughters and one son:

> *There is no need to care for the girls, not even in infancy. They are like Kikar (acacia, a thorny plant which grows without any care). Girls will grow up without any care just as the Kikar tree grows up without any care. But boys are like Shisham (a precious timber wood tree which needs special care to grow). Moreover, caring for a girl means caring for someone else's baag (garden) because she is a Paraya Dhan (other's property) and will go to others' house after marriage* (pgs. 23-24).

Second, gender norms generally discourage women from working in the formal economy, and differences in the absolute financial returns from male and female labor are common even where they do (Kapsos et al., 2014; Miller, 1997). In 2012, India actually ranked fourth from last for women's participation in the labor market (Kapsos et al., 2014). As a result, limited food resources probably yield the most immediate or direct monetary gains when allocated to men. Similarly, for households engaged in predominately manual labor, men's general size and strength

advantages over women would increase both real and perceived financial returns on sex-biased food investments (Palriwala, 1993).

Where these gender norms reign but disparities are not found, other socioeconomic (e.g., household wealth, occupation, land ownership, income contributions, individual income contributions), demographic (e.g., religion, ethnicity, caste, education, family structure), and individual (e.g., personal preference and taste, food behaviors, nutrition knowledge) variables may be modifying the expected patterns of male favoritism (Harris-Fry et al., 2017) For example, poor households may be more inclined to encourage female economic productivity. When this occurs, income-driven pressures for pro-male allocation biases would relax and women's bargaining power increase (Agarwal, 1997). And, indeed, sex-dependent food allocation disparities in South Asia do not appear to diminish with increasing incomes (Haddad et al., 1996; Miller, 1992); among adults, pro-male biases may actually be larger in high compared to low SES households (i.e., higher caste and higher incomes) (Harris-Fry et al., 2017).

In some cases, the interaction between two or more modifying factors may underlie female disadvantage (or its absence). This can be seen very clearly with two variables in particular: food insecurity and age. In their systematic review of studies on intrahousehold food allocation in South Asia, Harris-Fry and colleagues (2017) concluded that adults in households facing severe or unexpected food insecurity exhibited more marked pro-male biases (Harris-Fry et al., 2017).[14] Similarly, Haddad et al. (1996) suggested that the greatest food access inequalities were probably present during the lean season. However, social norms surrounding food preparation and serving order mean that the individuals tasked with cooking may not receive sufficient portions when food

[14]Note that Harris-Fry et al. (2017) defined adults as individuals >15 years of age because the reviewed studies grouped together 'women of reproductive age' (i.e., ages 15-49). This window overlaps substantially with the adolescent population examined in this study.

supplies are limited; and responsibilities for cooking almost always fall to adolescent girls and women (Chorghade et al., 2006; Gittelsohn, 1991; Madjdian and Bras, 2016; Palriwala, 1993). For example, working in Nepal, Gittelsohn (1991) showed that male and female children are served at similar times, but female serving order declines starting at age 10. In other words, beginning in early adolescence, girls are served later. They may eventually join their mothers in eating very last. In a subsequent study by Madjdian and Bras (2016), Nepali women reported feeding men and young children first, while they and their adolescent daughters ate only what was left over; as one woman noted, this sometimes meant little to nothing:

> *Yes, I eat leftovers. First, I serve my husband. If his stomach is full then I can eat […] Because we cook, we sometimes don't have a full stomach. We have to compromise. Men always get sufficient [food]."* (pg. 215).

Palriwala (1993) similarly describes how food insecurity, gender, age, and patrilocal residence patterns interact to shape intrahousehold allocation disparities in northern India:

> *The person who cooked and the youngest daughter-in-law, usually the same person, ate last. This itself acted against her, even if there was no conscious discrimination. Thus after feeding unexpected guests, the person who ate last, the cook, could prefer to do without rather than cook again. In middle peasant households, often there could be no vegetables or lentils left and she made do with a pepper paste and/or raabri. In a situation of deficit she went hungry when other household members did not have to* (pg. 60).

In view of such accounts, it is all the more curious that there is almost no standard nutritional evidence for gendered food disparities in adolescents and, at best, suggestive evidence for adults (Haddad et al., 1996; Harris-Fry et al., 2017). Several possibilities could explain this observation. It may be that there are no intrahousehold disparities at all and that positive results merely represent a publishing bias (Haddad et al., 1996). Alternatively, the disparities may be too small to capture using standard methods (e.g., dietary recalls or observational measures of food consumption) or restricted to very specific circumstances that researchers rarely encounter. Finally, it is possible that food allocation disparities manifest primarily via "social rather than nutritional inequity" (Harris-Fry et al., 2017, pg. 18) because "Diets are not only evaluated by the

households on the basis of nutrients, but also on the basis of variety and prestige foods" (Haddad et al., 1996, pg. 21).

What does it mean to live in a slum?

How is slum defined?

Around 1 in 8 people and a quarter of the world's urban residents live in slums (UN-HABITAT, 2016). Despite reductions in the percent of the global population living in informal settlements, the overall number of slum dwellers continues to increase (UN-HABITAT, 2016). Because of rapid urbanization, South Asia is expected to see particularly dramatic growth in the absolute size of its slum population during the coming years (UN-HABITAT, 2016).

According to UN-HABITAT, slum-dwellers are those living in *households* that lack one or more of the following provisions: 1) access to improved water sources, 2) access to improved sanitation facilities, 3) sufficient living area, 4) durable housing, or 5) secure tenure. A slum, then, is any area for whom a portion of the residents face some assortment of these five "household deprivations" (UN-HABITAT, 2016). However, it is frequently the case that certain households within an informal settlement do not meet this definition or that slum households exist in an otherwise well-serviced community. For example, Fink et al. (2014) found that more than 70% of urban *households* in their 73-country sample would meet at least one of the UN-HABITAT criteria, and thus be considered slum-dwelling.[15] However, if a slum *community* was defined as those neighborhoods in which at least 50% of household lacked one or more of the UN-HABITAT criteria, then 80% of urban households were located in slums (Fink et al., 2014).

[15]Fink (2014) considered four of the household deprivations identified by UN-HABITAT 1) access to improved water sources, 2) access to improved sanitation facilities, and 3) sufficient living area. Secure tenure could not be easily assessed with DHS data. It seems likely that these numbers would be even higher if secure tenure could be assessed.

To further complicate the issue, slum definitions vary between and within countries; not all countries employ the UN-HABITAT definition (Nolan, 2016).[16] In India, there are substantial differences in the slum definitions used at the national, state, and city levels. Moreover, these definitions have changed over time (Nolan, 2016). For example, over the past 20 years, there have been four different slum definitions in active use at the national level alone, and these definitions often disagree (Nolan, 2016).[17] In an analysis of 8 Indian cities, only 10% of those areas designated slums by at least one of the definitions were considered such by all four; thus, the definitions overlapped for only 10% of putative slums (Nolan, 2016).

These discrepancies in slum definition have real consequences for the landscape of urban poverty in India. UN-HABITAT (2016) encourages local governments to upgrade extant slum communities in situ. This includes not only material upgrades (e.g., improved sanitation or water facilities) but the implementation of social programs that improve educational opportunities and government initiatives that grant land tenure rights to slum households. In India, politicians, research committees, and outside consulting companies determine which areas constitute slums and thus deserve "notified" status—notified slums are officially recognized and eligible for certain basic water and sanitation facilities (Nolan, 2016).[18] Non-notified slums, though sometimes documented in official registers, are considered illegal; efforts are generally not made to provide these communities with basic public infrastructure (Nolan, 2016). As Jaipur and other Indian cities work to upgrade informal settlements and improve the lives of residents, slum definitions and

[16]An extreme example can be seen in the 2008 slum definition used by Uganda's Ministry of Lands, Housing and Urban Development (Nolan, 2016). The ministry's definition designates areas with high levels of immorality (pornography and prostitution) as slums but makes no mention of infrastructural inadequacies like a lack of improved water sources or sanitation facilities (Rugadya et al., 2008). Yet, if the UN-HABITAT definition is applied to Ugandan cities, a full 93% of the country's urban population would live in slums (Nolan, 2016; Rugadya et al., 2008).

[17]These definitions include ones recommended by 1) the Registrar General of India for the 2001 Census, 2) the Ministry of Housing and Urban Poverty Alleviation for the 2011 Census, 3) the 2005-2006 National Family and Health Survey, 4) UN-HABITAT (Nolan, 2016).

[18]In reality, of course, notified slums frequently go without adequate access to these services.

designations become increasingly important. They affect which households will benefit from sanitation improvements and municipal water access. And they affect which communities will be granted land tenure rights or otherwise be slated for forcible relocation.

The material reality of slum life

These infrastructural and legal constraints shape residents' experiences with resource insecurity. For example, households without an official address or proof of residence (e.g., a property deed or official electricity bill) can have difficulty obtaining a ration card (Subbaraman et al., 2012). Because ration cards are necessary for access to the PDS, residence in certain slums prevents realization of government-instituted food security protections. In addition, rats and insects can compromise household food stores (Subbaraman et al., 2014). These pests are a direct result of the crowded living conditions and poor waste disposal services characteristic of slums.

At the same time, water insufficiency borne from limited or inadequate infrastructure renders many daily activities difficult. Water is needed for cleaning the home, washing clothes, and bathing. In India's hotter and drier regions, water is also necessary for indoor temperature regulation; instead of fans (less powerful) or air conditioning units (more expensive), households may prefer to use "coolers"—machines that combine both a fan and a continuous stream of water to circulate chilled air.[19] Water is also needed for post-defecation cleansing, menstrual hygiene, and subsequent hand washing. Moreover, water supports household food consumption; dishes must be washed and many recipes require water. For households without private taps, water collection can involve spending large amounts of time waiting in line at public access points or travelling to other communities with better water infrastructure. The time spent on these activities is sometimes diverted from income-generating activities that would otherwise afford households

[19]In the sample from Jaipur described in this study, 81% of households owned a fan, 57% owned a cooler, and none owned an air conditioning unit. A further 12% had no means of temperature control.

the capital necessary to purchase basic resources (e.g., food, charcoal, wood, electricity) (Subbaraman et al., 2015).

In addition, it is often difficult for slum residents to meet their energy needs, and this could compound other resource inadequacies. Many households must rely on illegal electricity connections because no official meter is provided to them (Subbaraman et al., 2014). Still others have no electricity connections at all. Energy deficiencies may be exacerbated during the summer because excess strain on the municipal power grid yields recurrent blackouts. The inability to alleviate extreme heat with fans and coolers can worsen dehydration and necessitate additional water consumption even as water sources are already stretched during the summer months, and households reliant on water pumps can no longer run them. Power grid failures occur, in part, because large portions of the population attempt to run air conditioning units to escape the heat. Finally, whether they use an electric, wood, coal, or gas stove, all households require a fuel source to cook food. In view of safety concerns, residents may additionally choose to boil drinking water prior to consumption, and this too requires a fuel source. The cost of wood, coal, gas, and electricity can make these daily activities prohibitively expensive for some households, thereby threatening food and water security.

Overview of papers

Chapter 1 examines whether perceived resource deprivation predicts differences in depression, anxiety, and stress in Jaipur's slums. It discusses how the material realities of slum life—namely, the overlap between different resource pressures—might explain variation in the predictive power of food and water insecurity for mental wellbeing. It addresses why gender and age influence perceived differences in food and water security in this setting. And it discusses why gender- and age-based disparities alter the strength of the relationships between resource—

insecurity and mental health. Moreover, it broaches the idea that relative resource deprivation matters for mental wellbeing. More specifically, it proposes that the relative impacts that household food and water insecurity have on depression, anxiety, and stress depend on whether people feel that others suffer similarly.

Chapter 2 identifies local cultural models for food prestige in adolescents attending government and private schools in Vijayapura. It discusses how local histories and global processes shape adolescents' cultural models of food and why both globalization and food prestige are particularly relevant topics for adolescent dietary choices. Moreover, it finds that knowledge about food prestige (i.e., cultural capital) varies according to a SES-associated variable. Finally, this study suggests that "at-home" and "away-from-home" foods are distinct cultural domains whose existence reflects particular nuances of the local food landscape while simultaneously influencing adolescents' engagement with that landscape.

Chapter 3 returns to Jaipur, where it extends some of the ideas concerning food prestige first established in Vijayapura. It finds broad similarities between the models for high status foods in both locations, including the fact that knowledge of prestige foods is uneven. Nonetheless, this chapter traces the unique contributions that the local ecology and regional food history of Rajasthan have on the content and structure of the cultural model for food prestige in that setting. In addition, it takes some of the analyses proposed previously one step further, finding that the relationship between food prestige and food preference varies substantially between adolescents and adults. Finally, this chapter asks whether differences in prestigious food consumption are useful barometers of intrahousehold allocation disparities that add to the information already offered by standard anthropometric measures.

Chapter 4 explores whether sociocultural or biological pathways might underlie the relationship between food insecurity and mental health among slum-dwellers in Jaipur. More specifically, it asks whether being relatively more deprived with respect to prestigious food consumption contributes to the relationship between food insecurity and mental health. It does so by building on ideas laid out in Chapters 2 and 3, namely that local cultural models in India contain information about food prestige. It then goes on to hypothesize that individuals interpret the prestige of their own diets based on those cultural models. Moreover, by controlling for food insecurity, water insecurity, wealth (i.e., wealth index, income, and expenditure), and energy undernutrition (e.g., BMI), Chapter 4 is able to address the idea that individual wellbeing is influenced not just by material circumstances but the sociocultural values that shape perceptions of those circumstances.

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Chapter One

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Abstract

Theoretical analyse8iks by anthropologists suggest that food and water insecurity exhibit multiple conceptual parallels, hold similar consequences for wellbeing, and lead to analogous coping strategies aimed at mitigating those consequences. However, these deductions largely originate from studies conducted separately on either food or water insecurity. Thus, these similarities may not bear out when examined in populations facing high rates of both.

In particular, some researchers argue that food and water insecurity exert independent but nonetheless iterative effects on mental wellbeing. Others hypothesize that food insecurity mediates the relationship between water insecurity and mental health, especially in agricultural communities. However, relevant studies are limited, and none test this hypothesis in urban areas. Moreover, no data exist on water insecurity and mental wellbeing in adolescents, which hampers comparative analyses of youth resource insecurity.

In addition, resource buffering—a long-discussed coping strategy—remains contested with respect to food insecurity and effectively untested with respect to water insecurity. The buffering hypothesis suggests that adults cushion younger household members against resource inadequacies via tradeoffs that yield gender- and age-based disparities in intrahousehold resource distributions. For example, adults may forgo food quality, quantity, or variety in favor of children. It stands to

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reason that adults similarly buffer children against water scarcity, but, again, this has not been examined.

Conducted December 2016-April 2017, this cross-sectional survey included 650 mothers, fathers, boys, and girls living in the slums of Jaipur, India. When controlling for food insecurity, the relationship between water insecurity and psychosocial stress (Perceived Stress Scale-10) was eliminated; water insecurity's effect on anxiety and depression (Hopkins Symptom Checklist-10) remained significant for fathers only. These findings are consistent with the mediation hypothesis. Moreover, pursuant to the buffering hypothesis, parents generally reported more severe resource scarcity than their children; however, girls reported slightly worse water insecurity than fathers.

1. Introduction

Over 800 million people worldwide go to bed hungry (FAO/IFAD/ UNICEF/WFP/WHO, 2017), while even more lack food security—"sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO/IFAD/ UNICEF/WFP/WHO, 2017, p. 107). At the same time, around 4 billion live in areas facing severe annual water shortages (Mekonnen and Hoekstra, 2016), which yield persistent threats to water security—"sufficient safe water for a healthy and productive life" (Webb and Iskandarani, 1998, p. 4). Moreover, climate and other ecological changes, a growing global demand for water, and an increasingly large and urbanized population will continue to place new demands on the global food system and worldwide water supplies for the foreseeable future (WWAP, 2018).

Recent theoretical analyses by anthropologists find that food and water insecurity exhibit a number of apparent parallels (Wutich and Brewis, 2014). For example, they often co-occur at the community, household, and individual level (Workman and Ureksoy, 2017; Wutich and

Brewis, 2014). Locally-dependent gender norms are likely to underlie differences in their distribution (Hadley et al., 2008; Tsai et al., 2016; Wutich, 2009). Both are increasingly well-established predictors of anxiety, depression, and psychosocial stress (Stevenson et al., 2012; Weaver and Hadley, 2009; Workman and Ureksoy, 2017; Wutich and Ragsdale, 2008). And each lead households to adopt an analogous series of coping strategies aimed at mitigating the social, biological, and psychological consequences of their inadequacy (Hadley and Wutich, 2009; Maxwell, 1996). Thus, it has been additionally suggested that the study of food and water insecurity should occur within a shared theoretical framework for resource scarcity, broadly defined (Wutich and Brewis, 2014). More specifically, this framework encourages scholars to consider not only the biocultural consequences of food and water shortages but the unique experiences of communities, households, and individuals for whom different types of resource scarcity cluster together (Wutich and Brewis, 2014).

Relatively little health-oriented research actually addresses food and water insecurity simultaneously in populations facing high rates of both. Rather, observations about the similarities between them largely stem from studies conducted independently on either topic (but see: Stevenson et al., 2012; Stevenson et al., 2016; Workman and Ureksoy, 2017). Moreover, the vast majority of available research concerns adults, generally ignoring youth experiences. In particular, the author is not aware of any studies examining the effect of experiential water insecurity on adolescent mental health. Such deficiencies in the current body of research limit conclusions about the parallels between different types of resource insecurity and cast doubt on whether the proposed parallels exist to the degree expected.

It is frequently assumed that food and water insecurity inflict independent insults to psychological wellbeing (Wutich and Brewis, 2014). This assumption is borne out in the

observation that most research is restricted to either food or water insecurity and conducted without reference to the other. Yet it is alternatively possible that one type of resource insecurity actually mediates the other. Mediation seems particularly likely in agricultural communities, where smallholders rely on rainfall for crop and livestock yields. Perhaps unsurprisingly, then, all available studies with the capacity to test these hypotheses come from rural areas (Stevenson et al., 2012, 2016; Workman and Ureksoy, 2017). No research yet examines whether food and water insecurity exert independent or overlapping effects on mental wellbeing in urban settings.

Questions regarding the comparability of food and water insecurity also extend to the coping strategies they provoke. Buffering—the diversion of household resources to children at the expense of adults—is one of the most widely discussed. Though subject to local norms, buffering behaviors may be more common among mothers than fathers and boys more likely to be its beneficiaries (Haddad et al., 1996; Piperata et al., 2013). In India, specifically, patrilocal marriage patterns limit girls' long-term financial contributions to the household, and this may underlie their deprioritization compared to boys (Fikree and Pasha, 2004). Nonetheless, quantitative evidence for nutritional buffering is mixed, which reflects the difficulty inherent in its measurement (Haddad et al., 1996; Hadley et al., 2008). Moreover, research on the buffering hypothesis pertains almost exclusively to food scarcity, rendering its applicability for water insecure households uncertain (Wutich and Brewis, 2014). This keeps both water-related buffering and its relationship to food-based buffering poorly theorized.

To better inform discussions about a broader theory of resource scarcity (Wutich and Brewis, 2014), this study tests the following hypotheses in slums of Jaipur, India—a population facing high rates of both food and water insecurity: 1) parents, particularly mothers, report more severe resource insecurity than their children; 2) boys are preferentially buffered against both food

and water insecurity compared to girls from the same household; 3) food insecurity mediates the relationship between water insecurity and mental wellbeing (self-reported symptoms of depression, anxiety, and psychosocial stress); and 4) the relationship between resource insecurity and mental wellbeing (self-reported symptoms of depression, anxiety, and psychosocial stress) is stronger in mothers and girls than in fathers and boys.

2. Literature Review

Even where experience-based scales are used, studies on resource insecurity frequently collect data at the household level (Coates 2013; Quisumbing 2013). Specifically, the responses of a single adult—usually the mother—are assumed to be representative of all members' experiences (Coates 2013; Quisumbing 2013). However, household food and water insecurity may not be useful constructs in contexts where income generation, resource procurement, and food- or water-related chores are shared unequally across genders or age classes (Coates et al. 2010; Quisumbing 2013; Wutich 2009). Household level measures are unable to differentiate between the experiences faced by men and women (Coates et al. 2010; Kumar and Quisumbing 2013; Tsai et al. 2016), adults and children (Kuku et al. 2011) or male and female adolescents (Hadley et al. 2008). Moreover, failing to collect individual-level data precludes analyses of how the psychological effects of resource insecurity might similarly vary with gender and age.

These issues are particularly relevant for India, where men may have privileged access to household resources relative to women (Messer 1997; Miller 1997), and where gendered social roles drive involvement in resource-related activities. Indian women are responsible for day-to-day meal preparation and, as a consequence, most involved with "stretching" resources to meet household needs (Coates et al. 2010; Khare 1984). Indian women are traditionally expected to eat last, after first ensuring that others are satisfied, which may leave women wanting (Chorghade et

al. 2006). Women are held socially responsible for childcare and, in particular, care focused on feeding children (Khare 1984). As such, women with hungry children may feel guilt and shame more sharply than men for perceived failures in this role.

The gendered patterns observed in adults likely persist among adolescents. Girls are seen as an economic liability and boys a boon to household financial security (Fikree and Pasha 2004; Messer 1997; Miller 1997). Thus, where food or water is limited, households may preferentially divert resources to boys in recognition of their current and potential income-earning ability. Moreover, girls are socialized into and instructed regarding food-focused roles, which they will be expected to assume following marriage (Gittelsohn 1991). As such, girls may be more intimately familiar with household food shortages than their male siblings, and thereby experience the distress related to food insecurity more acutely.

As with food insecurity, gender and age-based social roles create differential experiences of water access. Women and girls are tasked with water procurement and most water-related chores (Das and Safini 2018; Ray 2007). This continually apprises them of household water supplies and forces decisions about water rationing. Additionally, women and girls experience greater pressure to keep hygiene-related activities private at the risk of social scorn and sexual violence (Sahoo et al. 2015). Women and girls living in households that rely on public water sources may thus perceive water insecurity to be higher than do men and boys from the same household, and experience more emotional distress as a consequence.

3 Methods

3.1 Setting

Jaipur is the capital and largest city of the Indian state of Rajasthan. With over 3 million residents, it is also the 10th largest city in the country (Census of India, 2011). Approximately 11%

of Rajasthan's urban population lives below the poverty line (Reserve Bank of India (RBI), 2015). In Jaipur, specifically, around 16% of people live in slums (Jaipur Development Authority (JDA), 2014), which are where this study occurred.

Demand-side estimates of water insecurity in Jaipur's slums are scarce. However, most of Rajasthan's landmass is covered by desert or semi-arid scrubland. Consequently, the state hosts few natural reservoirs. This leaves its population reliant on rainwater and groundwater (Singh et al., 2012). Moreover, Rajasthan's annual precipitation is the lowest in the country and largely restricted to several weeks in July and August (Singh et al., 2012). Because of this, supply-side indicators place Jaipur's unmet water deficit at nearly 80 million liters (Amit et al., 2012).

Water insecurity in Jaipur's slums is compounded by inadequate and crumbling infrastructure. Slum households rely on a patchwork system of community-level taps, informal systems of pumps and hoses, and privatized water tankers. Even well-serviced communities face daily fluctuations in water pressure, such that many keep large, plastic drums to cushion against shortfalls. Indeed, it is not uncommon to see a flurry of movement break out across communities as word travels that the water pressure has risen. In these moments, parents call for children to go collect water, and women gather around public taps to sit and wait their turn. Moreover, even were local water resources adequate for per capita daily use, safety concerns would continue to undercut true water security. For example, a group of women in one low-income community made a point to show the research team a glass of cloudy, white-tinged water from their tap; the sediment, they worried, was bad for their bones.

Estimates of food insecurity in Jaipur's slums are also limited; however, Rajasthan as a whole has some of the country's worst hunger-related indicators (National Institute for Transforming India (NITI), 2018). Moreover, though the government maintains social programs

aimed at mitigating undernutrition, access to these services is uneven and their utilization patchy. For example, the Public Distribution System (PDS) is a collection of fair-price shops offering subsidized grains to the poor. Access to this system is dependent on ownership of a Below Poverty Line (BPL) card, but BPL card ownership in any given slum may be as low as 13.7% (Mander and Manikandan, 2009). Moreover, as few as 27% of Jaipur's BPL cardholders report actually receiving subsidized grains from PDS shops (Mander and Manikandan, 2009).

Data on food insecurity in Jaipur is equally scarce, with relevant studies largely restricted to measures of adolescent undernutrition in government schools.[21] For example, Mohan et al. (2013) found that 33.7% of adolescent boys and girls were underweight, while less than 2% were overweight. Moreover, 27.4% were stunted (Mohan et al. 2013). Unfortunately, appraisals based on anthropometry are likely to underestimate the true burden of food insecurity. And, indeed, experience-based estimates for slums in other Indian cities find household food insecurity rates ranging from 51% to 76.3% depending on the tool used (Agarwal et al. 2009; Chatterjee et al. 2012; Chinnakali et al. 2014).

3.2 Sample

Participants were selected from a government slum list via multistage cluster design. However, many enumerated areas would not be considered slums by most definitions (i.e., households had most or all basic civil services). This fits with work suggesting that slum designation varies substantially throughout India; individual slum communities are unequally disadvantaged with respect to latrines, electricity, piped water, durable housing, and land tenure (Nolan, 2015). We categorized the listed slums on a scale from 1 to 3. Level 3 slums had most or

[21] Though government school attendance is not a direct measure of slum membership, it is a rough predictor of socioeconomic class. High-income households are more likely to send their children to private schools than government schools.

all basic civil services and were not included in the sampling frame. The remaining slums were classified as Level 1 or 2 according to civil service access and overall condition. In total, we located and classified 168 slums.

From these, we randomly selected 5 Level 1 and 5 Level 2 slums. We canvassed each, identifying entrances and major crossroads. These were numbered, and a starting point was selected using a random number generator. When a road forked, our route was similarly decided. We asked every other household to participate until identifying 20 per slum. We interviewed the mother, father, and all adolescents (13–17 years) in each selected household.

It was difficult to arrange meeting times with fathers because many worked long hours. For this reason, we randomly chose an additional Level 2 slum to achieve the total desired sample size of 200 households. The final sample included 6 Level 2 and 5 Level 1 slums.

3.3 Data collection

Native Hindi speakers conducted the cross-sectional surveys between December 2016 and April 2017. Interviewers were gender matched to participants. We collected the following information from all participants: Food Insecurity Experience Scale (FIES), Water Insecurity Experience Scale (WIES), Hopkins Symptom Checklist-10 (HSCL-10), Perceived Stress Scale-10 (PSS-10), and demographic questions. We documented household goods and household living conditions (see Appendix Item 17). We also determined whether each slum was peri-urban or urban (urbanicity) because public services like streetlights and roads are not necessarily guaranteed in peri-urban communities, even if they are wealthy. Finally, we recorded the income, education, and occupation of each household member. The final participation rate was 87%. Fathers whom we could not locate were considered refusals despite initially agreeing.

3.4 Translation

The author, three assistants, and a professional translator all translated the instruments. We conducted roundtable discussions with a local anthropology professor to select the most suitable translations. Translations for the PSS-10 and HSCL-10 were additionally assessed during a roundtable discussion attended by a local psychologist. The psychologist instructed assistants in the use of the mental health scales. The final questionnaires were piloted with 10 individuals and back-translated by a second translator.

3.5 Food insecurity

The FIES is an 8-item tool that asks about food-related difficulties, with each question covering progressively severe experiences (Ballard et al., 2013). We used a 6-month recall period. The FIES asks about personal experience; other household members' situations are not discussed. FIES questions are binary, yielding scores from 0 to 8. For bivariate analyses, FIES scores were classified into four levels: none (0), marginal (1–3), moderate (4–6), severe (7–8). However, as only 1 boy experienced severe food insecurity (Table 1), the FIES was treated as a 3-level variable in regressions: none (0), marginal (1–3), moderate/severe (4–8).

3.6 Water insecurity

The WIES is a 5-item questionnaire developed for this study (in late September 2016). It is intended to mimic the FIES, which asks whether respondents experience issues with food quality, quantity, or variety. In other words, the WIES allows food and water insecurity to be compared on the basis of the same dimension: perceived adequacy. In focusing on adequacy, the WIES is capable of offering evidence for the buffering hypothesis.

The WIES was developed using free lists conducted in slums different than those in which the cross-sectional survey occurred. In order to establish whether slum residents judged food and water scarcity to be significant problems, eighty individuals were first asked to free list sources of

tension in their community. Subsequently, those same eighty individuals were asked to identify how local households handle water scarcity. They were then asked how local households handle food scarcity. Participants were spread equally across mothers, fathers, boys, and girls in addition to Level 1 and 2 slums.

The final scale included 5 binary questions, yielding total possible scores from 0 to 5. The first question asked whether participants worried that they would run out of water because the FIES asks the same about food. The next three questions asked whether participants were forced to economize water use by limiting water for washing clothes, for bathing, or for drinking. These items were selected by comparing the most salient free list responses (those listed earliest and most often; Smith and Borgatti, 1997) to published water insecurity scales (Stevenson et al., 2012). Moreover, a recent ethnography of water insecurity in Indian slums ostensibly confirms the relevancy and ordering of the coping strategies identified in this study, with one woman noting, "When water is running out, I will not do any laundry and washing. Bathing is also reduced. Then I must also judiciously ration water for cooking and drinking because we do not have much water left and managed accordingly" (Das and Safini, 2018, p. 191). The final question asked whether participants believed that the water they used was dangerous to their health. For chi-square and regression analyses, the final WIES scores were categorized into three levels: none (0), moderate (1–3), severe (4–5).

3.7 Anxiety and depression

The Hopkins Symptom Checklist (HSCL) measures symptoms of psychological distress (Derogatis et al., 1974). The HSCL-10 is a short-form version of longer HSCL iterations. It asks participants to specify on a 4-point Likert scale how frequently they experienced depression and anxiety-related symptoms during the last week: not at all, a little, quite a bit, extremely. Scores

range from 0 to 30 and are calculated by summing the point values for all questions. The HSCL-10 performs similarly to psychological distress scales developed specifically for South Asian populations (Snodgrass et al., 2017; Syed et al., 2008), and the symptoms in the HSCL-10 reflect those associated with "tension," a common idiom of distress in India (Weaver, 2017).

3.8 Perceived stress

The PSS-10 determines how frequently participants experienced their life situation as stressful during the previous month: never, almost never, sometimes, fairly often, very often (Cohen et al., 1983). The 10 Likert-style questions are summed, yielding scores from 0 to 40. The PSS-10 does not assess psychiatric symptomology; however, stress is often antecedent to psychiatric disorders, such that individuals with high PSS-10 scores may be at risk of developing such disorders (Cohen et al., 1983).

3.9 Visual Likert scales

To ensure that interviewers need not interpret answers to the mental health questions, we adapted the method used by Kohrt et al. (2011) in Nepal. Participants were presented with a drawing of water-filled cups. Each successive cup contained an increasing amount of water. Interviewers explained that each cup corresponded to a Likert-scale point. Participants pointed to the relevant cup while also answering verbally.

3.10 Ethical approval

The Ethical Committee at the Indian Institute for Health Management Research (IIHMR) and the Emory University Institutional Review Board approved this study. Written consent was obtained from participants.

3.11 Statistical analyses

The wealth index was developed from the first dimension of a multiple correspondence analysis run on a list of household assets. Households that owned a given item were assigned the point value of the respective factor loading. The sum of all assigned factor loadings is the household's wealth score. Higher scores indicate greater wealth. Twenty-three individuals (3.4%) included in the intrahousehold buffering analysis (Fig. 1, Fig. 2 & Table 2) were dropped from the bivariate tests and regression models (Table 1, Table 3 & Table 4) because their households were missing the roster of goods used to calculate wealth scores.

Five participants had missing responses to one FIES question. These were addressed via a procedure similar to that outlined in Bickel et al. (2000): Individuals were marked as saying "yes" if they answered at least one question indicative of more severe food insecurity in the affirmative. The WIES has not been validated as progressive, but its questions were selected to capture increasingly severe experiences. Moreover, the distribution of responses indicates that affirmative answers decreased as expected question severity increased. Therefore, five missing WIES answers were addressed with the same procedure as that used for the FIES. Seven participants had missing responses to one HSCL-10 question and twenty-three participants had missing responses to PSS-10 questions. These were addressed via individual means imputation.

The internal reliability of the HSCL-10, PSS-10, FIES, and WIES were checked using Cronbach's alpha. Ideally, Cronbach's alpha should exceed 0.7. The FIES was also assessed using Rasch-model fit statistics. Infit statistics indicate how well scale items discriminate between individuals. Infit statistics below 1 suggest that an item discriminates more sharply than average, while infit statistics above 1 suggest that an item discriminates less sharply. The ideal range is 0.8–1.2, but the target outer range is 0.7–1.3 (Sethi et al., 2017). All scale statistics were calculated before missing value imputation.

Continuous variables were evaluated using means and standard deviations. Categorical variables were assessed with frequencies and percentages. Differences across age classes and between genders were assessed with chi-square tests, Fisher's exact tests, and independent t-tests. To assess hypotheses regarding buffering, discordant answers to each FIES and WIES question were calculated by comparing participants within households. For example, a father was compared to his wife, son, and daughter. Where more than one boy existed in a household, a single boy was randomly selected. The same approach was used when more than one girl was present. For each question, a household pair was marked discordant if one participant answered "yes" while the other answered "no." Results are visualized using spineplots (Fig. 2). Within a given plot, bar width is proportional to the relative number of pairs who gave discordant answers to that question. Bar height indicates the proportion of times that each respondent type answered "yes" when answers were discordant.

To gauge the utility of measuring resource insecurity at the household level, discordant FIES and WIES scores were calculated by comparing participants within households. Results are visualized in Table 2. Each row shows the percentage of girls and boys whose food or water insecurity level was discordant with that of their mother, father, or opposite-sex sibling. Where scores did not match, the percentage that each participant type had the higher score is shown.

Linear regressions were used to evaluate the relationships between resource insecurity, the HSCL-10, and PSS-10. Models were created for the full sample and each participant type. Food and water insecurity were first modeled separately to assess their independent effects on mental health; food insecurity was then added in a stepwise fashion to the water insecurity models. In all cases, urbanicity, age, sex, wealth, and the education level of the household head were included as controls. Finally, following Paternoster et al. (1998), the equality of food insecurity regression

coefficients for predicting both the HSCL-10 and PSS-10 were tested in a pairwise fashion between mothers and fathers and between boys and girls.

The original model specifications included a random intercept for slum membership (out of eleven slums sampled) and another random intercept for household membership (out of 194 households sampled). However, these random intercepts explained around 4% or less of the variation in HSCL-10 and PSS-10 scores. Moreover, their inclusion did not substantially alter the overall results of the fixed effects for food or water insecurity (whether coefficient size or significance). Thus, for the sake of simplicity, they were dropped from the models. The HSCL-10 was log transformed because HSCL-10 residuals violated assumptions of normality and homoscedasticity. PSS-10 residuals exhibited normality and homoscedasticity without transformation. All statistical analyses and visualizations were completed in R.

4. Findings

4.1. Scale statistics

Cronbach's alpha was 0.90 for the FIES and 0.88 for the WIES, indicating good internal reliability for both. Cronbach's alpha for the HSCL-10 and PSS-10 was similarly satisfactory at 0.88 and 0.74, respectively. Notably, however, Cronbach's alpha for the PSS-10 in adolescents examined alone was only 0.63; this is below the standard 0.7 cutoff. Moreover, two PSS-10 items were negatively correlated. For this reason, PSS-10 results are not reported for adolescents.

FIES Rasch-model infit statistics ranged from 0.65 to 1.36, which is outside the target range (0.7–1.3). However, the observed infit statistic pattern fits with the findings of Sethi et al. (2017); their review of experienced-based food insecurity measures finds that questions assessing less severe experiences exhibit less satisfactory infit and outfit statistics in Indian samples.

4.2. Urban livelihoods

The majority of the sample included in the regression analyses lived in urban slums (76.3% of n=650). Of the peri-urban households, just 17 (8.8%) relied on farming as a primary income source. Eighteen percent of households fell below the state-level poverty line as indicated by their ration card. The median household income was 12,000 rupees per month. The median household income per person (>5 years old) per month was 2000 rupees—approximately twice the consumption-based cutoff for urban poverty in Rajasthan (Reserve Bank of India (RBI), 2015).

Table 1. Individual and household-level statistics for participants included in the regression models.

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
Age										
Min	13	20	13		22	20		13	13	
Max	70	70	17		70	60		17	17	
Mean(sd)	29.0 (14.6)	40.8 (8.9)	14.8 (1.5)		43.7 (9.4)	38.3 (7.7)		14.9 (1.4)	14.8 (1.5)	
Sex				p=.523						
Male	315 (48%)	167 (47%)	148 (50%)		167 (100%)	0 (0%)		148 (100%)	0 (0%)	
Female	335 (52%)	187 (53%)	148 (50%)		0 (0%)	187 (100%)		0 (0%)	148 (100%)	
Urban				p=.532			p=.951			p=.347
Peri-urban	154 (24%)	80 (23%)	74 (25%)		37 (22%)	43 (23%)		33 (22%)	41 (28%)	
Urban	496 (76%)	274 (77%)	222 (75%)		130 (78%)	144 (77%)		115 (78%)	107 (72%)	
Food Insecurity				p<.001				p<.001		
None	225 (35%)	90 (25%)	135 (46%)		57 (34%)	33 (18%)		71 (48%)	64 (43%)	
Mild	238 (37%)	123 (35%)	115 (39%)		62 (37%)	61 (33%)		66 (45%)	49 (33%)	
Moderate	90 (14%)	60 (17%)	30 (10%)		30 (18%)	30 (16%)		10 (7%)	20 (14%)	
Severe	97 (15%)	81 (23%)	16 (5%)		18 (11%)	63 (34%)		1 (1%)	15 (10%)	
Water Insecurity				p<.001				p<.001		
None	394 (61%)	196 (55%)	198 (67%)		111 (66%)	85 (45%)		113 (76%)	85 (57%)	
Moderate	140 (22%)	76 (21%)	64 (22%)		25 (15%)	51 (27%)		27 (18%)	37 (25%)	
Severe	116 (18%)	82 (23%)	34 (11%)		31 (19%)	51 (27%)		8 (5%)	26 (18%)	

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
HSCl-10				p<.001			p<.001			p=.009
Min	0	0	0		0	0		0	0	
Max	28.0	28.0	26.0		28.0	28.0		21.1	26.0	
Mean(sd)	8.1 (6.9)	10.0 (7.2)	5.8 (5.6)		6.8 (5.9)	12.8 (7.1)		4.9 (5.0)	6.7 (6.1)	
PSS-10							p<.001			
Min		0			0	0				
Max		36			36	36				
Mean(sd)		16.2 (7.6)			13.6 (6.7)	18.6 (7.6)				
Education				p<.001			p<.001			p=.089
None	313 (48%)	233 (66%)	80 (27%)		87 (52%)	146 (78%)		32 (22%)	48 (32%)	
Primary	244 (38%)	89 (25%)	155 (52%)		55 (33%)	34 (18%)		87 (59%)	68 (46%)	
Secondary	89 (14%)	30 (8%)	59 (20%)		23 (14%)	7 (4%)		28 (19%)	31 (21%)	
Higher	4 (1%)	2 (1%)	2 (1%)		2 (1%)	0 (0%)		1 (1%)	1 (1%)	

4.3. Gender-biased resource buffering

Examining the sample as a whole, adults reported food insecurity (75% adults; 54% adolescents, $p<.001$) and water insecurity (45% adults; 33% adolescents, $p=.004$) more often than adolescents (Table 1). Moreover, a larger percentage of parents reported severe food insecurity (23% adults; 5% adolescents, $p<.001$) and severe water insecurity (23% adults; 11% adolescents, $p<.001$). For each FIES question, mothers responded in the affirmative more frequently than all other participant types (Figure 1). Except for one question (Q2: inability to eat healthy food), boys endorsed all FIES items least frequently. Similarly, for each WIES question, mothers responded affirmatively the most frequently. Boys endorsed each question least frequently. In general, the percent of participants responding in the affirmative to individual FIES questions decreased from mothers to fathers to girls to boys (e.g., FIES Q1– 73.6% of mothers; 46.0% of fathers; 40.3% of girls; 13.8% of boys). For the WIES, affirmative responses generally decreased from mothers to girls to fathers to boys (e.g., WIES Q1 – 46.1% of mothers; 26.4% of fathers; 29.9% of girls; 16.4% of boys).

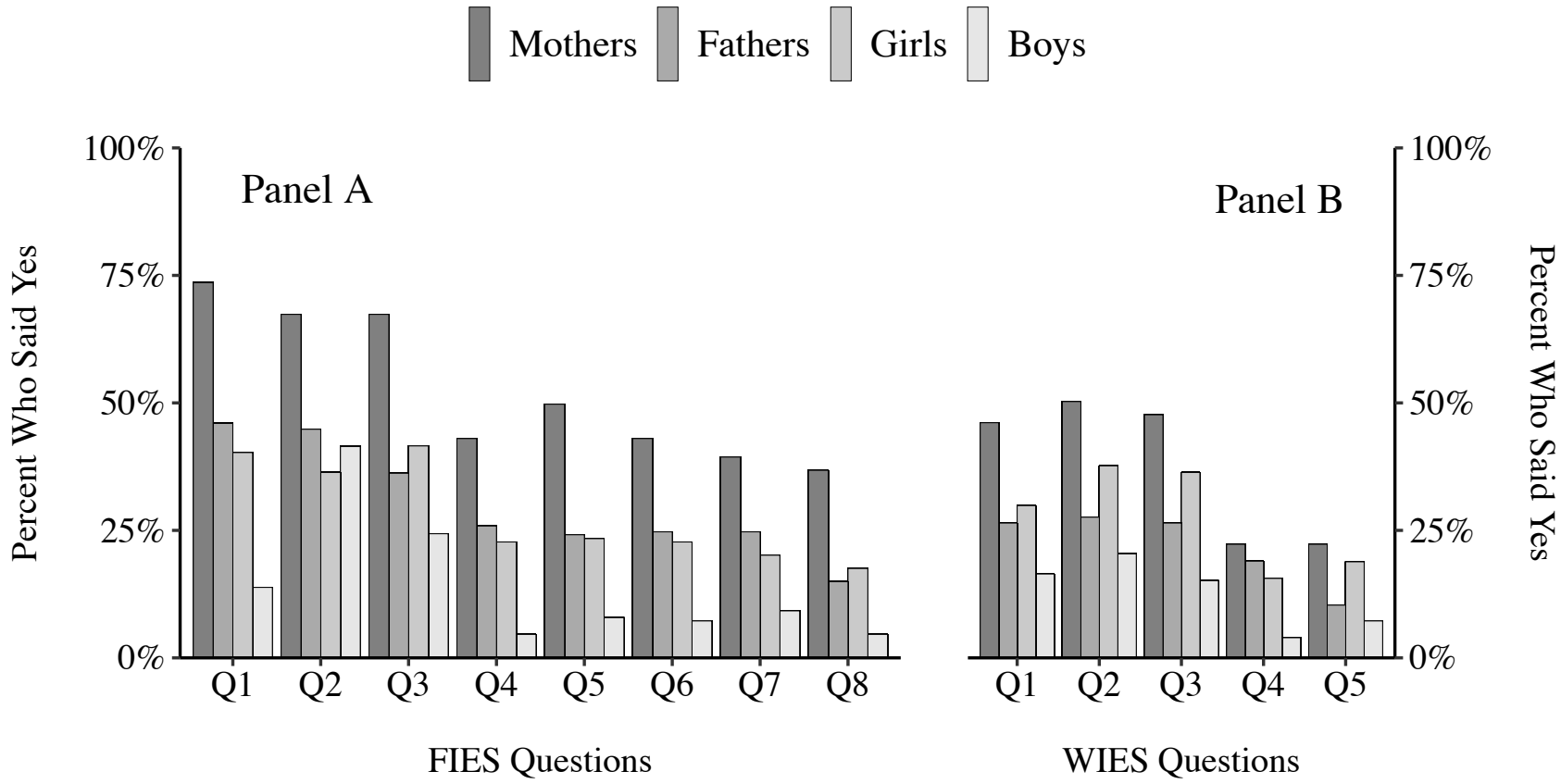


Figure 1. Percent of mothers (n=187), fathers (n=167), girls (n=148) and boys (n=148) answering, "yes," to FIES (A) and WIES questions (B). Questions are ordered from least to most severe.

The age-based disparities observed across households generally persisted within them, particularly in favor of sons. Specifically, where parents disagreed with their sons regarding an FIES question, parents responded "yes" a larger percentage of the time (when FIES were answers discordant, mothers yes – 92.1%–98.0% of cases; fathers yes – 64.1%–96.6% of cases) (Fig. 2; bar height). Similarly, parents were more likely to endorse WIES questions than their sons when discordant answers were given (when WIES answers were discordant, mothers yes – 85.7%–97.7% of cases; fathers yes – 70.0%–95.0% of cases). Where adults and sons had divergent FIES or WIES scores, adults usually exhibited the higher score (when FIES scores were discordant, mothers higher – 90.6% of cases; fathers higher – 83.6% of cases; when WIES scores were discordant, mothers higher – 86.9% of cases; fathers higher – 77.5% of cases) (Table 2). As with sons, mothers and fathers were more likely to say "yes" to FIES questions than their daughters when a pairing disagreed (when FIES answers were discordant, mothers yes – 80.4%–93.1% of cases; fathers yes – 51.1%–62.2% of cases). Parents also tended to have higher FIES scores than their daughters when reporting different levels of food security (when FIES scores were discordant, mothers higher – 84.0% of cases; fathers higher − 62.5% of cases). However, this pattern faltered for water insecurity. When fathers and daughters disagreed about a WIES question or had discordant WIES scores, girls were often more disadvantaged (when WIES answers were discordant, fathers yes – 28.6%–52.3% of cases; when WIES scores were discordant, fathers higher – 43.2% of cases).

Comparing adolescents to each other, girls were more likely than boys to report any water insecurity (43% of girls, 24% of boys, $p<.001$) but not any food insecurity (57% of girls, 52% of boys, $p=.484$) (Table 1). However, a larger percentage of girls than boys experienced severe food insecurity (10% of girls, 1% of boys, $p=.001$). This was also true for severe water insecurity (18%

of girls, 5% of boys, p<.001). Comparing adolescents within households, sisters were more likely than brothers to endorse any given FIES or WIES question when siblings disagreed (when FIES answers were discordant, girls yes – 58.3%–100.0% of cases; when WIES answers were discordant, girls yes – 84.6%–100.0% of cases) (Fig. 2). Girls also reported worse food and water insecurity levels than their brothers when overall scores were discordant (when FIES scores were discordant, girls higher – 71.4% of cases; when WIES scores were discordant, girls higher – 88.2% of cases) (Table 2). In other words, when one individual from a sister-brother pair was disadvantaged, it was usually the sister.

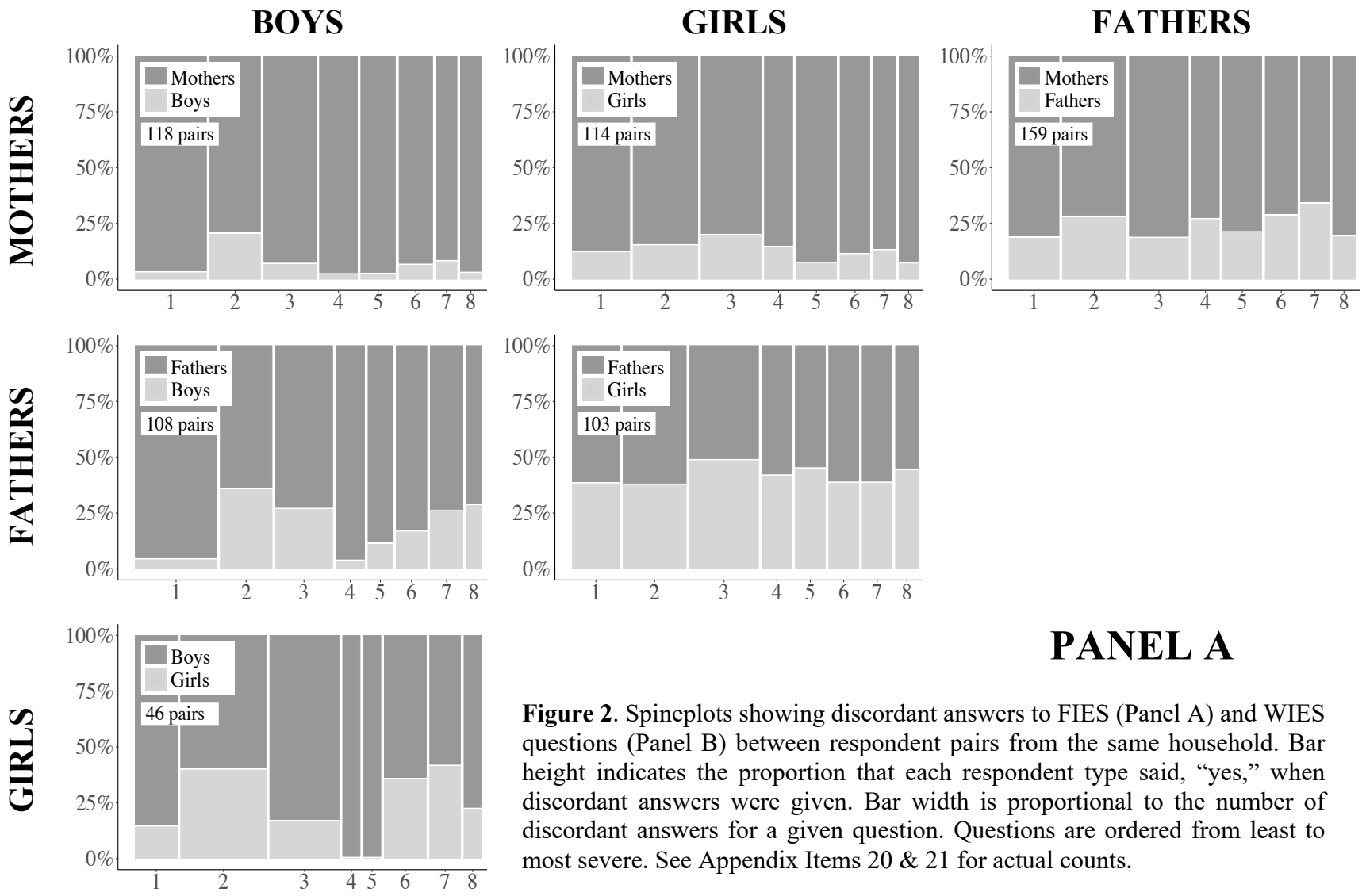
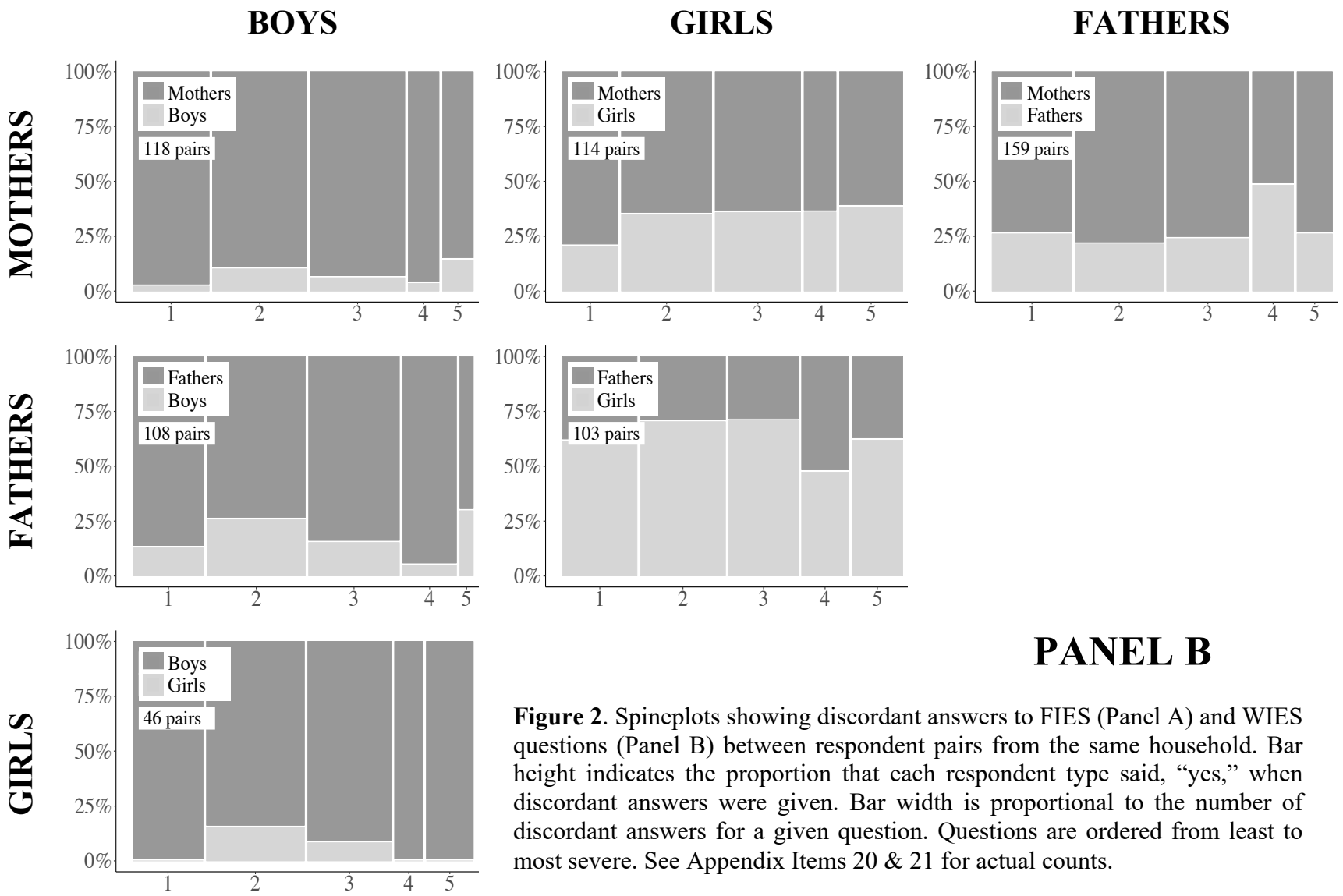


Figure 2. Spineplots showing discordant answers to FIES (Panel A) and WIES questions (Panel B) between respondent pairs from the same household. Bar height indicates the proportion that each respondent type said, "yes," when discordant answers were given. Bar width is proportional to the number of discordant answers for a given question. Questions are ordered from least to most severe. See Appendix Items 20 & 21 for actual counts.



PANEL B

Figure 2. Spineplots showing discordant answers to FIES (Panel A) and WIES questions (Panel B) between respondent pairs from the same household. Bar height indicates the proportion that each respondent type said, "yes," when discordant answers were given. Bar width is proportional to the number of discordant answers for a given question. Questions are ordered from least to most severe. See Appendix Items 20 & 21 for actual counts.

Table 2a. Percent of pairwise comparisons for which participants' FIES (Panel A) and WIES scores (Panel B) were discordant between mothers and their children, fathers and their children, and male and female siblings.

PANEL A			
	GIRL (n=114)		
MOTHER	Discordant	Mother Higher	Girl Higher
	65.8%	84.0%	16.0%
	BOY (n=118)		
	Discordant	Mother Higher	Boy Higher
	72.0%	90.6%	9.4%

	GIRL (n=103)		
FATHER	Discordant	Father Higher	Girl Higher
	69.9%	62.5%	37.5%
	BOY (n=108)		
	Discordant	Father Higher	Boy Higher
	56.5%	83.6%	16.4%

	GIRL (n=46)		
BOY	Discordant	Boy Higher	Girl Higher
	60.9%	28.6%	71.4%

Table 2b. Percent of pairwise comparisons for which participants' FIES (Panel A) and WIES scores (Panel B) were discordant between mothers and their children, fathers and their children, and male and female siblings.

PANEL B			
	GIRL (n=114)		
MOTHER	Discordant	Mother Higher	Girl Higher
	44.7%	68.6%	31.4%
	BOY (n=118)		
	Discordant	Mother Higher	Boy Higher
	51.7%	86.9%	13.1%

	GIRL (n=103)		
FATHER	Discordant	Father Higher	Girl Higher
	42.7%	43.2%	56.8%
	BOY (n=108)		
	Discordant	Father Higher	Boy Higher
	37.0%	77.5%	22.5%

	GIRL (n=46)		
BOY	Discordant	Boy Higher	Girl Higher
	37.0%	11.8%	88.2%

4.4. Mediation of water insecurity-mental health relationship

For the sample used in regression analyses (n=650), water insecurity was positively associated with HSCL-10 scores in a dose-dependent manner (moderate, b=0.137, p<.001; severe, b=0.194, p<.001) (Table 3). Severe but not moderate water insecurity was positively associated with PSS-10 scores (severe, b=2.647, p<.01) (Table 4). When food insecurity was included, water insecurity remained a significant though weakened predictor of HSCL-10 scores (moderate, b=0.086, p<.01; severe, b=0.069, p<.05). Adding food insecurity to the
PSS-10 model eliminated any significant relationship between psychosocial stress and water insecurity. Finally, when participants were parsed by type and food insecurity was controlled for, water insecurity was predictive of mental wellbeing in fathers only and only for the HSCL-10 (moderate, b=0.142, p<.05; severe, b=0.149, p<.01).

4.5. Gender and age-based disparities in the resource insecurity-mental health relationships

For the sample used in regression analyses (n=650), adult HSCL-10 scores (mean=10.0, sd=7.2) were significantly higher than adolescent scores (mean=5.8, sd=5.6, p<.001). Mothers (mean=12.8, sd=7.1) had significantly higher scores than fathers (mean=6.8, sd=5.9, p<.001). Girls (mean=6.7, sd=6.1) had significantly higher scores than boys (mean=4.9, sd=5.0, p=.009) (Table 1). And fathers (mean=13.6, sd=6.7) had significantly lower PSS-10 scores than mothers (mean=18.6, sd=7.6, p<.001).

As noted above, when controlling for food insecurity, water insecurity was no longer a significant predictor of mental wellbeing in any participant type except fathers (Tables 3 and 4). In contrast, food insecurity was positively associated with the HSCL-10 in a dose-dependent fashion in fathers (mild, b=0.237, p<.001; moderate/severe, b=0.491, p<.001), mothers (mild, b=0.450, p<.001; moderate/ severe, b=0.609, p<.001), boys (mild, b=0.162, p<.01;

moderate/severe, b=0.563, p<.001), and girls (mild, b=0.172, p<.01; moderate/severe, b=0.438, p<.001). PSS-10 scores were also positively associated with food insecurity in a dose-dependent fashion in fathers (mild, b=3.565, p<.01; moderate/severe, b=7.886, p<.001) and mothers (mild, b=7.236, p<.001; moderate/severe, b=11.440, p<.001).

Regression coefficients for mild food insecurity were significantly different between mothers and fathers in models predicting the HSCL-10 (z=−2.809, p=.005) and PSS-10 (z=−2.079, p=.038). In contrast, the relationships between moderate/severe food insecurity and the HSCL-10 (z=−1.414, p=.157) and between moderate/severe food insecurity and the PSS-10 (z=−1.811, p=.070) did not significantly differ between mothers and fathers. Finally, the relationship between food insecurity and the HSCL-10 was not significantly different between boys and girls at any level (mild, z=−0.138, p=.890, moderate/severe, z=1.116, p=.264).

In the full sample, being male reduced log-transformed HSCL-10 scores by 0.248. However, when food and water insecurity were added, the size of the coefficient relating gender to the HSCL-10 dropped by 45.2%, with most of this decrease attributable to food insecurity. In fact, after accounting for food insecurity, gender was no longer a significant predictor of psychological distress in adolescents (not shown). Similarly, when controlling for both food and water insecurity, the size of the coefficient relating gender to the PSS-10 in adults was reduced by 36.4%.

Table 3. Linear models predicting the HSCL-10 (log-transformed).

	All			Fathers		Mothers		Boys		Girls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Intercept	2.654***	2.630***	2.473***	2.471***	2.206***	2.990***	2.590***	2.434***	2.531***	1.893***	2.104***
	(0.040)	(0.039)	(0.035)	(0.128)	(0.114)	(0.131)	(0.112)	(0.256)	(0.232)	(0.263)	(0.235)
Male	-0.248***	-0.210***	-0.136***								
	(0.025)	(0.025)	(0.022)								
Age	0.007***	0.006***	0.003***	0.004	0.005*	-0.0001	0.0004	0.008	-0.007	0.049**	0.027
	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.003)	(0.002)	(0.017)	(0.015)	(0.017)	(0.015)
Urban	0.103***	0.065*	0.035	0.122*	0.090	0.013	-0.044	0.061	0.052	0.052	0.027
	(0.030)	(0.030)	(0.025)	(0.058)	(0.049)	(0.057)	(0.046)	(0.060)	(0.053)	(0.062)	(0.055)
Wealth[a]	-0.219***	-0.187***	-0.047	-0.135*	-0.014	-0.259***	-0.070	-0.148*	-0.123*	-0.138*	0.024
	(0.033)	(0.032)	(0.028)	(0.062)	(0.054)	(0.060)	(0.052)	(0.066)	(0.059)	(0.068)	(0.065)
Primary Education[b]	0.063*	0.038	0.077**	-0.072	-0.004	0.051	0.071	0.042	0.111*	0.127*	0.099
	(0.029)	(0.029)	(0.025)	(0.055)	(0.047)	(0.054)	(0.044)	(0.056)	(0.050)	(0.064)	(0.056)
Secondary Education[b]	-0.016	-0.036	0.045	-0.075	-0.018	-0.046	0.039	0.031	0.126	-0.048	0.003
	(0.041)	(0.040)	(0.034)	(0.077)	(0.065)	(0.077)	(0.063)	(0.079)	(0.071)	(0.086)	(0.077)
Moderate Water Insecurity		0.137***	0.086**	0.138*	0.142*	0.095	0.049	0.142*	0.069	0.165**	0.102
		(0.032)	(0.027)	(0.067)	(0.056)	(0.057)	(0.046)	(0.066)	(0.059)	(0.061)	(0.055)
Severe Water Insecurity		0.194***	0.069*	0.300***	0.149**	0.153**	0.044	0.059	0.005	0.184*	0.083
		(0.035)	(0.030)	(0.063)	(0.057)	(0.058)	(0.048)	(0.109)	(0.097)	(0.071)	(0.067)
Mild Food Insecurity			0.249***		0.237***		0.450***		0.162***		0.172**
			(0.026)		(0.050)		(0.057)		(0.046)		(0.056)
Moderate/Severe Food Insecurity			0.504***		0.491***		0.609***		0.563***		0.438***
			(0.031)		(0.058)		(0.060)		(0.089)		(0.068)
Observations	650	650	650	167	167	187	187	148	148	148	148
Adjusted R^2	0.235	0.279	0.488	0.215	0.460	0.185	0.485	0.097	0.313	0.191	0.380

Note: [a]Scaled (mean = 0, sd = 1) $^{+}$p<.1, *p<.05; **p<.01; ***p<.001

[b]Household head education

Table 4. Linear models predicting the PSS-10.

	All			Fathers		Mothers	
	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Intercept	19.238***	18.659***	12.508***	10.951***	6.831**	22.484***	15.166***
	(1.903)	(1.907)	(1.839)	(2.696)	(2.611)	(2.891)	(2.666)
Male	-4.688***	-4.317***	-2.983***				
	(0.757)	(0.766)	(0.696)				
Age	-0.042	-0.043	-0.021	0.014	0.033	-0.122	-0.109
	(0.043)	(0.043)	(0.038)	(0.054)	(0.049)	(0.068)	(0.059)
Urban	1.510	1.108	0.262	1.950	1.452	0.516	-0.601
	(0.864)	(0.868)	(0.778)	(1.215)	(1.113)	(1.247)	(1.086)
Wealth[a]	-4.918***	-4.524***	-1.801*	-2.837*	-0.918	-5.976***	-2.347
	(0.931)	(0.933)	(0.878)	(1.303)	(1.234)	(1.326)	(1.233)
Primary Education[b]	0.322	0.025	1.007	0.011	1.077	-0.068	0.527
	(0.833)	(0.834)	(0.750)	(1.157)	(1.070)	(1.194)	(1.047)
Secondary Education[b]	-2.200	-2.288	-0.889	-2.323	-1.423	-2.396	-0.592
	(1.193)	(1.182)	(1.063)	(1.624)	(1.487)	(1.705)	(1.496)
Moderate Water Insecurity		1.096	0.689	1.667	1.741	0.639	-0.129
		(0.926)	(0.826)	(1.407)	(1.281)	(1.265)	(1.098)
Severe Water Insecurity		2.647**	0.396	3.523**	1.039	2.035	-0.139
		(0.915)	(0.855)	(1.328)	(1.309)	(1.272)	(1.136)
Mild Food Insecurity			4.782***		3.565**		7.236***
			(0.868)		(1.141)		(1.348)
Moderate/Severe Food Insecurity			9.347***		7.886***		11.440***
			(0.974)		(1.335)		(1.439)
Observations	354	354	354	167	167	187	187
Adjusted R^2	0.230	0.248	0.408	0.136	0.293	0.213	0.420

Note: [a]Scaled (mean = 0, sd = 1) $^{+}$p<.1, *p<.05; **p<.01; ***p<.001
[b]Household head education.

5. Discussion

Following calls for a broader theory of resource scarcity (Wutich and Brewis, 2014), this study aimed to engage with two proposed parallels between food and water insecurity—resource buffering and the effects of resource scarcity on mental wellbeing. With respect to the buffering hypothesis, it has long been proposed that parents reduce their own resource consumption in order to cushion children against scarcities. This is expected to yield disparities in the resource distributions observed within households. However, quantitative evidence for nutritional buffering is mixed, and evidence for water-related buffering comes entirely from ethnographic accounts (Wutich and Brewis, 2014).

By assessing intrahousehold differences in perceived food and water adequacy, this study was able to compare evidence for allocation tradeoffs in each resource. In general, the observed intrahousehold disparities are consistent with the hypothesis that adults buffer adolescents against resource insecurity. And, indeed, two free list respondents described parents favoring children when food resources were scarce (i.e., "*Fill the children's stomachs; mom's and dad's stomachs stay half full*" and "*Feed the children while mom and day stay hungry*."). Moreover, as expected, boys were relatively more cushioned than girls, and mothers were more likely to report resource shortages than fathers. These disparities were most apparent in the observation that more than half of girls who reported different water insecurity levels than their fathers actually reported more severe insecurity. It should be noted that the gender- and age-based disparities in water insecurity also extended to drinking water (WIES Q4), a possibility that has gone largely unexamined in previous research (Wutich and Brewis, 2014). At the same time, however, two free list respondents indicated that limited water resources meant fewer baths for children.

Although these results are generally consistent with the buffering hypothesis, buffering was not measured directly because of problems inherent in its measurement. For example, asking parents about their differential treatment of male and female children yields answers highly susceptible to social desirability bias. Therefore, this study relied on perceived resource scarcity to make inferences. This approach leaves open the possibility that the observed disparities do not reflect buffering at all and instead stem from participants' gendered interactions with the world. For example, Indian boys are generally allowed greater freedom of movement outside the home, while girls are restricted because of concerns surrounding reputation loss and sexual violence (Mehra et al., 2002). This limits girls' participation in income-generating activities and likely curtails their access to food and water sources outside the home (Hadley et al., 2008). Indeed, significantly more boys in this study were employed ($p<.001$), and boys reported significantly more spending money ($p<.05$). In the same vein, gendered social roles affect individual familiarity with household resource scarcities and, presumably, subsequent responses to experiential measures like the FIES and WIES. That is, girls may be more cognizant of household food shortages than their male siblings because girls are socialized into food-focused roles (Khare, 1984). Similarly, female household members are tasked with most water-related chores (Ray, 2007), and face a variety of sanitation pressures that boys and men do not (Sahoo et al., 2015).

The second proposed parallel between food and water insecurity concerns their relative consequences for mental wellbeing. More specifically, it is generally assumed that food and water insecurity are independently predictive of poor mental health outcomes. Alternatively, some researchers suggest that food insecurity mediates the relationship between water insecurity and mental wellbeing. To date, studies examining food and water insecurity concurrently, and thus

capable of testing these hypotheses, have all come from agricultural settings (Stevenson et al., 2012, 2016; Workman and Ureksoy, 2017).

This study is the first to test the applicability of the mediation hypothesis in a non-farming community. The results presented here indicate that controlling for food insecurity reduces the strength of the association between water insecurity and mental wellbeing in urban slums. Moreover, the limited number of agricultural households makes it unlikely that this finding reflects drought-related crop loss.

Instead, these results may indicate substantial overlap in the way that slum residents experience different types of resource scarcity. In particular, high food insecurity rates may complicate attempts to parse food-related stressors from those tied to water security. That is, many water-related tasks are connected to food preparation. Water is necessary for cleaning fruits, vegetables, pulses, and rice. Pots must be washed, and water is a key component in many recipes. In line with this, when asked how households handle water scarcity, five free list respondents described reserving water for cooking or eating, and eleven others reported using less water when making food (e.g., "*When making food, use only half a pot of water*" and "*Don't make food that requires a lot of water*"). At the same time, water may be relied upon to temper food scarcity. One study respondent reported adding extra water to food in order to stretch meals, and another reported drinking water instead of eating. Similarly, the charcoal and wood used to boil contaminated water is expensive, forcing households to reserve it for cooking (Das and Safini, 2018). Thus, the stress and anxiety associated with food and water insecurity may be inextricably linked for many slum households.

Alternatively, these results may reflect which dimensions of water insecurity were measured. For example, working in Lesotho, Workman and Ureksoy (2017) found that differences

in reported water usage explained comparatively little psycho-emotional distress relative to differences in water access. Similarly, Wutich and Ragsdale (2008) found no association between water usage and distress among Bolivian respondents, but differences in household water source were significant predictors. Yet the scale used here was primarily an assessment of adequacy, with four out of five WIES questions asking about water sufficiency. It is possible that a scale oriented toward issues of access would better capture what matters for mental wellbeing.

That the WIES was nonetheless associated with HSCL-10 and PSS-10 scores prior to controlling for food insecurity warrants additional study. It suggests that disparities in perceived water adequacy are not wholly unimportant for mental health. Moreover, it supports this paper's earlier supposition that a reduction in the water insecurity mental health–relationship occurred, at least in part, because food and water shortages are experienced as a tangled set of problems that strain the balance of a household's overall resource budget.

Nonetheless, water insecurity's overall limited association with mental wellbeing is surprising. This finding may, counterintuitively, reflect the perceived pervasiveness of water insecurity in Indian slums. When Stevenson et al. (2012) asked about the stressors that women in rural Ethiopia face, food shortages were the second most common answer; water insecurity was not among the top five (<12 of 70 respondents). Similarly, few respondents in Workman and Ureksoy (2017) research from rural Lesotho identified water as an important daily stressor, but 60% mentioned food. Yet both Stevenson et al. (2012) and Workman and Ureksoy (2017) ultimately found water insecurity to predict differences in mental wellbeing beyond that explained by food insecurity. In contrast, water-related problems were the most frequently named community stressors in this study, with over 60% of participants mentioning them during free lists (51 of 80).

However, except for fathers, water insecurity was not associated with mental wellbeing independent of food insecurity.

It has been previously suggested that resource insecurities foster psychological distress in part because they mark inequality (Ennis-McMillan, 2001; Hadley and Patil, 2006; Wutich and Ragsdale, 2008). In other words, the emotional distress expressed in response to water scarcity may be as much a commentary on disparities in distribution as it is a function of absolute shortages (Ennis-McMillan, 2001). If a household's immediate neighbors are perceived to experience water shortages with similar frequency and severity, resource inadequacies may not yield as marked an impact on mental wellbeing. Water scarcity may be seen as a shared community experience and thus not as stigmatized. More focused ethnographic work is required to test this hypothesis.

Finally, this study proposed that the strength of the relationship between resource insecurity and mental health would vary within households. As expected, the effect of mild food insecurity on both the HSCL-10 and PSS-10 was stronger in mothers compared to fathers. This could indicate that the psychological burden brought on by mild food shortages weighs more heavily on women. More specifically, when food insecure households gather to eat, mothers are the ones ultimately put upon to serve monotonous or less than desirable meals. They may feel the most invested in making the available food sufficiently satisfying and, as a result, take the brunt of the guilt when this is not possible. In support of this idea, the experiences indicative of mild food insecurity in the FIES include forgoing healthy or preferred foods and limiting food variety.

At the same time, results indicate that extreme manifestations of food inadequacy like missing meals or going to bed hungry are equally distressing for parents of both genders. This could be because absolute food shortages are more obviously tied to fathers' view of themselves as household financial providers than an inability to eat varied meals (Coates et al., 2010). In other

words, fathers' self-efficacy vis-à-vis their proscribed social role is sufficiently threatened by the experiences associated with severe food insecurity so as to bring their distress on par with what mothers report. In the same vein, the proportion of discordant answers between mother-father pairs appears to trend downward as question severity increases (Figure 2; bar width). In other words, mothers and fathers are more likely to agree that resource insecurities exist as the inadequacies become more pronounced. This pattern finds support in Wutich's (2009) observation that severe resource pressures relax gendered differences in experiential water insecurity in Bolivian adults.

Interestingly, although the gender- and age-based differences in regression results for food insecurity were generally in line with expectation, this was not true for water insecurity. After controlling for food insecurity, water insecurity remained predictive of mental wellbeing in fathers but not mothers. Given the unexpectedness of this finding, any explanations are extremely tentative; however, it is possible that this reflects the degree to which the lived realities of food and water insecurity overlap in women compared to men. As previously discussed, the observed reduction in the water insecurity–mental health relationship is consistent with the idea that individuals experience food and water shortages as a tangled set of problems. In India, women are the household members tasked with most day-to-day food and water management decisions (Khare, 1984; Das and Safini, 2018). Consequently, they are also likely to be the individuals most familiar with the resource trade-offs required to run a household. In contrast, water insecurity in fathers is unlikely to interface with decisions regarding how much water to use for cleaning pots, making meals, stretching recipes, or washing ingredients. In the same vein, when sufficient water resources are unavailable for any one of these tasks, mothers are the often ones who must decide whether to spend time collecting more water or otherwise see themselves and family members forgo washing, bathing, and cleaning in favor of eating.

5.1 Limitations

The WIES has not been validated and may be missing dimensions of water insecurity relevant for depression, anxiety, and stress. The absence of questions measuring within-slum inequalities in water distribution, behaviors related to reciprocal water exchange, and refined measures of water access are most notable.

In addition, this study did not directly measure buffering. It is possible that participants' resource-related social roles or other gendered experiences underlie the disparities observed. Even if the reported findings are an outgrowth of buffering, the results presented here are at best a descriptive accounting of the end result of the allocation process. In-depth analyses regarding why certain allocation decisions occur were ultimately beyond the scope of this project. It may be, for example, that the disparities observed for food insecurity reflect buffering practices, whereas those observed for water insecurity reflect perception-based differences.

Furthermore, the cross-sectional nature of this study precludes conclusions about the directionality of the relationship between resource insecurity and mental health. Although the interpretations put forward here generally presume that resource insecurity underlies psychological outcomes, it is alternatively possible that poor mental health hinders work productivity, limits income, and thereby worsens resource insecurity. In this vein, psychological distress could lead to more negative appraisals of one's resource situation (Pellowski et al., 2017).

Finally, there were limitations related to the timing of data collection. The cross-sectional survey occurred during Jaipur's cooler season, making it possible that water insecurity's importance for mental health was reduced relative to the summer months. Moreover, data collection overlapped with India's attempt to combat "black money" via demonetization. During this scheme, the two highest currency notes were voided, leading to marked cash shortages

throughout the country. As the study population relies on cash for everyday purchases and labor compensation, food insecurity and its salience for mental health may have been inflated in this sample. For comparison, experience-based estimates of household food insecurity in the slums of other Indian cities suggest rates as high as 76.3% (Chatterjee et al., 2012), which is slightly lower than that reported by mothers in this sample (82%).

6. Conclusion

The results and interpretations presented here highlight several points that will be important to consider in future refinements of Wutich and Brewis (2014) theory of resource scarcity. First, studies on resource insecurity and mental wellbeing should avoid isolated analyses of food and water scarcity. Examined alone, food and water insecurity offer at best a partial picture of the links between resource shortages and mental health. At worst, such studies overestimate the explanatory power of each.

Second, comparisons between food and water insecurity should be made with care when the available data come from different genders and age groups or are based on scales collected at the household level. Adult responses to resource insecurity scales are somewhat questionable estimates of the resource pressures that younger household members face. Parental buffering practices and resource-related social roles may influence the degree of resource insecurity reported by different genders and age groups.

Third, because the links between resource scarcity and mental health vary within households, assuming a blanket mechanism connecting food or water insecurity to mental health is ill-advised. In this vein, the effects that either food or water insecurity have on mental health may vary dependent on the meaning that food and water insecurity hold within different

communities. More specifically, this study echoes previous research in suggesting that perceived or relative resource insecurity might matter for mental wellbeing.

Finally, though locally-specific water insecurity scales have proliferated (Jepson et al., 2017), cross-culturally validated options are needed. Their development and selection will require thoughtful discussion about which dimensions of water insecurity a given scale captures. This includes assessments of the degree to which those dimensions overlap with other types of resource poverty, particularly food and sanitation insecurity. In addition, scales designed to mirror extant food insecurity measures will be helpful; comparing entirely different dimensions of food and water insecurity may yield misleading results. Researchers wanting a scale comparable to the FIES might consider the WIES developed here. However, because the WIES focuses on adequacy, they should first consider whether this dimension is of most interest to their study; associations between water insecurity and depression, anxiety, or stress are liable to vary accordingly.

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Chapter Two

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Abstract

This study provides a foundation for understanding how globalization and changing food environments are linked to cultural models of food prestige in adolescents. We used methods from cognitive anthropology, including free lists, pile sorts, and consensus modeling, to explore the meanings that Indian adolescents attribute to foods. Adolescents (n = 29) were asked to free list foods eaten outside and inside the home. Different adolescents (n = 65) were asked to pile sort and rank 30 foods identified during the free lists according to which foods are the most prestigious, traditional, routine, and advertised on television. We found that adolescents overwhelmingly believed nontraditional foods to be the most prestigious. Nonlocal foods, both from foreign countries and other regions of India, as well as foods eaten outside the home, were also considered prestigious.

1. Introduction

Globalization leads to dietary change in populations around the world (Hawkes 2006). In contemporary low- and middle-income countries (LMICs), this nutrition transition involves shifts away from traditional diets high in fiber and cereals to diets high in sugar, refined carbohydrates, fats, and animal products (Popkin, 2001). Frequently, this shift includes increased consumption of

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heavily processed foods and foods eaten outside the home (Kennedy, Nantel, and Shetty, 2004; Monteiro et al., 2011; Popkin, 2001). Combined with reduced physical activity, the nutrition transition is implicated in rising chronic disease rates around the world (Popkin, 2001; WHO, 2005).

Studies probing the reasons for dietary transition frequently find that globalization and its related processes contribute via absolute changes in food availability and accessibility. Economic liberalization paves the way for greater foreign direct investment by multinational food corporations, which create and exploit the global market for highly processed foods (Hawkes, 2006; Stuckler et al., 2012). Such foods may be readily adopted, at least in part, because they are cheaper and quicker to prepare than whole foods (Powell and Bao, 2009). Moreover, processed foods' high sugar, fat, and salt contents make them hyperpalatable, which may lead to addictive overconsumption (Gearhardt et al., 2011; Moss, 2013). In addition, increases in supermarkets and fast food chains ease consumer access to heavily processed and ready-made foods more than previously possible in all but the largest, most connected cities (Pingali, 2007). In this sense, then, research has focused on the ways in which globalization contributes to the nutrition transition via changes in material aspects of local food environments (Bodor et al., 2010).

While changes in the availability of heavily processed and energy-dense foods undoubtedly affect eating habits, there remains a dearth of research explicitly connecting the sociocultural meanings associated with such foods to the nutrition transition as it occurs in local communities. Yet eating is one of the most profoundly meaning-ridden activities in human life (Farb and Armelagos, 1980). Food is a communication system; consuming particular foods transmits information about self to others (Barthes, 1997; Douglas, 1972), and status is a particularly salient message (Goody, 1982; Wiessner, Wiessner, and Schiefenhövel, 1998). Food habits reproduce

class distinctions (Bourdieu, 1984) and reinforce membership across ethnic, religious, gendered, and social categories (Caplan, 1997; Mintz and Du Bois, 2002). Thus, while it is clear that factors such as availability and accessibility make certain food choices more or less convenient, a wide variety of socioculturally mediated meanings are implicit in every food choice an individual makes because "food is never just food" (Caplan, 1997, pg 3). Food choices in contexts experiencing rapid dietary change cannot be considered in isolation from the sociocultural and historical meanings associated with those foods and eating habits.

Research on food and meaning is particularly warranted among adolescents in LMICs. First, adolescents depend heavily on material lifestyles to negotiate identity formation, to form social relationships with peers, and to mark status (Miles, 2000). Food is just as meaningful as material goods, and thus the consumption of particular foods is a similarly critical site for accomplishing those objectives (Neely, Walton, and Stephens, 2014; Stead et al., 2011). That is, food sends information about not only social relationships, but also social distance. What people eat reflects who they are and who they want to be. Among adolescents, specifically, research suggests that marginalization, bullying, and social embarrassment beset individuals who eat differently (Roos, 2002; Stead et al., 2011; Verstraeten et al., 2014). For example, Stead et al. (2011) and Verstraeten et al. (2014) found that 13- to 15-year-olds in England and 11- to 15-year-olds in Ecuador, respectively, avoid healthy foods, fearing that peers will mock their "weird" eating behaviors. Adolescents similarly expressed concerns that eating particular foods would make them look poor or unable to spend money (Stead et al., 2011; Verstraeten et al., 2014) As such, the meanings adolescents associate with particular foods are apt to influence their dietary choices.

Second, adolescents hold large sway over household purchasing decisions in many countries (Kaur and Singh, 2006; McDermott et al., 2006; Wilson and Wood, 2004), including India (Kaur and Singh, 2006). Adolescents may convince their parents to buy particular foods (Kaur and Singh, 2006; McDermott et al., 2006; Wilson and Wood, 2004), which likely affects the diets of both adolescents and other family members. For example, tracing the changing meaning and popularity of McDonalds in China, Yan (1997) noted that its success there is partly attributable to shifts in family structure and subsequent cultural pressures for parents to please children. More specifically, China's one-child policy produced families in which parents and grandparents were heavily invested in doting on a single child; through advertising, McDonald's positioned itself as the fashionable place for children and adolescents to eat, and when a "Little Emperor" wanted McDonald's, the entire family participated (Yan, 1997).

Third, as with consumer goods more generally (Johnson, 2001), increasing media access in remote communities—namely, television and the Internet— means that information about foods may even precede the widespread availability of those items. Adolescents, in particular, exhibit heightened awareness toward the latest "global" products and styles, making adolescent culture a useful barometer of globalization's reach (Miles, 2000). Research suggests that adolescents from "less developed" regions may prefer material lifestyles depicted favorably by international mass media because these lifestyles offer adolescents a way to experience the lives they imagine characterize peers in wealthier communities (Appadurai, 1990; Liechty, 2006). In line with this, studies suggest that foreign brands and material goods connote high status (Batra et al., 2000; Ger, Belk, and Lascu, 1993). Moreover, there is evidence to suggest that new or foreign foods are similarly desirable; however, this data comes primarily from adults (Conlon, 1995; Dewey, 2012; Newkirk et al., 2009; Oths, Carolo, and Dos Santos, 2003). Thus, more research is needed on

adolescents' cultural models for food prestige in LMICs, particularly across socioeconomic backgrounds and outside major urban centers.

In this study, we use several methods from cognitive anthropology, including free lists, pile sorts, and consensus modeling, to identify the meanings that adolescents living in rapidly developing contexts attribute to different foods. In particular, this research provides a foundation for understanding how changing food environments, including the influx of new, nonlocal, and global foods, is linked to local cultural models of food prestige. If adolescents' cultural models indicate that the foods made accessible via globalization and urbanization are highly desirable, then adolescents may be motivated to preferentially consume those items (D'Andrade and Strauss, 1992). If those foods are largely the processed, energy-dense, and sugar- or fat-laden foods implicated in the nutrition transition (Monteiro et al., 2011; Popkin, 2001), then adolescents' cultural models for food prestige may contribute to the dietary change currently observed in LMICs.

2. Ethnographic Background and the Changing Food Environment in India

The integration of new foods into local diets is a complex and uneven process. Foreign consumer goods and lifestyles do not outright supplant local practices, because new ideas and products are not uncritically adopted by passive consumers; they are interpreted and modified according to local norms, which are themselves an outgrowth of local history (Appadurai, 1988a; Jackson, 2004; Miller, 1998). For example, multinational food chains in India make pizzas with paneer (farmer's cheese) and tikka sauce (a spicy tomato-based sauce common in North Indian dishes), while burgers are actually spicy chicken or potato patties, not beef. Moreover, globalization and localization are twinned processes, such that the incursion of global foodstuffs into communities may foster "self-conscious difference," whereby people emphasize their local

cuisine as a counterpoint to the perceived uniformity and banality of western diets (Wilk, 2006). In addition, the global trade in food values is not unidirectional. In many ways, the local, rather than the cosmopolitan, is now a crucial commodity in the global cultural economy (Appadurai, 1990). For example, knowledge about "authentic" and traditional culinary cultures serves as a mark of class distinction in many communities (e.g., "foodies" in the West) (Johnston and Baumann, 2014; Wilk, 2006). Thus, in order to assess how changes in local food environments affect adolescents' cultural models for prestige, it is important to understand the ethnographic context of the community in question.

India now boasts one of the world's fastest-growing economies, but extreme poverty persists (Deaton and Drèze, 2009). Indeed, India still shoulders some of the highest food insecurity and undernutrition rates globally (Black et al., 2008), which remain far greater than expected given the country's rapid economic development (Deaton and Drèze, 2009; Pritchard et al., 2014). At the same time, concerns mount that obesity and chronic disease rates are increasing (Shetty, 2012), such that India may now face a "dual burden" of under- and overnutrition.

Globalization and economic liberalization have drastically changed Indian consumer culture (Derné, 2008; Mankekar, 1999). Among the nonelite, "myth[s] of upward class mobility" are salient, and individuals view consumer goods as tickets to middle-class membership (Dickey, 2010, pp. 193; Mankekar, 1999). Even Indian slums now represent "hotbeds of aspirational consumption," as households allocate money to prestige goods, including branded foods (Mukherjee, 2013).

Most early scholarship on food in India tied food's status-connoting properties to its role as a transducer of pollution in the caste system (Marriott, 1968; Dumont, 1980). The focus on caste and its portrayal have since been criticized (Appadurai, 1988b; Mencher, 1974), and indeed, at

least among wealthy urbanites today, individuals are often far more interested in knowing what is "cool" to eat than in traditional sociomoral or religious proscriptions about spiritual pollution (Dewey, 2012). Even traditional Hindu religious prohibitions against meat consumption blur as one moves up or down the socioeconomic ladder (Robbins, 1999). Where explicit ideas about pollution persist, these concerns now interface with neoliberal ideals like "hygiene" or "standards" (Dewey, 2012). That is, rather than concerns about pollution per se, individuals focus on the cleanliness associated with food preparation.

This study takes place in Vijayapura, a remote, midsized city in the southern Indian state of Karnataka. Its official designation as a Tier III city places Vijayapura among the smallest and least developed urban centers in India. However, literacy rates in Vijayapura are higher than the national average (Registrar General and Census Commissioner, 2011), and the city is home to several universities, including a medical college. The majority of the population is Hindu or Muslim, but Jain and Christian communities are also present.

Local observers in Vijayapura indicate that food outlets, including roadside eateries and hotel restaurants, are increasing. This reflects trends in India, more generally. That is, public dining was not common in India historically (Conlon, 1995), and the restaurant options available through the 1930s were primarily utilitarian in nature, intended for laborers, travelers, or bachelors (Conlon, 1995). These days major cities are inundated with multinational restaurant chains (e.g. McDonald's, KFC, Pizza Hut) and supermarkets. In contrast, restaurant chains are scarce outside urban centers. In line with this, during our study there were no major fast food chains in Vijayapura, and supermarkets had arrived only a few years prior to the study. Street food vendors and bakeries, on the other hand, were quite common.

Television access in Vijayapura appears nearly ubiquitous across socioeconomic backgrounds; all adolescents in our sample reported watching television at least once a week. Indeed, approximately 77% of urban Indian households own television sets (Registrar General and Census Commissioner, 2011). Until the 1990s, most television programming in India was available via the state-run channel, Doordarshan (Mankekar, 1999). Now other broadcasting services are available in a variety of languages, though Kannada and Hindi are common viewing choices in Karnataka (Devadas and Ravi, 2013); on the other hand, where language barriers are not an issue (due to English fluency or dubbing), Indian adolescents often prefer American and British television shows.

Schools in Vijayapura are predominately government or private, and students attend school 6 days weekly. This study included pupils in both coeducational government and private schools. Among Indian adolescents, government or private school attendance is generally a good indicator of socioeconomic status (Reddy and Gibbons, 1999). In Vijayapura, specifically, families whose children attend government schools earned a median monthly income of INR 5,001–10,000 (approximately USD 79–159) (Staab et al., 2016). For families whose children attend private schools, the median monthly income was INR 10,000–20,000 (USD 158–317) (Staab et al., 2016). This reflects the substantial fees required to attend private schools; government schools are free or nearly free.

The tendency for private-school students to hail from wealthier backgrounds than government-school students means that their experiences with respect to material, social, and symbolic aspects of the food environment diverge. First, government-school students usually receive free lunches through the government's midday meal scheme (Khera, 2006). Private-school students, on the other hand, pack their own lunches or eat from their schools' in-house cafeteria

programs. Second, compared to government schools, the medium of instruction in private schools is more likely to be English (Desai et al., 2009). Moreover, English fluency in India increases with education and income. Where private school students' parents are wealthier and better educated, adolescents may be more likely to hear English spoken at home. These opportunities could yield higher English fluency among adolescents attending private schools and, thus, greater access to English language movies, television shows, Internet sites, and the messages about food and status contained therein. Third, computer ownership across India remains low; among urban households, only 8% own laptop or desktop computers with associated Internet access (Registrar General and Census Commissioner, 2011). As expected, private-school adolescents from our sample in Vijayapura were significantly more likely to have a laptop or desktop computer at home with Internet access.

2. Data and methods

2.1 Field methods

This study used anthropological methods, specifically free lists, pile sorts, and cultural consensus analysis, to identify the values that adolescents attribute to foods. Free listing is a semi-structured interview method that asks respondents to name all of the items that they can think of for a particular domain (Borgatti, 1999). Generally, respondents free list the things that are most familiar to them first. Moreover, this method assumes that those items which are frequently listed across individuals will also appear early in those lists. Generally, 20–30 respondents are sufficient to identify the core items in a cultural domain (Weller and Romney, 1988). Written free lists achieve similar results to free listing conducted orally and may be the ideal approach for literate populations (Quinlan, 2005).

Unconstrained pile sort exercises ask participants to group items together in whatever manner they wish and to describe or name the piles that they create (Borgatti, 1999). This method allows researchers to identify how people think a set of items relate to each other. Pile sort tasks are often developed using data obtained from free lists and are analyzed with multidimensional scaling (MDS) to provide a visualization of the relationships between items. Items grouped together more frequently during pile sorts are closer together on the MDS plot. Close proximity on the plot indicates that informants perceive those items as similar, while items located far apart are perceived to be different. Hierarchical clustering identifies how items group together within a domain. The meaning of these groups is interpreted with the help of qualitative data collected during the pile sort interview when informants are asked to name their piles (Borgatti, 1999).

Cultural consensus modeling determines the extent to which respondents share knowledge about a single cultural domain. If one model exists, consensus analysis provides the culturally "correct" knowledge about that domain (Romney, Weller, and Batchelder, 1986). In other words, this method produces a culturally specific "answer key" for the questionnaire used. In the case of a card ranking activity like the one used in this study, consensus analysis yields the "correct" order of 30 foods along prestige lines according to the aggregate opinion represented by participant answers.

2.2 Data collection

This study was part of a larger project focused on understanding patterns of unhealthy weight among adolescents in the city of Vijayapura. The research described here was conducted in July 2013 in a representative sample of schools that were participating in the larger project, but with a separate sample of adolescents. The Emory University Institutional Review Board and the BLDE Ethical Committee approved the human subjects protocol for this study. Written consent

was collected from parents, and assent was obtained from adolescents prior to the interviews. All adolescents in eighth and ninth grades at one government and one private school were invited to participate in the free-listing exercise during school hours. Of those who volunteered, 30 adolescents were nominated by teachers to complete written free lists; one government-school girl was not able to answer the questions. The final sample included 29 participants: 14 students from the government school and 15 from the private school, 15 boys and 14 girls.

We developed a free list questionnaire that asked students to list all of the items they could think of for several prompts about food. Two prompts are the subject of this analysis: (1) "What foods and beverages do people in Vijayapura eat and drink at home? Please name as many specific foods and beverages as possible" and (2) "What foods and beverages do people in Vijayapura eat and drink outside of the home? Please name as many specific foods and beverages as possible." Free list questionnaires were developed in English, translated into Kannada, piloted, and back translated into English. The final questionnaires were in Kannada, but students had the option of answering in either English or Kannada.

Interviewers explained the free list instructions to students in Kannada at the start of the survey and remained available to answer questions as needed. Each prompt was written on a separate page, and below each prompt were 32 empty, numbered boxes. Written and oral directions instructed students to write only a single food or beverage in each box. For demonstration purposes, students were presented with a mock prompt and filled response sheet about an unrelated topic. At the end of each answer sheet, written instructions asked students to look back over their lists to see if they could think of any additional responses. Students were also asked orally to revisit their answers and to add as many items as possible before finishing. There was no time limit placed on the free list task, and students worked alone.

We developed consensus and pile sort surveys using results from the free lists. For free list data, the standard analytical strategy is to identify the most salient items and to use these for later instrument development. As expected, given that saliency is calculated in part according to frequency, in this study the most frequently mentioned and most salient items overlapped substantially within each domain. However, for this study, we selected the 15 most frequently mentioned "foods eaten at home" and the 15 most frequently mentioned "foods eaten away from home." Given our research questions, we decided that the pile sorts and food rankings would be most informative if a variety of items were included. We determined that the most frequently mentioned foods, rather than the most salient foods, provided greater breadth and thus used frequency as a cutoff for inclusion. Even those few foods that were salient, but less frequently mentioned, remain represented in the foods ultimately selected. For example, bakery foods were one of the most salient foods eaten away from home and were listed four times. Cakes were listed five times, but were not extremely salient. Bakery foods encompass a variety of items; however, cakes are a good representation of the foods purchased at bakeries. By making frequency our cutoff rather than saliency, we achieved a list of items more useful for answering our research questions.

The items that were mentioned frequently for both prompts, dosa and idli, were included as foods eaten at home because they were mentioned more frequently for this domain. We limited the final list of items in the consensus and pile sort surveys to 30 foods and beverages because piloting showed that a larger number of cards was tedious for adolescents to work with.

The pile sort instruments were developed in English, translated into Kannada, piloted, back translated into English, and administered in Kannada during school hours. The 30 foods and beverages were written on notecard-sized paper. Each item was written in both Kannada and English.

We conducted the pile sorts and consensus surveys at a government and a private school that were not involved in the free listing. All adolescents in the eighth and ninth grades were invited to participate. Teachers nominated 65 students, 33 in the government school and 32 from the private school. The sample consisted of 33 boys and 32 girls.

The interviewer asked each student to arrange the shuffled deck of 30 cards into groups however he or she wanted. Participants were required to make at least two piles, but no limit was placed on the number of piles. Interviewers emphasized that there were no correct answers. Students were not given prompts or hints about how to arrange the cards. After the cards were sorted into groups, interviewers asked students to explain the piles they had created. The interviewers elicited names for each group of items with questions like "Why do these foods belong together?" and "What do you call the foods in this pile?" The answers were recorded by local interviewers in Kannada and translated into English.

Students completed the consensus survey immediately after the pile sort. For the consensus survey, interviewers shuffled the deck of 30 cards and asked each participant to complete four ranking tasks. After completing each, the student was given a shuffled deck of the same 30 cards and asked to complete the next of the four tasks. The four prompts were (1) "Think about 'everyday foods' that people eat routinely. Please rank these 30 foods from the most to the least routine"; (2) Think about foods that are traditional to Vijayapura. Please rank these 30 foods from the most to the least traditional"; (3) "Think about foods that are fashionable or prestigious. Please rank these 30 foods from the most to the least prestigious"; (4) "Think about the foods advertised on television. Please rank these foods from the most to the least advertised on television." As prestige is a central concept in this article, it is important to note that among adolescents the word "prestige" in Kannada has a connotation of "trendy" or "cool." In view of this, our prompt for ranking foods

according to prestige asked them to think about prestigious or fashionable foods and to rank them along that dimension.

After the consensus survey, interviewers administered a brief questionnaire. Students were asked whether they practiced a strict vegetarian (eats no meat or eggs), vegetarian (eats no meat, but eats eggs), or nonvegetarian diet (eats at least one type of meat), whether they had a laptop or desktop computer at home with access to the Internet, and how frequently they watched television in Hindi and in English: every day, a few times a week, once a week, less than once a week, or never. They were also asked their mother's highest education level: none, primary, high school, pre-university course (PUC), college, or professional/postgraduate.

3. Analytic methods

Frequency was calculated for each item in the free lists using ANTHROPAC 4.98. Prior to analysis, some of the items were collapsed into broader, culturally relevant terms to facilitate analysis (Borgatti, 1999). The decision to collapse an item was based on the recommendations of key informants and the responses of participants. For example, respondents frequently mentioned the item "cold drinks," which refers to sugary sodas like Coca-Cola and Mirinda. Individuals who answered with the specific names of such products were counted as saying cold drinks.

The pile sorts were analyzed with ANTHROPAC 4.98 following standard procedures for multidimensional scaling and hierarchical clustering. Stress level, which is similar to a goodness-of-fit measure, was calculated for the MDS plot. Larger stress levels indicate poorer fit. For a 30-item matrix scaled in two dimensions, a stress level below 0.328 is considered acceptable and suggests only a 1% chance that the items in the MDS plot are randomly arranged (Sturrock and Rocha, 2000).

Adolescent consensus was evaluated independently for each of the four rankings exercises: most to least traditional, most to least routine, most to least prestigious, and most to least advertised on television. Consensus was calculated using UCINET. An eigenvalue ratio of at least 3:1 is considered evidence of a single cultural model, but a ratio of 4:1 is sometimes used as a more stringent cutoff (Weller, 2007). Due to recording errors in the field, a few students' answers included two items both logged as the same rank. We randomly assigned positions to these duplicate card rankings. For example, if a student was recorded as placing both pizza and roti at rank 4 for the domain "traditional foods," then we determined which rank was missing and randomly selected whether pizza or roti would be entered as 4 for that ranking. The other food was then recorded as the missing rank. This accounted for only 0.006% of the 7,800 total card rankings.

4. Results

The total sample for the pile sort and ranking tasks included 65 adolescents (table 1). More than half of the respondents were either strict vegetarian (29%) or vegetarian (31%); 40% were not vegetarian. Less than half of the participants (43%) had Internet access at home, and television viewing was almost universal: 77% watched English-language television and 92% watched Hindi-language television at least once a week. Forty percent of mothers had attended college or professional school.

Respondents attending private and government school differed significantly on mother's education level ($p < .0001$) and Internet access at home ($p < .001$). There was also a marginally significant difference in how frequently private and government school adolescents watched English-language television ($p = .052$). Private- and government-school students also differed significantly in the likelihood that they were nonvegetarian, vegetarian, or strict vegetarian ($p = .037$).

Table 1. Characteristics for adolescent participants who pile sorted and ranked 30 foods (n=65).

Variable	Government school (n=33)	Private school (n=32)	X^2	P-value
Gender			0.015	p=1
Boy	16 (48.5%)	16 (50.0%)		
Girl	17 (51.5%)	16 (50.0%)		
Grade in school			0.135	p=0.806
8th	18 (54.5%)	16 (50.0%)		
9th	15 (45.5%)	16 (50.0%)		
Diet			6.611	p=0.037
Strict vegetarian[a]	6 (18.2%)	13 (40.6%)		
Vegetarian	9 (27.3%)	11 (34.4%)		
Non-vegetarian	18 (54.5%)	8 (25.0%)		
Internet access at home			26.195	p<0.001
No	29 (87.9%)	8 (25.0%)		
Yes	4 (12.1%)	24 (75.0%)		
English television			9.397	p=0.052
Everyday	8 (24.2%)	8 (25.0%)		
Few times a week	8 (24.2%)	13 (40.6%)		
Once a week	6 (18.2%)	7 (21.9%)		
Less than once a week	3 (9.1%)	4 (12.5%)		
Never	8 (24.2%)	0 (0.0%)		
Hindi television			6.853	p=0.144
Everyday	19 (57.6%)	26 (81.3%)		
Few times a week	5 (15.2%)	4 (12.5%)		
Once a week	5 (15.2%)	1 (3.1%)		
Less than once a week	1 (3.0%)	1 (3.1%)		
Never	3 (9.1%)	0 (0.0%)		
Mother's education			44.312	p<0.0001
None	7 (21.2%)	0 (0.0%)		
Primary	7 (21.2%)	0 (0.0%)		
High school	14 (42.4%)	1 (3.1%)		
PUC[b]	1 (3.0%)	9 (28.1%)		
College	3 (9.1%)	13 (40.6%)		
Professional/postgraduate	1 (3.0%)	9 (28.1%)		

Note: (a) Strict vegetarians do not eat meat or eggs. (b) PUC referes to the two-year bridge course in art, commerce, or science beginning after year 10 that students most complete before college.

4.1 Foods Eaten at Home and Outside the Home Are Distinct Cultural Domains

When asked to name foods eaten at home and outside the home, adolescents listed 196 different foods: 111 foods eaten at home and 85 foods eaten away from home. Students listed on average 12.3 at-home foods and 10.0 away-from-home foods. There was little overlap between the lists for foods eaten at home and foods eaten outside the home. Only four foods were mentioned five times or more for both domains: dosa (fermented rice and lentil pancake), idli (fermented rice and lentil bread), tea, and chicken (table 2).

Table 2. Foods that adolescents (n=29) listed during free lists for two domains: "Foods Eaten at Home" and "Foods Eaten Away From Home."

At home			**Away from home**		
Rank	**Food**	**Frequency**	**Rank**	**Food**	**Frequency**
1	**roti**	24	1	**chaats**	19
2	**rice**	23	2	**cold drinks**	16
3	**chapati**	22	3	**gobi manchurian**	15
4	***dosa**	17	4	**ice cream**	14
5	***idli**	14	5	**chicken**	13
6	**vegetables**	13	6	*dosa	13
7	**sambar**	13	7	**pakora**	11
8	**milk**	8	8	*idli	11
9	**eggs**	8	9	**fruit juices**	9
10	**fruits**	7	10	**samosa**	8
11	**curd**	7	11	**chocolates**	7
12	***tea**	6	12	**noodles**	7
13	**pulses**	6	13	**pav bhaji**	6
14	**puranpoli**	6	14	**pizza**	6
15	**upma**	5	15	**puffs**	5
16	bananas	5	16	**cakes**	5
17	bhajis	5	17	**chips**	5
18	butter	5	18	kachori	5
19	chicken	5	19	*tea	5
20	curd rice	5			
21	shira	5			
22	salads	5			

Note: (a) Only foods named at least 5 times are included. (b) **Bold** items were included in the pile sort and consensus surveys. (c) Starred items were listed 5 or more times as both "at home" and "away from home" foods.

Through cluster analysis of the pile sort data, three major groups emerged; the MDS stress level suggests that this domain structure is not random (stress = 0.094) (figure 1). Although the students were not instructed to sort items by where they are eaten, nor were students aware of the free list task conducted at other schools, which asked about consumption location, the two largest groups from the cluster analysis substantially overlap with the free list results for at-home and outside-the-home foods. Moreover, adolescents commonly described the piles they made as "foods eaten at home," "outside foods," and "homemade" as well as "healthy" and "unhealthy."

There were only two major inconsistencies between the groupings that emerged from the pile sorts and the designation of foods as either at-home or outside-home foods according to the free list results. First, in the pile sorts, eggs and chicken clustered together as a separate group from the other two major clusters. During the pile sorts, adolescents frequently lumped together chicken and eggs and described the group as "non-veg" or "I do not eat these." Thus, the vegetarian diets of many participants probably account for this pattern. Second, fruit juices clustered together with at-home foods, while in the free lists they were named frequently as foods eaten away from home. Fruit juices can refer to either the highly sweetened beverages found at roadside stands or homemade drinks. Some adolescents may have interpreted fruits juices as referring to the homemade variety and placed them with other at-home items. Alternatively, the close proximity of fruit juice to tea and milk suggests that it was frequently lumped with these items—perhaps as drinks or liquids—and that this accounts for its position in the MDS plot.

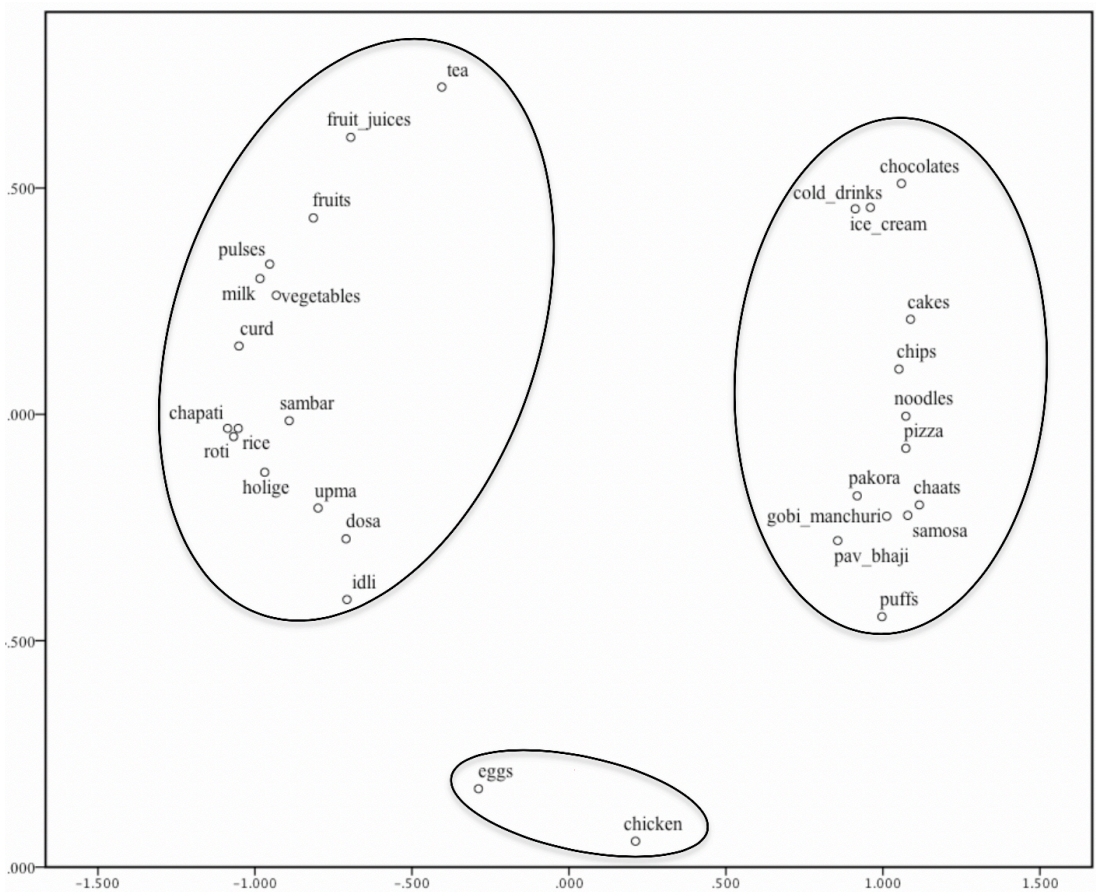

Figure 1. Multidimensional scaling plot (stress=0.094) and cluster analysis for adolescents' (n=65) unconstrained pile sorts of 30 foods, which were previously identified during free lists.

4.2 The Most Prestigious Foods Are Nontraditional and Eaten Outside the Home

Following consensus analysis, the eigenvalue ratios for the ranking of foods as prestigious, traditional, routine, and advertised on television were all greater than 4:1, indicating that adolescents share a single cultural model about each of these domains (table 3). The rankings for prestige are generally the inverse of the rankings for traditional (figure 2). For example, adolescents identified pizza, noodles, cold drinks (sodas and fruit-flavored drinks), ice cream, and cake as nontraditional and believed these to be among the most prestigious foods. Adolescents identified curd, rice, pulses, holige (sweet, pulse-stuffed flatbread), and roti (flatbread) as the least prestigious, but also believed them to be among the most traditional. Similarly, the rankings for

prestige are generally the inverse of the rankings for routineness, while the relationship between prestige and television advertising is less clear. However, for a core set of items, including chocolates, ice cream, chips, cold drinks, noodles, and pizza, advertising does appear related to prestige.

Table 3. Cultural consensus results for 30 foods ranked according to which are the most to least routine, prestigious, traditional, and advertised on TV by adolescents (n=65).

	Routine	Prestigious	Traditional	Advertised on TV
eigenvalue ratio	8.502	8.229	8.593	4.091
MOST	Roti	Pizza	Roti	Chocolates
	Chapatti	Noodles	Chapatti	Ice cream
	Rice	Cold drinks	Holige	Chips
	Vegetables	Ice cream	Rice	Cold drinks
	Milk	Cakes	Vegetables	Noodles
	Pulses	Gobi manchuri	Pulses	Pizza
	Curd	Chips	Upma	Milk
	Upma	Chocolates	Sambar	Tea
	Fruits	Puffs	Curd	Cakes
	Sambar	Samosa	Milk	Fruit juices
	Tea	Chaats	Tea	Chicken
	Idli	Chicken	Dosa	Fruits
	Dosa	Pav bhaji	Idli	Rice
	Fruit juices	Fruit juices	Fruits	Chaats
	Chocolates	Eggs	Fruit juices	Eggs
	Holige	Pakora	Pakora	Chapati
	Pakora	Milk	Eggs	Gobi manchuri
	Ice cream	Dosa	Chicken	Samosa
	Chips	Idli	Pav bhaji	Pav bhaji
	Pav bhaji	Fruits	Chaats	Idli
	Samosa	Tea	Chocolates	Curd
	Eggs	Upma	Ice cream	Dosa
	Cakes	Chapati	Samosa	Puffs
	Chaats	Sambar	Puffs	Pulses
	Noodles	Vegetables	Gobi manchuri	Vegetables
	Gobi manchuri	Curd	Chips	Roti
	Cold drinks	Rice	Cakes	Sambar
	Puffs	Pulses	Cold drinks	Pakora
	Chicken	Holige	Noodles	Upma
LEAST	Pizza	Roti	Pizza	Holige

Note: (a) Shaded items were identified as eaten away from home based on the free lists and pile sorts. (b) Non-shaded items were identified as eaten as at home based on the free lists and pile sorts.

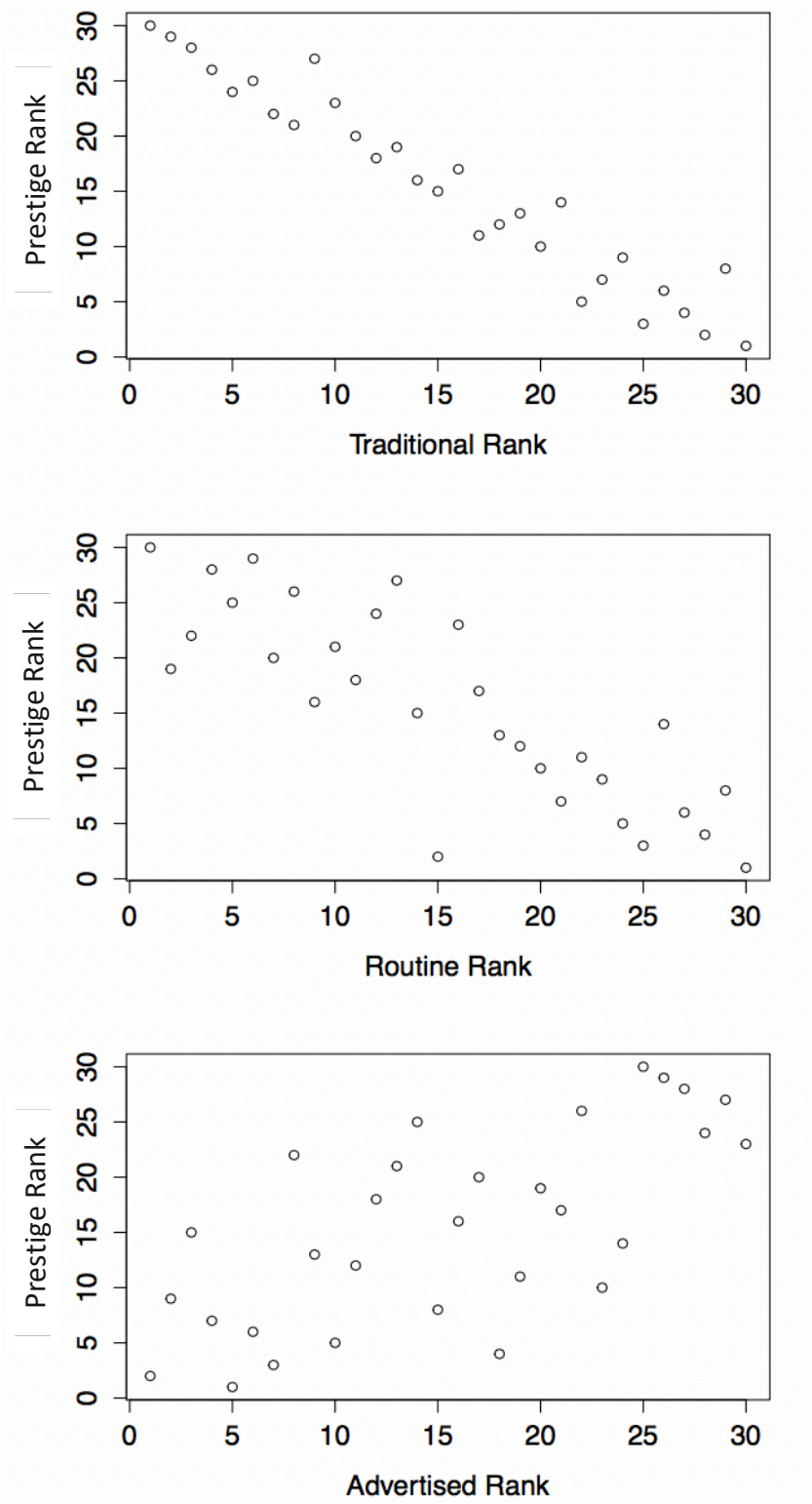

Figure 3. Adolescents' (n = 65) rankings of 30 foods according to prestige versus their rankings of those same 30 foods according to three other dimensions: traditional, routine, and advertised on television. For each panel, the relative prestige rank of each food (between 1 and 30) was plotted against the relative rank of that food (between 1 and 30) on the other three dimensions.

4.3 Private School Adolescents Are More Familiar with Prestigious Foods Eaten Away from Home

During the free lists, private-school adolescents named more foods eaten away from home than did government-school students: 12.3 compared with 7.7, on average. Overall, private-school students listed more new, nonlocal, and comparatively expensive items (e.g., cold drinks, noodles and pizza) than government school students, whose lists included primarily traditional and easily accessible regional foods (figure 3). For example, private-school students named noodles seven times while no government school students listed noodles. Similarly, 12 private-school students named cold drinks while only four government-school students did. Private-school adolescents also listed more at-home foods than government-school students, 13.7 and 10.7, respectively. However, except for private-school adolescents' much more frequent mention of eggs, students from both school types had very similar lists for at-home foods.

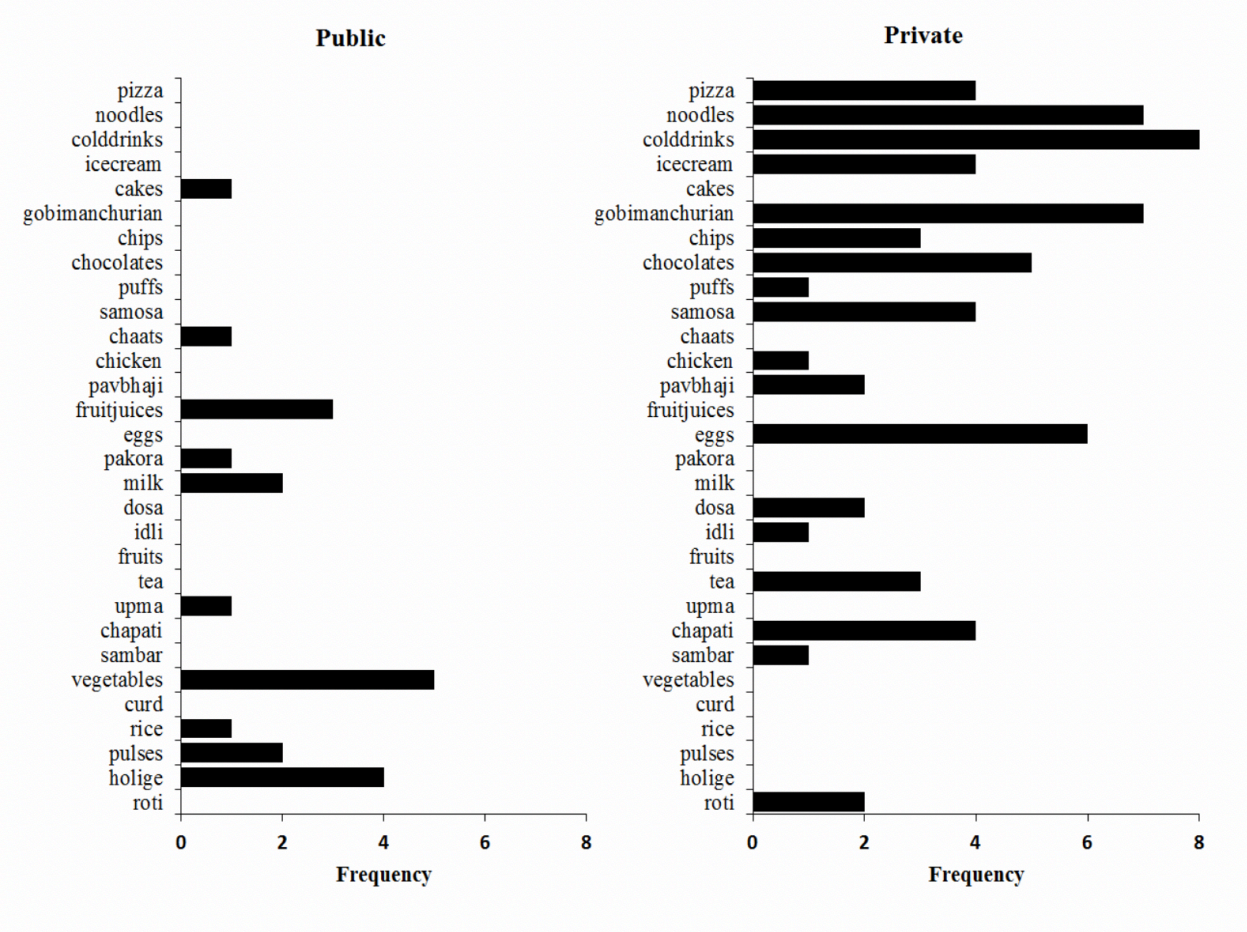

Figure 1. Difference in the number of times that private and government school students named each of 30 foods during free lists. Based on the results from consensus analysis, the foods are listed in descending order from most to least prestigious. A bar indicates that students from that school type (e.g., private) named the food more frequently than students from the other school type (e.g., government), with bar length representing the net, positive difference in favor of that school type.

4.3 Foods Eaten Outside the Home are Prestigious and Generally Less Healthy

Synthesizing the results from the pile sorts and consensus analysis, it appears that foods eaten outside the home are generally more prestigious. Moreover, outside-home foods are generally less healthy than the more traditional, less prestigious foods that adolescents indicate are eaten at home. Prestigious foods are generally calorie-dense, prepackaged or fried foods found at roadside eateries, hotel restaurants, and small grocery stalls. This includes chocolates, cold drinks

(sodas and carbonated fruit beverages), ice cream, cakes, chips, noodles, pizza, pakora (fried vegetables), chaats (spicy, usually fried snacks), samosas and puffs (fried, savory pastries), pav bhaji (vegetable curry with buttered roll), and gobhi manchurian (fried, spiced cauliflower in soy sauce). By contrast, non-prestigious foods include vegetables, fruits, fruit juices, and dairy products (milk and curd) as well as rice and pulse-based foods (roti, chapati, rice, upma, idli, and dosa). Except for fruit juices, which may include added sugars, these items are generally low in refined carbohydrates, sugar, and fat.

5. Discussion

Most research examining globalization and dietary change emphasizes the effects that processes such as increased market integration and foreign direct investment have on material changes in the food environment—namely, the increased availability of new and highly processed food products. Comparatively few studies address the importance that the sociocultural meanings associated with those foods might play in dietary change. Such research is particularly lacking for adolescents. Our study addresses this issue by examining adolescents' cultural models for food prestige in a rapidly developing Indian city.

Research suggests that people in LMICs may consider new and foreign foods prestigious (Conlon, 1995; Dewey, 2012), though the degree to which those foods are prestigious varies across age groups (Watson, 2006) and socioeconomic classes (Newkirk et al., 2009; Oths, Carolo, and Dos Santos, 2003). Our results similarly suggest that Indian adolescents accord high prestige to nontraditional and foreign foods.

The most pertinent question, then, is why these foods warrant such high social value. First, and perhaps most straightforward, being foreign may in and of itself be a desirable characteristic for foods. As Liechty (2006) notes, youth from countries deemed lower on the developmental

totem pole toward "modernity" may experiment with particular consumptive lifestyles as a way of accessing the other "possible lives" depicted in globalizing mediascapes and that they imagine characterize more affluent communities (Appadurai, 1990). Alternatively, the lower classes in LMICs, rather than venerating global goods and brands because they are foreign, may favor these as status symbols because the upper classes in their own countries consecrate those items' social value (Üstüner and Holt, 2010). Similarly, young people outside of major urban centers may strive to eat the way they imagine peers in larger cities do. In this sense, global prestige markers reach lower- and middle-class consumers—or more rural, less cosmopolitan communities like Vijayapura—through a trickle-down process. That is, the proximate field of status goods to which lower- and middle-class consumers actually aspire is, ultimately, a local and country-level one (Üstüner and Holt, 2010).

In smaller cities like Vijayapura, where, at the time of this study, there were as yet no incursions by foreign fast food chains (or even any major Indian fast food chains), local producers such as family bakeries and hotel restaurants, rather than multinational corporations, bring the global to consumers (Liechty, 2006). Thus, it seems significant that adolescents consider pizzas the most prestigious food even while all pizzas available in Vijayapura are locally produced. This indicates that local interpretations of global foods are still desirable relative to regional options. On the other hand, when given the choice, Indian adolescents are nonetheless likely to prefer authentic foreign brands (Batra et al., 2000; Lakha, 1999).

Second, the prestige adolescents attribute to global and ostensibly modern foods may reflect an ongoing process of identity formation. Individual identities and the attendant lifestyles through which they are negotiated are always formed in reference to the dominant social structure (Miles, 2000). Moreover, consumption is a particularly salient avenue through which youth

identities are practiced (Miles 2000). In the case of Indian adolescents, the roles afforded to them by Indian culture are primarily ascertained through interactions with the adult world—mainly parents (Bansal, 2012; Kakar, 2006). While the tendency for youths to seek out identities other than the adult-dictated positions otherwise afforded to them has been noted in numerous contexts (Miles, 2000), several scholars suggest that the status quo in Indian families remains relatively uncontested by most adolescents, particularly as it pertains to more weighty matters such as marriage or career choice (Bansal, 2012; Kakar, 2006). When conflict does arise, tradition and family mandates usually prevail (Derné, 2008; Verma and Saraswathi, 2002). Bansal (2012) argues that in this context, markers of capitalist individualism may offer one of the few means by which Indian youth are able to craft and display individual identity. Food preferences are an important identity marker among adolescents in other contexts (Neely, Walton, and Stephens, 2014; Stead et al., 2011). Given the importance of material lifestyles as a primary outlet for expressing individuality apart from the Indian family (Bansal, 2012), it seems likely that food consumption similarly offers Indian adolescents an arena for negotiating identities.

Moreover, even in contexts where "generational conflict" is muted (Montemayor, 1983), the parent–child relationship as a fundamental unit of cultural reproduction becomes increasingly unsteady, contested, and politicized in the face of global information flows (Appadurai, 1990). In response, parents may emphasize tradition and heritage-related identity markers as a counterpoint to mass media representations of alternative identities (Appadurai, 1990; Srinivas,, 2013). Thus, although older generations may associate status with eating out, they simultaneously express anxiety about the replacement of traditional Indian fare with new and imported foods (Dewey, 2012; Srinivas, 2013).

In addition, new economic pressures in rapidly urbanizing contexts pave the way for households wherein both parents work outside the home and women face trade-offs in their allocation of time toward domestic tasks (Ruel, 2000; Smith, Ruel, and Ndiaye, 2005). In many cases, consumption of processed and prepared foods may reduce the time that women spend cooking, thereby reducing employment-related opportunity costs (Ruel, 2000). In India, however, the expectation that women will continue to prepare elaborate, time-consuming, and traditional meals does not necessarily decrease. Srinivas (2013) notes that urban, middle-class women increasingly serve ready-to-eat packaged Indian foods as a way to meet all of their socially dictated responsibilities.

The efforts that parents take to ensure that their children eat traditional, regional, and caste-appropriate foods at home are not likely to go unnoticed by adolescents. It is against this backdrop that adolescents are socialized into particular identities and food preferences. It has been suggested that children reinterpret and reorder the adult social world, such that objects and ideas considered base or unappealing among adults are accorded great prestige among younger generations (James, 1982). For example, James (1982) shows how English children adopted the word "ket" to refer to favorite sweets, while adults used the same word to reference rubbish or useless things. Similarly, children are known to conceptualize foods as belonging to dichotomous adult food or kid food categories (Chapman and Maclean, 1993; Elliott, 2011). Indian adolescents may similarly consider nontraditional, foreign foods eaten outside the home prestigious at least in part because these foods are not "for adults." This is not to say that Indian adolescents consume nontraditional and nonlocal foods explicitly in opposition to adult-defined values; however, adolescents' lifestyle choices, particularly their consumption practices, may nonetheless reflect a more generalized desire to fashion alternative, individual identities (Bansal, 2012; Miles, 2000).

Research in LMICs suggests that eating out at restaurants is prestigious (Conlon, 1995; Dewey, 2012; Watson, 2006). Our study supports this observation as the same foods adolescents identified as prestigious are also those they consider outside-home foods. Moreover, the cultural domains "foods eaten outside the home" and "foods eaten at home" both appear extremely salient and distinct. In the Indian context, if parents emphasize eating traditional foods at home and adolescents do not consider those foods prestigious, then outside the home becomes the de facto site for consuming "cool" foods. Moreover, conspicuous consumption of prestigious foods—or even conspicuous knowledge of which foods are prestigious—highlights individual status differences and reinforces power relationships (Stead et al., 2011; Ulijaszek, 2012). As such, restaurants and other food outlets offer adolescents a place to be seen consuming highly valued, global foods and, in doing so, to demonstrate their worldliness. That private-school students named new and nonlocal foods more often than government-school students fits with research suggesting that familiarity with novel foods, and imported foods in particular, is a marker of sophistication, power, and modernity (Dewey, 2012). This familiarity likely reflects private-school adolescents' wealthier families and greater exposure to cosmopolitan ideas.

Although our results fit with research suggesting that changing consumption norms in India highly value knowledge about novel or foreign goods and lifestyles, our finding that adolescents agree about food prestige across socioeconomic backgrounds diverges from research conducted among adults in Brazil (Newkirk et al., 2009; Oths, Carolo, and Dos Santos, 2003). This discrepancy may reflect the importance that advertising plays in directing adolescent food choice, particularly the use of food's symbolic meaning or "coolness" by marketers. Indeed, although the degree to which a food is advertised on television is not as clearly associated with food prestige as a food's novelty, adolescents in this study did consider heavily advertised foods prestigious. On

the other hand, it is possible that a more fine-grained analysis (e.g., one ranking soft drink brands) would yield results similar to Oths, Carolo, and Dos Santos (2003) and Newkirk et al. (2009), thereby uncovering class-based differences in cultural capital or "taste" between government- and private-school adolescents (Bourdieu, 1984). More to the point, our finding that government and private school adolescents were differently familiar with prestigious food items suggests that high-status cultural knowledge pertaining to food may nonetheless be uneven (Bourdieu, 1984).

The prestige that adolescents associate with nontraditional foods and those eaten outside the home may have implications for dietary change. Research suggests that consumption of foods outside the home is linked with higher dietary energy intake (Lachat et al., 2012) as well as overweight and obesity (Bezerra and Sichieri, 2009; Prentice and Jebb, 2003). In line with this research, the foods that adolescents in our study identified as eaten outside the home are often deep fried and higher in trans-fatty acids, sugar, and refined carbohydrates. Moreover, adolescents considered cold drinks, which include sodas and sugary fruit beverages, among the most prestigious food items. Sweetened drinks have been connected with childhood obesity in the United States (Ludwig, Peterson, and Gortmaker, 2001) and diabetes (Malik et al., 2010).

Future research should consider whether cultural models for food prestige are shared across socioeconomic backgrounds in both major urban centers and more rural, less populous cities. Although rapidly growing, Vijayapura remains a midsized city. Our results suggest that shared cultural models for food do not vary across socioeconomic backgrounds in Vijayapura; however, a similar study conducted in a larger, more urbanized population might yield different results more in line with Oths, Carolo, and Dos Santos (2003) and Newkirk et al. (2009).

Using methods from cognitive anthropology, we found that adolescents living in a small Indian city share a single cultural model about which foods are most prestigious and that agreement

persists across socioeconomic classes. However, adolescents from wealthier backgrounds were more familiar with nontraditional foods, and these foods are overwhelmingly considered to be both more prestigious and eaten outside the home. Moreover, the degree to which a food is considered nontraditional or foreign may be a key contributor to its prestige among adolescents. These prestigious foods are typically less healthy, heavily processed, and eaten outside the home. The positive meanings that adolescents associate with nontraditional foods likely reflect globalization's influence on local cultural models.

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Chapter Three

Can prestigious food consumption measure gender- and age-based disparities in intrahousehold resource access?

Abstract

Intrahousehold food allocation disparities are a perennial topic in social science research. Although studies sometimes find evidence for a pro-male bias, conflicting results exist. This study begins with the observation that standard measures of intrahousehold allocation bias take a narrow view of food. More specifically, anthropometric and nutrition-based measures (e.g., calorie intake or micronutrient intake) focus on food's biological value to the exclusion of its sociocultural meaning. Yet household allocation decisions are as much about the high cultural value placed on certain foods as they are about actual knowledge of a given item's nutrient content. Moreover, as overnutrition becomes an increasingly common problem among food insecure households, food disparities become divorced from standard anthropometric measures and assessments of energy intake. Thus, it may be more instructive to assess who gets less of food's social value than to estimate who gets less of its biological value.

This study tests the hypothesis that access to food's social value—namely, its prestige—varies within slum-dwelling Indian households. It finds that people agree about which foods are prestigious across genders and age groups. However, access to food's prestige value varies according to gender in adolescents, with boys being advantaged relative to girls. At the same time, prestigious food consumption by adolescents exceeds that of their parents.

1. Introduction

Social science research in South Asia has long sought to determine whether intrahousehold food allocation varies between genders (Aurino, 2017; Basu et al., 1986; Coates, 2010; Harriss, 1990; Kramer, 1997; Messer, 1997; Miller, 1997). Where biases are found, studies generally conclude that men have greater access to foodstuffs compared to women (Coates, 2010; Kramer, 1997), while boys are privileged relative to girls (Aurino, 2017; Gupta, 1987). Yet a number of researchers report no intrahousehold disparities or find that their existence varies according to other factors (Basu, 1989; Brahamam et al., 1988; Harriss, 1990; Messer, 1997; Miller, 1997; Sen and Sengupta, 1983). Thus, despite the topic's ubiquity, food allocation biases and the conditions under which they proliferate remain debated (Harris-Fry et al., 2017).

In most cases, these studies take a relatively narrow view of food (but see: Sudo et al., 2006 and Gittelsohn, 1991). That is, they treat nutritional difference as the optimal indicator of intrahousehold disparity. Yet food's importance to human wellbeing is as much about the social meaning it conveys as the calories it provides (Barthes, 2012; Douglas, 1975; Farb and Armelagos, 1983; Rozin, 1996). The food that an individual consumes reflects who they believe they are, who they want to associate with, and who they aspire to be. In this sense, then, research must expand beyond an analysis of who gets more than their fair share of calories to consider who gets less than their fair share of food's social value. It may very well be, for example, that intrahousehold disparities missed by measures of calorie and nutrient consumption would be nonetheless apparent if food's social value was measured.

Although food undoubtedly has a variety of meanings, this paper focuses on its prestige value because of food's longstanding place in anthropological inquiry as a semiotic vehicle of status (Douglas, 2002; Goody, 1982; Mintz, 1985; Wiessner et al., 1996). Food's role as a status marker

is particularly apparent in scholarship on India, where this study occurred (Appadurai, 1981; Dumont, 1980; Marriott, 1970). The ability to identify prestige foods using anthropological methods is well established (Hadley et al., 2019; Chapter 2 - Maxfield et al., 2016; Newkirk et al., 2009; Oths et al., 2003). And several previous studies on intrahousehold food allocation in South Asia note that high-status foods are a critical site for discrimination between genders or age groups (Palriwala, 1993; Sudo et al., 2006; Gittelsohn, 1991). Even more explicitly, the most well-known review on food allocation disparities notes that "Diets are not only evaluated by the households on the basis of nutrients, but also on the basis of variety and prestige foods" (Haddad et al., 1996, pg. 21). A more recent review similarly suggests that "…'channeling' of high status, often micronutrient-rich luxury foods…could result in social rather than nutritional inequity" (Harris-Fry et al., 2017, pg. 18).

Thus, the primary aim of this paper is to test the idea that access to food's social value—specifically, its prestige value—is shared unequally within households. It tests the hypothesis that men and boys consume a disproportionate quantity of prestige foods compared to women and girls, respectively. Intrahousehold disparities in underweight and overweight are also examined. This allows findings concerning food's social value to be situated within the broader literature on intrahousehold allocation biases. In other words, does prestigious food consumption vary in a manner similar to standard measures of nutritional disparity? Finally, research on food prestige would be remiss without an analysis of which factors drive food's standing as high- or low-status. As such, this paper includes a discussion of what prestige really measures and, consequently, what any intrahousehold variation in prestigious food consumption actually means.

2. Background

2.1 Rajasthani Ecology and Cuisine

Rajasthan's primary agroecological zones are arid and semi-arid (Swain et al., 2012). Summer highs in Rajasthan's desert region can surpass 48°C (Swain et al., 2012), while the state's more fertile eastern region logs summer temperatures around 35-40°C (Tyagi et al., 2012). Rainfall in Rajasthan is highly variable throughout the year and fluctuates with one's location relative to the Aravalli Range, which cuts diagonally across the state. Most of Rajasthan's rainfall comes during monsoon season, reaching its peak during July and August (Singh et al., 2015). However, where monsoons in eastern Rajasthan bring yearly precipitation totals to around 492mm (Singh et al., 2012), the western side of the Aravalli Range sees as little as 100mm (Swain et al., 2012).

Around 75% of Rajasthan's population resides in rural areas (Census of India, 2011) and, as such, the state's economy centers on agriculture. Most rural households engage in smallholder farming or animal husbandry, particularly of cattle, goats, sheep, and camels (Swain et al., 2012). Indeed, around 65% of the state's population derives its livelihood from agriculture and allied activities (Swain et al., 2012). However, Rajasthan is also known internationally for its textiles, handicrafts, and semi-precious jewelry, reflecting the large mineral deposits present in the state (Kaminsky and Long, 2011).

Unsurprisingly, Rajasthani cuisine is heavily influenced by the region's harsh environment and agrarian base. Water-related constraints have historically limited local diets to desert-hardy crops, trees, and shrubs. When regular cereal grain production is not possible because of drought, household food security hinges on milk and other animal products (WFP, 2002). In this vein, dairy features heavily in many Rajasthani dishes as a way to minimize water consumption (Dubey, 2010; Singh, 1998). Ghee and buttermilk, in particular, are generously used (Dubey, 2010; Singh, 1998). Moreover, many ingredients stereotypically associated with Indian cuisine are comparatively recent additions to the Rajasthani diet (Highmore, 2009), especially as it manifests in rural, poor,

or tribal communities.[23] For example, where water-loving tomatoes act as a staple souring agent in wetter regions, people living in and around the Thar Desert have traditionally relied on ingredients like *kachri* powder (Dubey, 2010; Goyal and Sharma, 2009; Varshney, 2017).

Similarly, academic discussions about Indian staple grains often gloss northern states as wheat-growing and southern states as rice-cultivating. However, while wheat and rice are indeed major cash crops in northern and southern India, respectively, they are not necessarily the traditional grains thereof. In Rajasthan, drought-hardy pearl millet has historically been the staple cereal crop (Singh, 2015). Even today, 20-40% of protein and energy consumption in rural Rajasthan continues to be derived from millet, while over 50% of cereal consumption is millet based (Parthasarathy Rao et al., 2006).

Despite persistent drought risk, concerted efforts have been made in recent years to expand the range of crops grown in Rajasthan. Facilitated by improved irrigation, advances from the Green Revolution, and an uptick in the viability of cash cropping, contemporary Rajasthani farmers now grow a variety of drought intolerant and non-indigenous species, including tomato, okra, ridge gourd, snapmelon, Indian eggplant, bottle gourd, round melon, moringa, cowpeas, gooseberry, citrus fruit, spinach, cauliflower, cabbage, peas, sugarcane, carrots, and daikon radish (Meena et al., 2009). The more humid southeastern zone can additionally support wheat, maize, barley, and sorghum during monsoon season (Hussain, 2015; Swain et al., 2012). Rajasthan is also a major producer and exporter of spices, with the state's key contributions being fenugreek, coriander, cumin, garlic, fennel, and chilly (Kumawat and Meena, 2005).

[23] In fact, a substantial number of ingredients traditionally associated with Indian food are not actually indigenous to the subcontinent at all; notable examples include potato, chili, tomato, onion, cauliflower, tea, garlic, turmeric, and ginger (Nandy, 2004).

In addition to agroclimatic conditions, researchers identify a diverse set of historic and present-day cultural influences as foundational to contemporary Rajasthani cuisine, the most cited being Rajput, Mughal, and indigenous tribal.[24] The Rajputs are an amalgamation of castes and kin-groups that claim descent from kshatriyas, the Vedic warrior class (Naravane, 1999). Many princely states extant in the region during India's medieval and colonial eras were controlled by Rajput royal families (Naravane, 1999).[25] Rajput communities were generally non-vegetarian (Naravane, 1999). In particular, they were avid hunters, consuming game animals like rabbit and wild boar in addition to livestock (Naravane, 1999). Rajput cereal consumption was based around wheat, maize, and sorghum, while rice was rare (Naravane, 1999). Fenugreek and pulses were additional staples (Naravane, 1999).

The Mughals were a dynastic Muslim empire originating in Central Asia who came to control much of what is now present-day Rajasthan during the 16th-18th centuries. Like the Rajputs, the Mughals were avid meat eaters. Indeed, many of Rajasthan's most well-known meat dishes likely emerged following the introduction of Mughlai cooking methods that involve marinating meat in yogurt (Banerji, 2008). Mughlai cooks also brought the techniques for making leavened and baked bread (Banerji, 2008). Notable dishes that entered Rajasthan's culinary sphere during this time included things like kebabs, *naan*, *biryani,* and *gulab jamun* (Banerji, 2008).

Rajasthan's tribal communities account for around 13% of the state's current population, many of whom live in the state's arid western region (Census of India, 2011). Tribal households in rural areas rely on indigenous staples, particularly pearl millet and dairy products (e.g. milk,

[24] A variety of other castes and ethnolinguistic communities are present in Rajasthan. However, the literature about their unique influence on contemporary Rajasthani cuisine is limited. Moreover, there is often substantial overlap in group membership between such communities. For example, large portions of the sample described here (as well as Jaipur's overall population) were Marwari; many Marwaris are also Rajput.
[25]Rajputs continue to wield considerable influence in contemporary Rajasthan.

chaach, *ghee, kadhi, raabdi, kheer*) (Singh, 2016; Srivastava et al., 2014). Pulses also are eaten (Srivastava et al., 2014) but remain relatively rare among the poorest households due to their high cost (Joshi and Singh, 2015). Green leafy vegetables and tubers are more commonly consumed than other produce types (Joshi and Singh, 2015; Srivastava et al., 2014). Wild vegetables and fruits are eaten when seasonally available; they are often pickled or reconstituted after drying (Goyal and Sharma, 2009; Srivastava et al., 2014). Very few households consume rice because local agriculture is predominately rainfed (Srivastava et al., 2014). Wheat is consumed only by those with the requisite capital for irrigation facilities or otherwise sufficient income to purchase it from the market (Srivastava et al., 2014). Dairy consumption is stratified, with wealthier households keeping cows and buffalos as milch animals, while lower income households rely on goats (Srivastava et al., 2014).

Despite the historic influence of meat-heavy cuisines, contemporary Rajasthan has a higher proportion of vegetarians than any other Indian state,[26] with around 75% of residents claiming to forgo meat, fish, or eggs (Natrajan and Jacob, 2018). Only four other states have vegetarian populations exceeding 50%, and these all border Rajasthan (Natrajan and Jacob, 2018). Although no single factor is likely to explain this statistic, some commentators have pointed to the region's comparatively large number of Jains[27] and Vaishnava Hindus (Singh, 1998). Notably, however, 71% of the households in this sample reported that they did purchase eggs, meat, and/or fish.

2.4 Contemporary Jaipuri Foodscape

[26] Despite common assumptions about vegetarianism in India, 70-80% of the country eats 'non-veg' food (meat, fish, and/or eggs) (Natrajan and Jacob, 2018). Even beef consumption approaches 15% (Natrajan and Jacob, 2018). Meat consumption varies substantially according to region, urbanicity, religion, class, caste, and gender. Thus, sweeping generalizations about the Indian propensity to avoid meat misses considerable heterogeneity in meat consumption, vegetarianism, and the rationalization for either.

[27]Only 0.91% of Rajasthan is Jain. However, with 622,023 total adherents Rajasthan actually has the second highest Jain population in India (Census of India, 2011). There were no Jains in this study.

With over 3 million people, Jaipur is Rajasthan's capital and largest city as well as the 10th largest city in the country. It was founded in 1727 by then sovereign Sawai Jai Singh II (Kaminsky and Long, 2011). Jaipur became the capital when 19 Rajput states joined together to form Rajasthan following partition (Kaminsky and Long, 2011). However, the city's establishment during the Mughal empire by a Rajput prince is reflected in the mix of architectural styles present and which today make Jaipur a major tourist destination (Kaminsky and Long, 2011). Its popularity among both international and domestic visitors also reflects its proximity to India's capital, New Delhi, which lies just 270km south. Moreover, as part of India's "Golden Triangle",[28] it is well connected to the country's other major cities.

Large portions of Jaipur's population maintain strong connections with their ancestral villages and significant family networks therein. A number of respondents in this study were migrants from rural Rajasthan or the descendants of them. Indeed, when meeting someone for the first time, asking about his or her home village is par for the course, while discovering a shared regional affiliation builds instant goodwill. Thus, unsurprisingly, rural Rajasthani food culture continues to exert a strong influence on day-to-day consumption norms in Jaipur.

Nonetheless, recent decades have seen urban diets undergo a series of rapid transformations. Rising per capita incomes have meant increased dietary diversification and a transition from diets high in fiber and cereal grains to those high in sugar, refined carbohydrates, fats, and animal products (Pingali and Khwaja, 2004; Popkin, 2001). In addition, economic liberalization in the 1990s ushered in a surge of foreign direct investment and the subsequent proliferation of new, packaged, pre-prepared, and foreign-branded products (Hawkes, 2006). International restaurant conglomerates like McDonalds and Pizza Hut have opened stores in all

[28]The "Golden Triangle" is a trio of cities that tourists tend to visit during the same trip. The cities include New Delhi (India's capital), Jaipur, and Agra (location of the Taj Mahal).

major Indian cities, even as local street vendors and family-owned food outlets now saturate the urban landscape. Once the resort of bachelors, travelers, and laborers (Conlon, 1995), eating out has become a popular pastime in all major cities, particularly among India's youth. Taken together, these processes have been implicated in India's rapidly rising rates of diabetes, cardiovascular disease, and obesity (Shetty, 2012).

Even as India faces an uptick in diet-related chronic disease, its undernutrition rates remain among the highest in the world (FAO, 2017). Rajasthan, in particular, has some of the country's worst hunger-related indicators (NITI, 2018). Consequently, the government maintains a variety of social programs aimed at mitigating undernutrition. Unfortunately, access to these services is uneven and their utilization patchy. For example, the Public Distribution System (PDS) is a nationwide network of fair-price shops that sell subsidized grains (rice and wheat) to poor households. A Below Poverty Line (BPL) card is necessary for access to this system. However, unlike rural areas, BPL designation in urban populations is not based on a formal census but rather decided on a case-by-case basis at the discretion of local officials (Mander and Manikandan, 2009). Given this, as few as 13.7% of Jaipur's slum households have a BPL card (Mander and Manikandan, 2009).[29] Moreover, only 27% of those BPL card-holders are actually able to receive subsidized grains from PDS shops (Mander and Manikandan, 2009).

Most slum households purchase their groceries from small, locally owned convenience stores near their homes (i.e., *kirana* stores). A variety of food and non-food items are available in these shops, though the stock is generally restricted to dry goods or very shelf-stable produce (e.g., onions). The most common offerings include packaged, single-serving products (e.g., individually wrapped candies, and biscuit packets), cold drinks (e.g., soda, packaged juice, and packaged milk),

[29]In this study, only 18% of slum households had a BPL designation.

spices or condiments, eggs, pulses, and grains. For perishable ingredients, families will visit open-air fruit and vegetable markets or buy from the produce sellers who make daily trips through the area with their pushcarts. Milk is often store-bought or delivered, but families that ownn goats may consume fresh goat milk. To purchase meat, families must visit independent butcher shops. Though modern single-stop or big-box style stores are increasingly available, their clientele is largely restricted to middle- and upper-class families.

Day-to-day meals among Jaipur's slum-dwellers are predominately consumed at home and revolve heavily around cereals, vegetables, and pulses. Breakfast might consist of tea and a grain-based item (e.g., toast, *fen*, *roti*, biscuits, or *double roti*), while lunch and dinner are comprised of *roti* and *dal* or a vegetable dish (e.g., *guar fali*, spinach, potatoes, or *lauki*). Compared to other items, fruit is rarely eaten. *Chaach*, *kadhi*, and milk are the primary avenues for dairy consumption. Chicken, goat, and egg are the primary non-vegetarian options. Foods available outside the home include chow mein, *kachori*, *samosa*, ice cream, chips, pastries, cold drinks, Indian sweets, *namkeen*, *pav bhaji*, *chole bhatura*, *patasi*, pizza, burgers, chocolate, cookies, cake, pasta, maggi noodles, and biscuits (Meena and Varma, 2014; Sukhwal et al., 2017).

3. Methods

3.1 Sampling frame

This paper draws on data from three different samples collected as part of a larger study on food insecurity, water insecurity, and mental health in Indian slums. All three samples were selected from a government slum list via a multi-stage cluster design. However, many of the slums included on the government list had access to most or all basic civil services (e.g. latrines, electricity, piped water, durable housing), casting on doubt on the appropriateness of their slum designation, particularly for the purposes of this project.

To address this, the research team visited all listed slums and ranked them according to their level of development (Levels 1-3). Level 3 slums were communities in which households had access to all or nearly all civil services; these slums were removed from the sampling frame. The remaining communities were designated Level 1 or 2 depending on their relative degree of safety and civil service access. Of the slums on the original government list, we were able to locate and classify 168. All three samples were collected from the updated slum list. In all cases, surveys were conducted by native Hindi speakers gender-matched to participants. Data collection for the components described here occurred between October 2016 and April 2017.

3.2 Instrument translation

All survey instruments were translated separately by the author, a professional translator, and three research assistants. These translations were compared during a roundtable meeting that included the author, the assistants, and a local anthropology professor. During this time, the most appropriate versions of each question were selected. The final selections were piloted with 10 individuals and back-translated by a different, professional translator.

3.3 Free lists – sample 1

The first sample of participants was needed to identify a list of prestigious foods for a dietary recall tool capable of assessing variations in high-status food consumption. To accomplish this, the author and three assistants free listed foods that are commonly available in Jaipur and further sorted these items into 8 subdomains: grains; legumes or pulses; sweets or dried fruits and nuts; pre-prepared or outside home foods; fruits; vegetables; beverages; animal products. Pictures of all the foods in each subdomain were printed onto one of eight plastic mats to be presented to participants from the first sample (Appendix Items 4-12).

We randomly selected two Level 1 and two Level 2 slums. From these, we identified a convenience sample of 80 participants spread equally across mothers, fathers, boys, girls, Level 1 and 2 slums. We asked participant to list all of the foods that they had eaten the previous day. They were then instructed to pick the 5 most prestigious foods from each of the 8 subdomains.

Based on participant responses, we selected 31 items for inclusion in the prestige scale. In general, we selected the most salient foods from each of the eight subdomains; but a few exceptions were made in consideration of issues like item seasonality (see Table 1). Saliency is a measure of both average item rank and frequency (Smith and Borgatti, 1996). We chose 31 foods as this is comparable to the number used in other studies that have developed ranked lists of prestige foods (Hadley et al., 2019; Chapter 2 - Maxfield et al., 2016; Newkirk et al., 2009; Oths et al., 2003; Weaver et al., 2014), and because it allows for a manageable number of items during paired comparisons.

The approach described was employed over standard free lists because it forces food type diversity into the final dietary recall tool. That is, participants asked to name prestige foods may primarily list from one or two subdomains (e.g., sweets). Though this might accurately reflect the most prestigious items in Jaipur, a subsequent dietary recall instrument including only those foods would likely miss a great deal of heterogeneity between individuals with respect to high status diets. That is, individuals capable of eating a large number of prestige foods are nonetheless only likely to eat so many items from each category (e.g., sweets) in a given time period, no matter how prestigious. Our method facilitates identification of prestige items from across the entirety of the food landscape, and thus captures what an overall prestigious diet might look like.

3.4 *Ranking task – sample 2*

The second sample of participants was used to develop a ranked list of foods from most to least prestigious. This was accomplished using consensus analysis on participants answers to a series of visual paired comparisons presented in an incomplete cyclic design (Burton, 2003). As with the first sample, participants were selected via convenience sampling within two Level 1 and two Level 2 slums (different than those previously visited), which were themselves randomly selected from the government slum list.

Consensus analysis is a method for determining whether a sample of participants share a single cultural model with respect to a set of questions (Romney et al., 1986). Where a single model is found, the method further identifies the culturally correct "answer key" to those questions. In this study, the questions used were a series of visual paired comparisons. Participants selected the most prestigious food from each of 93 pairs of pictures. Thus, the "answer key" created indicates which food is the most prestigious from within each pairing.

The standard approach to paired comparisons asks participants to evaluate each item from the full set of items against all others. However, the number of judgements required increases rapidly for each new item included (e.g., 190 comparisons for 20 items), which leads to respondent fatigue. In contrast, an incomplete cyclic design allows the researcher to closely approximate the results for a full set of judgements, while drastically reducing the number of comparisons actually required (Burton, 2003). For the 31 items in this study, an incomplete cyclic design required only 93 judgements.

Normally, an incomplete cyclic design asks each participant to answer a different randomized questionnaire, with no single person making all possible judgements (Burton, 2003). However, as consensus analysis requires all participants to answer the same set of questions, the standard incomplete cyclic design is not appropriate. In view of this, we opted to divide a sample

of 125 participants into 5 groups (24-27 per group), with each group being given a different randomized questionnaire developed according to the tenets of the incomplete cyclic design (Burton unpublished correspondence). The participants in each group were spread nearly equally across mothers, fathers, boys and girls as well as between Level 1 and 2 slums.

We conducted separate consensus analyses on all five questionnaires. A single cultural model was found to exist for each questionnaire. As such, it is reasonable to assume that consensus would similarly be found on a larger set of paired comparisons wherein participants are asked to make all possible pairwise comparisons for the same 31 foods. The total number of times a given item was selected as the most prestigious within a pairing was summed across questionnaires—that is, its total number of 'wins.' This total represents the food's value in the prestige scale and was used to rank the foods against each other.

3.5 Cross-sectional surveys – sample 3

The third sample was used to test the primary study hypothesis—that dietary prestige varies within households according to gender and age. We randomly selected five Level 1 and five Level 2 slums. We identified and numbered the entrances and major crossroads in each. We selected a starting location from among them using a random number generator. When a road forked, we again selected our path using a random number generator. We invited every second household with at least 1 eligible adolescent (13-17 years) to participate until reaching our desired per slum sample size of 20 households. The mother, father, and all eligible adolescent children were interviewed in each of the selected households. Because of difficulties in meeting fathers, one additional Level 2 slum was chosen for a total of five Level 1 and six Level 2 slums. The final participation rate was 87%. The final sample discussed in this paper included 673 participants.

However, the sample is reduced to 650 for analyses incorporating income or the wealth index because some households were missing the necessary data.

Participants' food prestige scores were calculated by multiplying each food's prestige value (total "wins" from all five paired comparison questionnaires) by how recently it was eaten (0—never, 1—more than three months ago, 2—within three months, 3—within one month, 4—within one week, 5—two days ago, 6—today/yesterday). Any time that a food had never been eaten by a participant, the reason for non-consumption was recorded. These reasons were categorized as "don't eat or don't like" (including religious reasons), "cost" (food is too expensive), and "don't know" (lack of familiarity with the food or where to acquire it). Each food's prestige value was then plotted against the percent of people that had eaten it within a given time frame. For example, food prestige was plotted against the number of people having consumed the food within the past 3 months. Finally, participants were handed a deck of cards depicting the 31 foods in the dietary prestige scale. They were asked to pick their 10 favorite foods from the deck.

Adolescent BMI-for-age z-scores were assessed with the WHO AnthroPlus macro for R. Adolescents were marked as underweight if they had BMI-for-age or height-for age z-scores 2 or more standard deviations below the mean of the age- and sex-matched reference population. Adults were considered underweight if their BMI was less than 18.5, overweight if their BMI was above 24.9, and obese if their BMI exceeded 30.0. There were two participants with missing BMI data. In both cases, the missing values were imputed with the sample mean for the respective participant type (e.g., a father with missing BMI was assigned the mean BMI for all fathers). These two individuals were kept rather than dropped in order to maintain direct comparability with the analyses of intrahousehold food and water insecurity reported for this sample (Chapter 1 – Maxfield, 2019).

Descriptive statistics were calculated for the sample as a whole for mothers, fathers, boys, and girls separately. Differences between mothers and fathers, boys and girls, and adults and adolescents were tested using independent t-tests, chi-squared tests, and Fisher's exact tests. All bivariate significance tests were two-sided.

Each food's overall prestige value was plotted against its sample-wide recency of consumption. Pearson correlation coefficients were also calculated between each food's prestige value and its popularity among fathers, mothers, boys, and girls (# of times it was selected as a favorite food). Scatterplots were created showing the relationship in prestigious food consumption scores between intrahousehold pairs. Simple linear regressions were fit and added to these scatterplots along with Pearson correlation coefficients. Additionally, the average prestige difference between intrahousehold parent-adolescent pairs was compared for households in the 1st and 4th income quartiles (average monthly per person income) and for households in the 1st and 4th wealth index quartiles.

For correlations comparing food prestige with popularity and for the intrahousehold analysis of prestigious food consumption scores, non-vegetarian foods were dropped because: 1) religious proscriptions prevent some households from consuming those items; 2) there were significant differences between genders as to the consumption of those items, which is itself a pattern largely dictated by religion. Interestingly, overall results with and without non-vegetarian items are approximately the same, except for the correlation comparing food prestige and popularity in girls (Figure 3). Still, to avoid confounding related to religion, in-text analyses are presented without non-vegetarian items. However, the results and figures *with* those items are included in the appendix (Appendix Items 13-16).

4. Results

4.1 Free lists - saliency

Frequency and saliency for the items in the 8 subdomains are visualized in Table 1. The final selections for the fruit subdomain were pomegranate, apple, and banana. Pea, tomato, potato, and cauliflower were selected from the vegetable category. The chosen animal products were *paneer*, *ghee*, *dahi*, egg, goat, and fish. *Moong dal* was the most prestigious pulse, and the only one included in the ranking task. Almond, *rasgulla*, cake, and chocolate were selected for the sweets/dried fruits subdomain. The final selections for prepared or outside home foods were burger, *samosa*, pizza, *patasi*, and *dal bati churma*. Coconut water, packaged juice, packaged milk, and cold drinks were chosen from the beverage category. Finally, the most prestigious cereal items were basmati rice, *double roti*, toast, and *roti*.

Table 1. The most prestigious foods from 8 pre-determined subdomains (n=80). 31 foods were selected for ranking and inclusion in the dietary recall tool. In general, the most salient items were selected. Highlighted foods were included in the prestige scale.

Fruits	Frequency	Salience	Vegetables	Frequency	Salience	Animal products	Frequency	Salience
Pomegranate	61	0.589	Okra[b]	31	0.268	Paneer	44	0.374
Apple	60	0.562	Pea	30	0.209	Ghee	40	0.328
Banana	37	0.274	Tomato	22	0.178	Dahi	34	0.254
Grape	33	0.23	Potato	23	0.172	Egg	35	0.25
Watermelon	26	0.166	Cauliflower	22	0.172	Kheer[f]	29	0.21
Papaya	25	0.149	Bitter gourd	20	0.163	Cow milk[g]	25	0.2
						Goat meat	26	0.199
						Buffalo milk[h]	27	0.197
						Fish	29	0.181
						Packaged milk[i]	18	0.151
Pulses/legumes	**Frequency**	**Salience**	**Sweets, etc.**	**Frequency**	**Salience**	**Outside home foods**	**Frequency**	**Salience**
Moong dal	64	0.6	Almond	60	0.539	Burger	41	0.352
Chane ki dal	59	0.463	Cashew[c]	42	0.343	Samosa	34	0.279
Rajma	44	0.39	Rasgulla	41	0.343	Pizza	25	0.242
Kabuli chana	49	0.374	Gulab jamun [d]	32	0.248	Patasi	27	0.241
Urad dal	40	0.261	Cake	29	0.188	Maggi [j]	22	0.18
Chana	43	0.245	Chocolate	25	0.187	Dal bati churma	20	0.163
Beverages	**Frequency**	**Salience**	**Cereals**	**Frequency**	**Salience**	**Spices**	**Frequency**	**Salience**
Coconut water	53	0.415	Basmati rice	38	0.336	Cardamom	43	0.349
Chai (tea)[a]	40	0.317	Double roti	41	0.311	Ginger	46	0.336
Packaged juice	40	0.262	Wheat flour[e]	33	0.293	Whole black pepper	39	0.325
Packaged milk	31	0.253	Toast	43	0.267	Saffron	30	0.297
Cold drink	31	0.242	Roti	30	0.257	Coriander leaves	34	0.242
Nimbu pani	36	0.226	Paratha	38	0.251			

a. Chai was frequently offered to the research team. As such, our presence influenced its consumption by respondents.
b. Okra was not in season for the entirety of the cross-sectional survey, arbitrarily giving some households an "advantage" in the recall tool.
c. Almonds and cashews are very similar. The contexts in which they are consumed are effectively identical.
d. Rasgulla and gulab jamun are very similar. The contexts in which they are consumed are effectively identical.
e. Wheat flour is the primary ingredient of wheat-based roti. Thus, these items are generally redundant.

f. We already intended to include 6 items from the animal products category—3 vegetarian and 3 non-vegetarian. Kheer fell just outside the three most salient/prestigious vegetarian animal products.
g. The image presented was 'fresh cow milk.' However, as packaged cow milk was selected in the beverage category, fresh cow milk was not included so as to limit the number of beverages and allow for other animal products to be selected.
h. Buffalo milk was not selected to avoid confusion with 'packaged milk' during paired comparisons.
i. Packaged milk was included, but counted as a selection from the beverage category.
j. Dal bati churma is a dish very strongly associated with traditional Rajasthani cuisine. It was also one of the few items free listed multiple times as a 'prestigious' food during pilot work (without prompting via the mats as visual aids). The author felt that including dal bati churma would provide a more interesting point of analysis than including maggi.

4.2 Ranking task - Consensus analysis

During consensus analysis, evidence for a single cultural model is said to exist when the ratio of the first to the second eigenvalue is greater than 3:1. However, a ratio of 4:1 or greater is ideal (Weller 2007). In this study, the eigen ratio was greater than 4:1 for each of the five paired comparisons questionnaires (4.288; 5.711; 9.160; 7.837; 4.724). In other words, participants completing the same questionnaire shared a cultural model for food prestige. Given that this was true for each questionnaire, it is reasonable to assume that *all* participants share a single cultural model for food prestige. After summing the number of "wins" for each food across all five questionnaires, the five most prestigious foods were almond, pomegranate, cake, pizza, and apple (Figure 1). Tomato, potato, toast, cauliflower, and *moong dal* were the least prestigious.

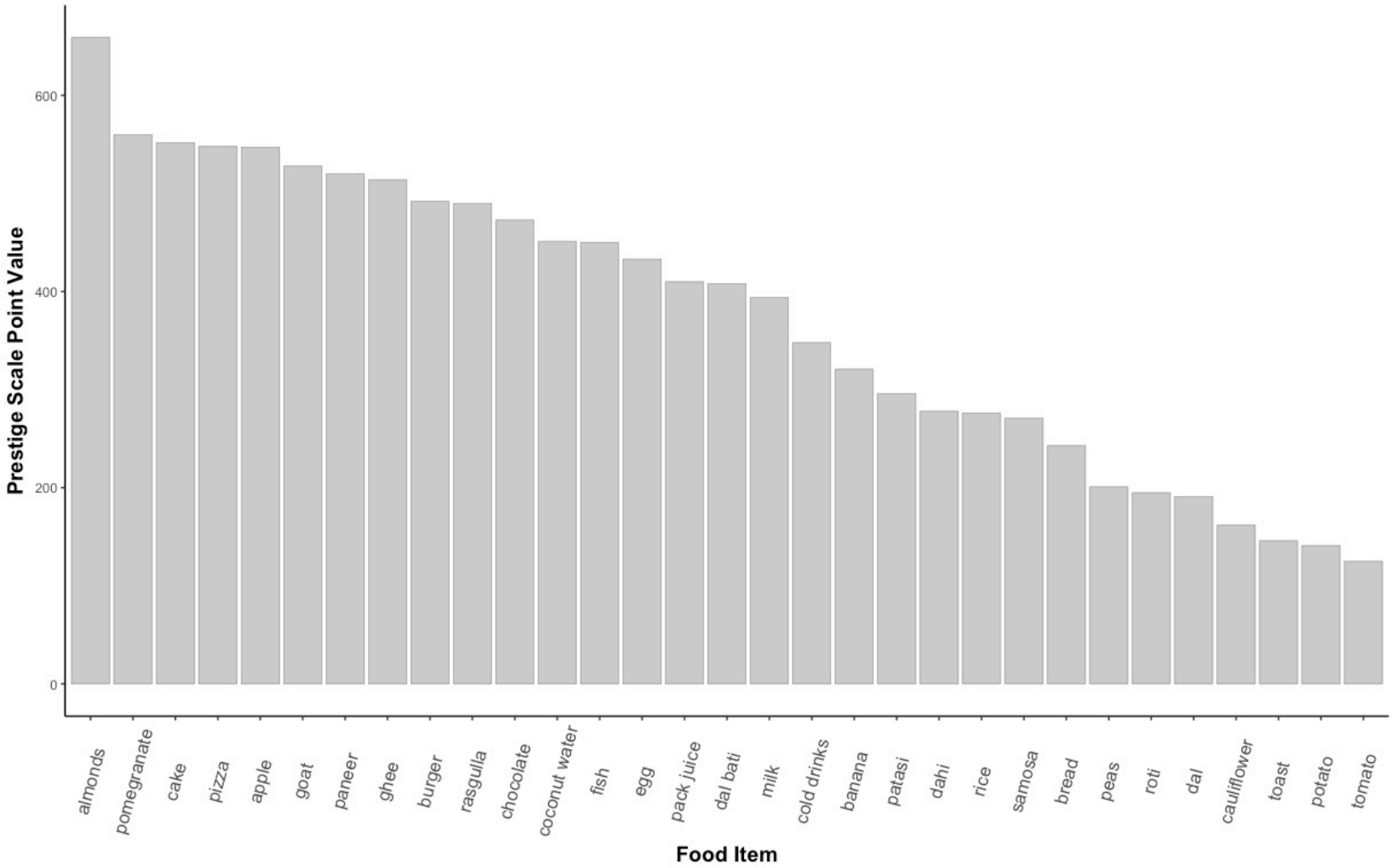

Figure 1. Point values for items in the food prestige scale. Point values are the number of times each food was selected as most prestigious by participants (n=125) during paired comparisons.

4.3 Cross-sectional survey – Descriptive Statistics and bivariate analyses

The percent of participants that had eaten each food within the past 1 day (today/yesterday) dropped dramatically as prestige increased, before leveling out for the most prestigious foods (Figure 2). In other words, the percentage of people eating foods from the top half of the prestige scale was approximately the same no matter how much higher or lower status the item. However, when considering the graph for 1 week, the relationship between food prestige and consumption was approximately linear. That is, a food's prestige value can be closely predicted by the percent of the sample having eaten the food within the last 1 week.

The most common reason given for having never eaten an item was dislike or abstention (i.e., religious prohibition against non-vegetarian foods: fish, goat, egg) (Figure 3). However, a sizeable number of respondents reported lifetime lack of consumption for pizza, burgers, and coconut water. For these items, cost was a key factor. Notably, over 100 people had never eaten pizza because they were unfamiliar with the item or did not know where to purchase it.

The relationship between food prestige and popularity was significant and positive in boys ($r=0.443$, $p=.018$) and girls ($r=.0445$, $p=.018$) (Figure 4). The relationship between food prestige and popularity was not significant in mothers or fathers (mothers $r=-0.159$, $p=.417$; fathers $r=-0.275$, $p=.157$).

A comparison of underweight and overweight between intrahousehold pairs shows boys were significantly more likely to be underweight than their sisters when siblings' weight statuses was discordant ($p<.001$). Similarly, fathers were significantly more likely to be underweight than their wives when parents' weight statuses was discordant ($p=.007$). However, mothers were also more likely to be overweight than their husbands when one parent was overweight while the other

was not (p=.002). There was no difference in overweight between boys and girls as only two adolescents had high BMIs (p=1).

The correlations in food prestige scores between different types of intrahousehold pairs were significant and positive in all cases (at least p<.05). But the correlation was highest for boys compared to girls (r=0.553, p<.001) and lowest for fathers compared to boys (r=0.209, p<.03). The lowest score difference between intrahousehold pairs was for mothers and fathers, with the average mother having 970 more prestige points than fathers. The largest score difference between intrahousehold pairs was for boys and fathers, with the average boy having 10,090 more prestige points than fathers. For context, if a boy had eaten almonds (the most prestigious food – 659 points) within 1 day (x6) while the father had never eaten almonds before, then the boy would receive 3,954 points more than his father (Boy: 659 x 6 = 3,954, Father: 659 x 0 = 0). Note, however, that only 10.1% of people reported eating almonds within the past 1 day (today/yesterday), while 97.8% had eaten almonds at some point in their life (Figure 2). Thus, it seems likely that the extra prestige points any one respondent earned over another were generally much more diffuse and slowly accumulated than the example scenario described.

The average prestige score difference between intrahousehold mother-boy pairs was significantly lower in the 4th compared to the 1st wealth index quartiles (p=.033). However, the average prestige score for those same boys did not exhibit a significant change between the 1st and 4th wealth index quartiles (mothers, p=.087). In contrast, the prestige of girls' diets remained similar to that of their parents regardless of wealth index (mothers, p=.858; fathers, p=.121). Moreover, this occurred even as girls' average prestige scores rose between the 1st and 4th wealth index quartiles (mothers, p<.001; fathers, p<.001). The same analyses for boys and girls conducted over the 1st and 4th income quartiles show similar trends.

Table 2. Descriptive and bivariate statistics for individual-level variables.

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
Age										
Min	13	20	13		22	20		13	13	
Max	70	70	17		70	60		17	17	
Mean(sd)	29.0 (14.6)	40.8 (8.9)	14.8 (1.5)		43.7 (9.4)	38.3 (7.7)		14.9 (1.4)	14.8 (1.5)	
Sex				p=.523						
Male	315 (48%)	167 (47%)	148 (50%)		167 (100%)	0 (0%)		148 (100%)	0 (0%)	
Female	335 (52%)	187 (53%)	148 (50%)		0 (0%)	187 (100%)		0 (0%)	148 (100%)	
Urban				p=.532			p=.951			p=.347
Peri-urban	154 (24%)	80 (23%)	74 (25%)		37 (22%)	43 (23%)		33 (22%)	41 (28%)	
Urban	496 (76%)	274 (77%)	222 (75%)		130 (78%)	144 (77%)		115 (78%)	107 (72%)	
Food Insecurity				p<.001				p<.001		
None	225 (35%)	90 (25%)	135 (46%)		57 (34%)	33 (18%)		71 (48%)	64 (43%)	
Mild	238 (37%)	123 (35%)	115 (39%)		62 (37%)	61 (33%)		66 (45%)	49 (33%)	
Moderate	90 (14%)	60 (17%)	30 (10%)		30 (18%)	30 (16%)		10 (7%)	20 (14%)	
Severe	97 (15%)	81 (23%)	16 (5%)		18 (11%)	63 (34%)		1 (1%)	15 (10%)	
Water Insecurity				p<.001				p<.001		
None	394 (61%)	196 (55%)	198 (67%)		111 (66%)	85 (45%)		113 (76%)	85 (57%)	
Moderate	140 (22%)	76 (21%)	64 (22%)		25 (15%)	51 (27%)		27 (18%)	37 (25%)	
Severe	116 (18%)	82 (23%)	34 (11%)		31 (19%)	51 (27%)		8 (5%)	26 (18%)	

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
HSCl-10				p<.001			p<.001			p=.009
Min	0	0	0		0	0		0	0	
Max	28.0	28.0	26.0		28.0	28.0		21.1	26.0	
Mean(sd)	8.1 (6.9)	10.0 (7.2)	5.8 (5.6)		6.8 (5.9)	12.8 (7.1)		4.9 (5.0)	6.7 (6.1)	
PSS-10							p<.001			
Min		0			0	0				
Max		36			36	36				
Mean(sd)		16.2 (7.6)			13.6 (6.7)	18.6 (7.6)				
Education				p<.001			p<.001			p=.089
None	313 (48%)	233 (66%)	80 (27%)		87 (52%)	146 (78%)		32 (22%)	48 (32%)	
Primary	244 (38%)	89 (25%)	155 (52%)		55 (33%)	34 (18%)		87 (59%)	68 (46%)	
Secondary	89 (14%)	30 (8%)	59 (20%)		23 (14%)	7 (4%)		28 (19%)	31 (21%)	
Higher	4 (1%)	2 (1%)	2 (1%)		2 (1%)	0 (0%)		1 (1%)	1 (1%)	

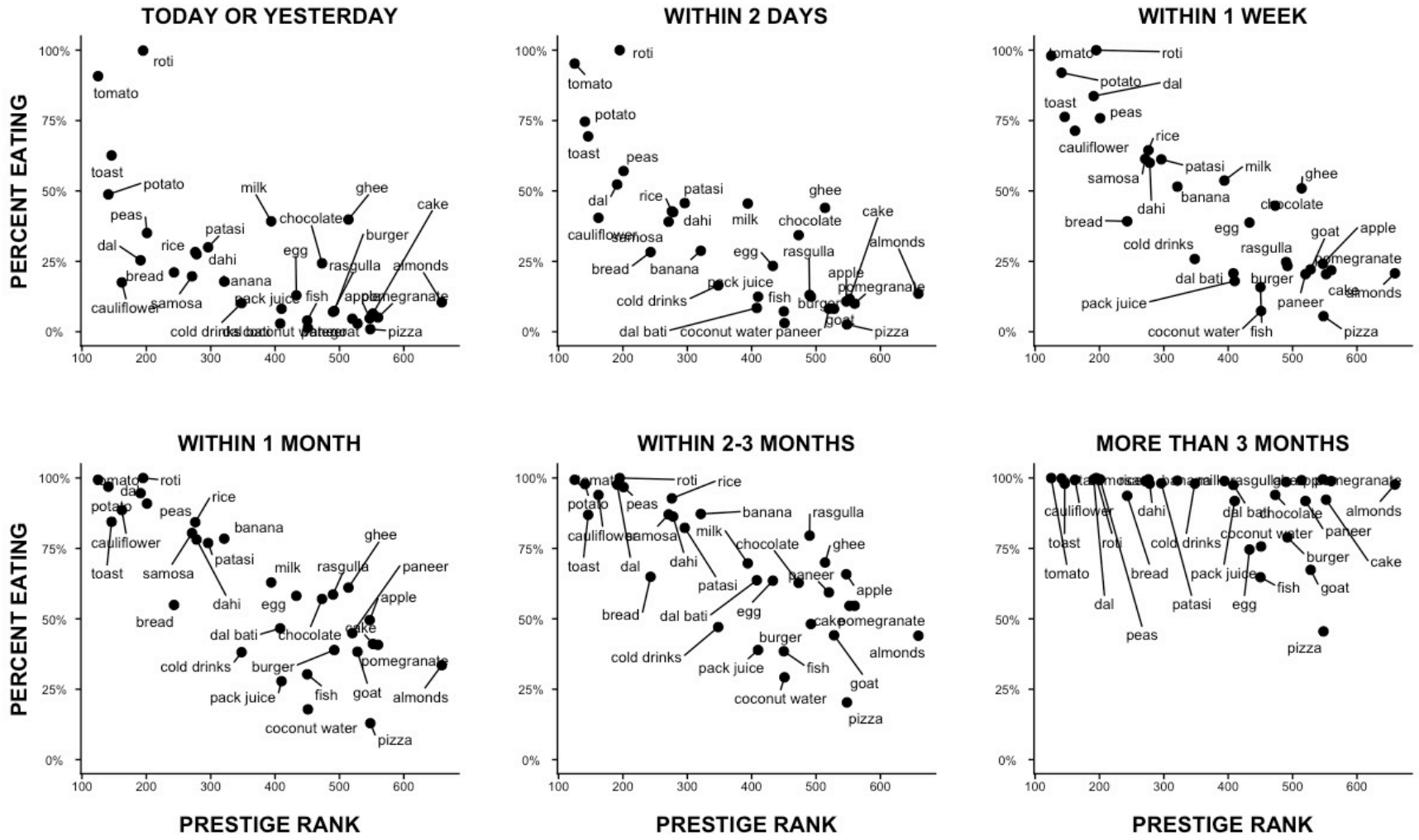

Figure 2. Percent of full sample (n=673) that had eaten each food within a given time frame (today/yesterday, within 2 days, within 1 week, within 1 month, within 2-3 months, more than 3 months but during lifetime) plotted against the same food's prestige value (total number of "wins" during paired comparisons).

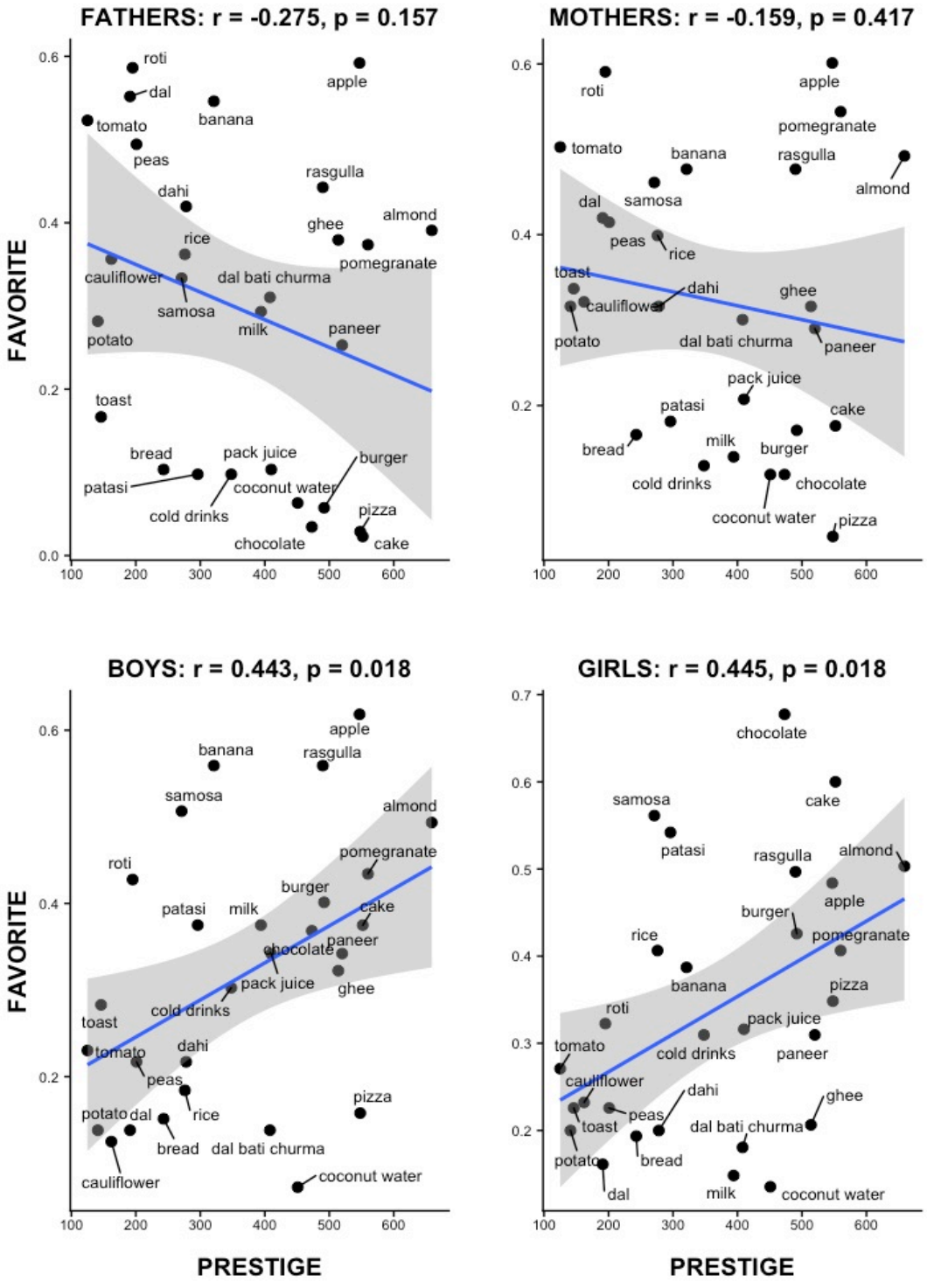

Figure 3. Correlation between food prestige and the percent of mothers, fathers, boys, or girls selecting that item as a favorite food (n=673). Non-vegetarian foods are **NOT** included.

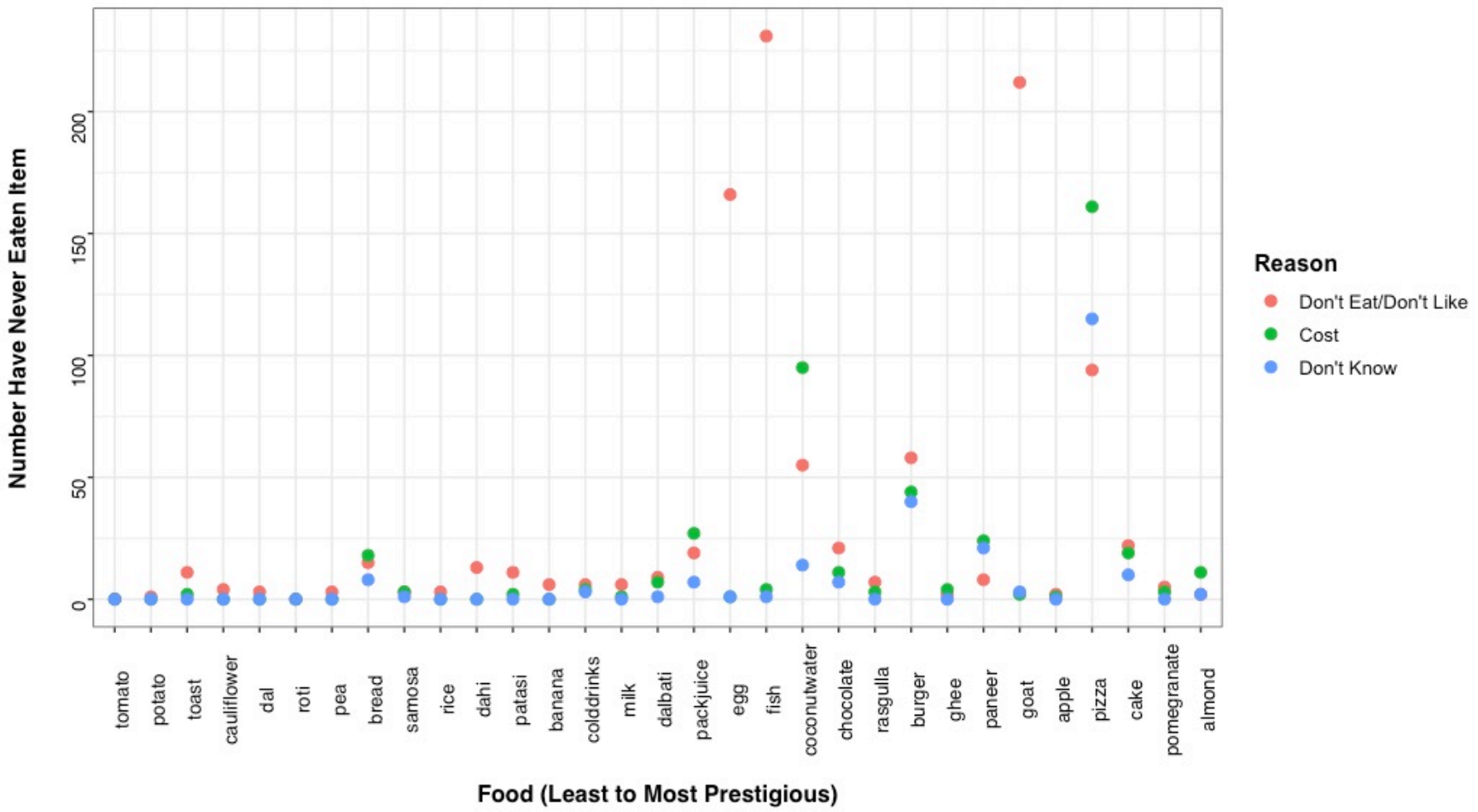

Figure 4. Number of participants from the full sample (n=673) reporting that they had never eaten a given food. Participants are classified according to their reason for non-consumption: 1) Do not like the food or do not ever eat the food (i.e. religious prohibition); 2) Food is too costly; 3) Don't know what the food is or do not know where to purchase the food.

Table 3. Percent of intrahousehold comparisons for which participants' weight classifications were discordant (i.e., one participant was underweight while the other was not OR one participant was overweight while the other was not). Out of the total number of discordant pairs, the percent that each participant type was underweight/overweight is shown. For example, the first cell of the first row shows the percent of mother-father pairs (n=159) where the mother was underweight but the father was not OR where the father was underweight but the mother was not (33.3%). The next two cells show the percent of those discordant pairs for which the father was underweight (64.2%) or the mother was underweight (35.8%). The likelihood that this distribution occurred by chance is assessed with a chi-squared test or Fisher's exact test whose p-value is reported in the fourth cell.

	UNDERWEIGHT			
MOTHER VS FATHER **n=159**	Discordant	Father Underweight	Mother Underweight	P-value
	53 (33.3%)	34 (64.2%)	19 (35.8%)	p=.007**
	OVERWEIGHT			
	Discordant	Father Overweight	Mother Overweight	P-value
	55 (34.6%)	19 (34.5%)	36 (65.5%)	p=.002**

	UNDERWEIGHT			
GIRL VS BOY **n=46**	Discordant	Boy Underweight	Girl Underweight	P-value
	15 (32.6%)	13 (86.7%)	2 (13.3%)	p<.001***
	OVERWEIGHT			
	Discordant	Boy Overweight	Girl Overweight	P-value
	2 (4.3%)	1 (50%)	1 (50%)	p=1

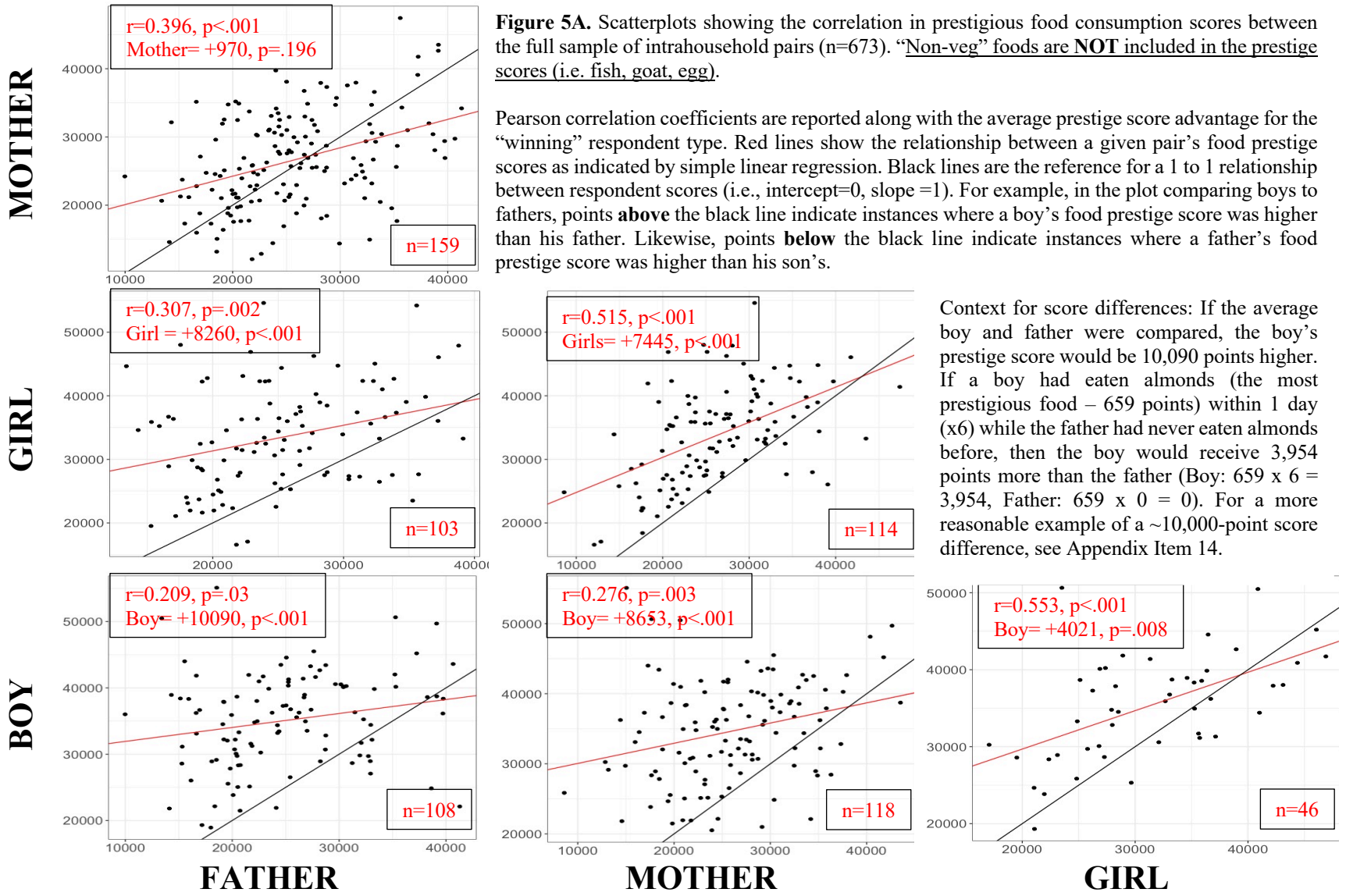

Figure 5A. Scatterplots showing the correlation in prestigious food consumption scores between the full sample of intrahousehold pairs (n=673). "Non-veg" foods are **NOT** included in the prestige scores (i.e. fish, goat, egg).

Pearson correlation coefficients are reported along with the average prestige score advantage for the "winning" respondent type. Red lines show the relationship between a given pair's food prestige scores as indicated by simple linear regression. Black lines are the reference for a 1 to 1 relationship between respondent scores (i.e., intercept=0, slope =1). For example, in the plot comparing boys to fathers, points **above** the black line indicate instances where a boy's food prestige score was higher than his father. Likewise, points **below** the black line indicate instances where a father's food prestige score was higher than his son's.

Context for score differences: If the average boy and father were compared, the boy's prestige score would be 10,090 points higher. If a boy had eaten almonds (the most prestigious food – 659 points) within 1 day (x6) while the father had never eaten almonds before, then the boy would receive 3,954 points more than the father (Boy: 659 x 6 = 3,954, Father: 659 x 0 = 0). For a more reasonable example of a ~10,000-point score difference, see Appendix Item 14.

Table 4. T-tests comparing the average prestige score difference between intrahousehold parent-adolescent pairs in the 1st wealth index quartile and the 4th wealth index quartile. The average overall prestige score for adolescents in the 1st and 4th wealth index quartiles are also compared using t-tests. Results are presented separately by gender.

*PRESTIGE SCORE CALCULATED WITHOUT NON-VEG FOODS (GOAT, EGG, FISH)	**1st Quartile Household Wealth Index**	**4th Quartile Household Wealth Index**	**p-value**
BOYS	n=33	n=25	
Average Prestige Score	32,971	36,333	p=.087^{+}
Average Prestige Score Difference Compared to Mothers	9,156	5,087	p=.033*
GIRLS	n=31	n=32	
Average Prestige Score	30,183	36,541	p<.001***
Average Prestige Score Difference Compared to Mothers	7,074	7,379	p=.858
BOYS	n=30	n=23	
Average Prestige Score	33,163	36,299	p=.120
Average Prestige Score Difference Compared to Fathers	+9,683	+6,330	p=.176
GIRLS	n=25	n=28	
Average Prestige Score	29,162	37,469	p<.001***
Average Prestige Score Difference Compared to Fathers	6,111	9,612	p=.121

Table 5. T-tests comparing the average prestige score difference between intrahousehold parent-adolescent pairs in the 1st income quartile and the 4th income quartile. The average overall prestige score for adolescents in the 1st and 4th income quartiles are also compared using t-tests. Results are presented separately by gender.

*PRESTIGE SCORE CALCULATED WITHOUT NON-VEG FOODS (GOAT, EGG, FISH)	**1st Quartile Average Monthly Per Person Income**	**4th Quartile Average Monthly Per Person Income**	**p-value**
BOYS	n=32	n=21	
Average Prestige Score	35,466	37,347	p=.358
Average Prestige Score Difference Compared to Mothers	+11,453	+8,084	p=.080+
GIRLS	n=25	n=18	
Average Prestige Score	32,672	37,938	p=.01*
Average Prestige Score Difference Compared to Mothers	+7,275	+7,965	p=.748
BOYS	n=28	n=23	
Average Prestige Score	36,029	36,921	p=.655
Average Prestige Score Difference Compared to Fathers	+12,616	+9,202	P=.146
GIRLS	n=24	n=18	
Average Prestige Score	31,879	35,819	p=.079+
Average Prestige Score Difference Compared to Fathers	+7,733	+7,375	p=.874

Table 6. Chi-squared tests comparing the number of boys and girls who had eaten each of 31 food items during the past 1 week. These time frames were chosen because an analysis of how recently individuals in the sample had eaten each food indicated a tight linear relationship between food prestige and the number of people eating a given item at 1 week.

WITHIN 1 WEEK				
FOOD ITEM	**BOY ATE**	**GIRL ATE**	X^2	**P-value**
Rice	102	109	0.326	.568
Apple	42	53	1.343	.247
Milk	**124**	87	21.33	<.001***
Pea	113	119	0.216	.642
Pomegranate	49	54	0.162	.687
Roti	152	154	0.013	.909
Pack juice	**61**	34	10.819	.001***
Almond	40	54	2.356	.125
Cauliflower	98	**122**	7.52	.006**
Banana	98	86	2.03	.154
Pizza	12	12	0	1
Dal	123	134	1.682	.195
Rasgulla	51	52	0	1
Cake	48	46	0.04	.841
Samosa	115	105	1.762	.184
Dal bati	33	39	0.373	.542
Burger	**68**	46	6.611	.01**
Fish	**34**	19	4.697	.03*
Dahi	87	**108**	4.957	.026*
Coconut Water	18	18	0	1
Patasi	132	132	0.015	.904
Tomato	151	152	0	1
Goat	**47**	21	12.242	<.001***
Egg	**79**	54	8.226	.004**
Potato	135	**148**	4.844	.028*
Paneer	37	42	0.207	.649
Bread	69	83	1.885	.17
Toast	132	129	0.358	.55
Chocolate	96	**115**	4.217	.04*
Ghee	84	94	0.825	.364
Cold Drinks	**68**	49	4.873	.027*

5. Discussion

Does the prestige scale actually index high-status foods?

Anthropologists working in India have long been interested in the connections between hierarchy and food. As such, a variety of studies have identified high and low status foods or food behaviors. From these, we can derive predictions about which items we expect respondents to indicate are high status and thereby confirm or reject the scale's ability to measure food prestige.

Numerous researchers have noted that food consumption outside the home is a key site for demonstrating class in India (Dewey, 2012; Chapter 2 - Maxfield et al., 2016; Staples, 2016). Bakeries, hotel restaurants, and street food vendors all offer the opportunity for conspicuous consumption (Veblen, 1899). After all, eating in public spaces invites observations of one's consumption habits. Moreover, many of the foods eaten in these spaces are novel, non-traditional, or foreign foods, which themselves carry status-related connotations (Chapter 2 - Maxfield et al., 2016). Thus, eating out requires not only the economic means to experiment with modernity, but the cultural capital necessary to know which foods convey heightened prestige (Bourdieu, 1984). In this study, several such novel or foreign items were considered very high status. In particular, cake, pizza, burgers, and chocolate are all relatively recent introductions to Jaipur and were placed in the top third of the prestige scale.[30] Moreover, these items are generally consumed while "eating out" or otherwise purchased pre-packaged from the market rather than prepared at home.

Dairy products hold great cultural importance throughout much of India. This reflects the

[30]Pizza, in particular, is often singled out as emblematic of the intersection between food, globalization, modernity and class (Solomon, 2014; Chapter 2 - Maxfield et al., 2016). This holds true even outside academic discussions as evidenced by the plot of the 2014 Tamilian film, *Kaaka Muttai*. The film follows the story of two boys growing up in a slum as they dream of tasting pizza from the new shop near their home. The movie is filled with messages about class and food. For example, a rich father denigrates traditional street food vendors as unclean. And the pizza shop owner slaps and rejects one of the boys when he comes to buy a pizza, despite having saved up sufficient funds and 'dressed the part.' Yet the boys themselves initially mock their grandmother's attempt to make an imitation pizza at home.

region's well-developed and longstanding dairy culture in addition to the significant religious importance placed on cows and the transformations that foods cooked in dairy (particularly ghee) are believed to undergo (Wiley, 2014). Furthermore, milk consumption in India has been growing in tandem with rising per capita incomes for novel reasons (Pingali, 2007). Wiley (2013) argues that this increase reflects the re-positioning of milk and milk products as "modern" ingredients important for strength and health, and whose consumption marks affluence. As such, the links between dairy and prestige are perhaps more acute than ever before (Wiley, 2013). Examining the results from this study, respondents' placement of ghee and paneer among the top ten most prestigious foods does appear to mesh with the historic and contemporary significance associated with dairy. Even milk and *dahi* (curd), as relatively lower ranked items, still fall at least a third of the way up the scale and higher too than all vegetables, grain-based products, and pulses.

It is important to note that even those items at the low end of the prestige scale are nonetheless high status compared to the overall realm of available foods in Jaipur. As Dickey (2010) notes, even seemingly fine gradations between vegetables can speak to significant cultural distinctions that augment or defend a household's movement up the social ladder. That is, although potato, tomato, and cauliflower may seem pedestrian, these were still ultimately selected as more prestigious than all other vegetables presented to participants during free lists. Interestingly, these three vegetables are strongly associated with a pan-Indian cuisine, especially as it is reckoned in in India's upscale hotel restaurants and in Western imaginings of Indian food (Nandy, 2004). Yet none of these items are actually indigenous to India (Nandy, 2004) and, further, have only recently come under production in Rajasthan.[31] Thus, though these items are increasingly available to slum

[31]Note that the second highest status item, pomegranates, are native to South Asia. Moreover, these are grown in rural Rajasthan, though sparingly. Thus, in contrast to the hypothesis put forward in Chapter 2 (Maxfield et al., 2016), it is not possible to say that non-indigeneity or novelty alone account for food prestige. Rather, any given item's prestige

households, and though they are certainly not the most expensive foods available, neither do they have as long a historic association with Rajasthani cuisine as the indigenous produce options presented to free list participants (i.e., *ker*, *ber*, *gunda*, *kachri*, *tinda*, *guar fali,* and fenugreek)[32]. Thus, it seems telling that potato, cauliflower, and tomato were selected during free lists while traditional crops pervasive in rural, tribal, and poor communities were not.

Notably, as much as class is about aspiration, it is also about defending one's position. Highlighting dietary distinctions between "us" and "them" is an exceedingly salient method for shielding oneself. For example, while conducting fieldwork in south India, Staples (2016) recorded one man's disparaging caricature of poor diets:

> *These kind of people…won't know how to cook or serve in a proper way…we've had more exposure, more education, but these people haven't had that (pg. 24).*

This generalized denigration of poor foodways also extends to specific items, such that their consumption becomes indicative of low-class diets. Though several examples of this phenomenon exist, two are particularly instructive in discussions of Rajasthani cuisine. The first of these is pearl millet, known locally as *bajra*. Pearl millet is the traditional staple grain in

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value reflects its position at the nexus of a variety of different associations (e.g., with modernity), social functions (e.g., marking caste affiliation via food taboos), and historical circumstances (e.g., longstanding dairy culture).

[32]Unfortunately, one culturally and nutritionally important indigenous vegetable, *sangri* (the pods of the desert-adapted *khejri* tree), was left off of the mat shown to free list respondents; this oversight reflects confusion during tool development owing to fresh *sangri*'s similar appearance to multiple other green, pod-like vegetables that were ultimately pictured. However, *sangri* is nonetheless worth calling attention to because of narratives suggestive of its importance within local cultural imaginings about identity. An example of the story in question as recounted by a resident of the Thar desert follows:

> *Some hundreds of years ago, my people fought to protect these trees. In one village near Jodhpur, 300 people sacrificed their lives to save khejri trees when the Maharaja of Jodhpur ordered a massive cut for the construction of his palace. The protesters resisted by clinging to the trees in order to protect them. Hundreds of them were massacred by the army* (Gagné, 2013, pg. 502)

Sangri is also one of the two primary ingredients in *ker-sangri* and one of the five primary ingredients in *panchkuta*. As described within the text, these are well-known and traditional Rajasthani dishes. Given these associations, it is possible that *sangri* might have been chosen as prestigious or high status had it been shown to participants.

Rajasthan due to is relatively high drought tolerance. Its primary use is in making *roti*, a rounded flatbread that is near indispensable to north Indian meals. However, *roti* can also be made with other grains, particularly wheat, which is now widely preferred. These days, people living in rural Rajasthan describe pearl millet as a "poor man's food" (Singh, 2015). So low has its status fallen, that Singh (2015) foresees a future when millet consumption will indicate not relative poverty but absolute destitution. Like famine foods, those who eat millet and those who are hungry may one day be the same (Singh, 2015).[33] This perceived inferiority of coarse cereals is not restricted to Rajasthan or even north India (Chera, 2017; Finnis, 2008; Nagaraj et al., 2013). For example, Finnis (2008) describes how rice has come to replace millet as the quintessential cereal in Tamilian cuisine. Millet is considered low status, poor, and uncultured (Finnis, 2008). It is associated with doing things the "old way," with "tribal hill farmer[s]," with being uneducated (Finnis, 2008). In contrast, eating rice is developed and sophisticated. Moreover, rice, not millet, is given to guests as a signal of household prosperity, because households who eat rice are households with money to spend (Finnis 2008). Thus, as expected, when participants in this study were presented pictures of grains and grain-based foods, wheat and rice, but not pearl millet were among the most prestigious (Appendix Item 9).[34]

The second such food item is *bor* (or *ber*), a desert-hardy berry that grows wild throughout much of Rajasthan. Described as a "poor man's fruit" (Pareek 1983), *bor* is crunchy, sweet, and sour. *Bor* can be pickled and dehydrated for later use or eaten raw when ripe. Gold and Gujar (2002) describe these berries as "…equalizers—a medium for generosity that [does] not depend

[33]The low status attributed to indigenous grains is independent of their real (Parthasarathy Rao et al., 2006) and even perceived healthfulness (Finnis, 2008). Indeed, pearl millet has a superior nutritional profile compared to both rice and wheat (Parthasarathy Rao et al., 2006).

[34]Notably, however, pearl millet was still selected by 32 free list respondents, primarily adults. This fits with observations by Finnis (2008) that older generations, in particular, maintain a certain amount of nostalgia and respect for millets, finding them good for keeping people strong and healthy.

on land ownership or wages," and something "eaten and given in the spirit of sharing" (pg. 87), while a rural Rajasthani proverb goes 'the woman's *bor* are worth (but) twenty sair'—or, like *bor* fruit, unrequired things have little value (*'bai ka bor bees sair ka'*) (Pareek and Trivedi, 2014)[35]. Thus, bor's easy accessibility and everyman reputation is likely to situate it decidedly in the low prestige camp. And, indeed, not a single respondent in this study chose *bor* during free lists.

It is additionally possible that participants' views are guided by other, comparatively more systematized ideologies related to food and eating. For example, Ayurveda relies heavily on the use of various plant materials to treat ailments and offers numerous dietary prescriptions and proscriptions (Sarkar et al., 2015). Of the foods that participants selected as prestigious during free lists, *ghee*, bitter gourd, and ginger are all common components in Ayurvedic preparations.[36] On the other hand, several therapeutic plants (i.e. gooseberry, turmeric, tamarind) and functional foods (i.e. *bael*, *jamun*, and fermented items like *dhokla*, *chaach, dosa* or *idli*) key to this medical system were not selected during free lists (Sarkar et al., 2015).

Similarly, among Hindus, certain foods may be prestigious because of their frequent use in association with the sacred. Deities sample offered foods, which then become *prasad*—material substances imbued with the divine. *Prasad* is subsequently eaten by worshipers. It is conceivable that those foods worthy of being offerings, and thus worthy of serving as the literal vehicle for transferring divine essence to devotees, would carry strong status-related connotations outside of religious contexts. It does appear that many of the items participants consider prestigious are the same ones commonly offered to deities. Ghee, pomegranates, bananas, apples, sweets (e.g.,

[35]Sair is a defunct unit of measurement.
[36]The principles of Ayurveda are more about achieving balance than consuming specific foods *per se*. However, there are nonetheless a variety of commonly suggested Ayurvedic foods and treatments (Sarkar et al., 2015)

rasgulla),[37] milk, and coconut (coconut water) are the most telling examples. On the other hand, these items are arguably used in offerings precisely *because* they are prestigious.

What does a high prestige score really measure?

The prestige scale closely tracks predictions derived from previous research about which foods are expected to be high status. Thus, on the surface, it may appear that the prestige scale assesses an economic capacity to purchase the most "desirable" or "preferred" foods. However, it is important to draw a distinction between preference based on palatability and preference reflecting a desire for consonance with local dietary norms. Two observations support the idea that the prestige scale developed here measures social class and the aspirations surrounding it rather than personal preference *per se*: 1) high status foods are not necessarily the most popular; 2) economic means are not sufficient for a high prestige score because one must also possess the requisite cultural capital regarding which foods are, in fact, prestigious.

The first observation is borne out by the lack of a relationship between food prestige and popularity in parents (Figure 3). Parents' food preferences remained oriented toward traditional fare, loosely defined, regardless of how prestigious those items were. For example, the foods that mothers or fathers commonly selected as favorites were *roti*, *dal*, tomato, peas, bananas, apples, pomegranate*, rasgulla*, almond, *samosa*, and *dahi*. Very few parents were inclined toward the most novel items like burgers, pizza, cake, chocolate, cold drinks, sliced bread, and packaged juice, regardless of those foods' prestige.[38]

[37]Sweets offered to deities are generally based on ghee, milk, or curd and then flavored with ingredients like saffron, cardamom, cashews, pistachios, and almonds. Milk and ghee-based varieties are commonly sold at the entrance to temple complexes (e.g., *barfi* and *laddu)*. However, *rasgulla* (curd-based) are not uncommon choices.

[38]Note that the foods in this prestige scale were themselves fairly high status, having been selected for this reason during free lists. These foods were not a random cross section of the items available in Jaipur. Had parents been presented a list of all possible foods, it is possible that they would have still picked these same items over other options like *bor* or pearl millet, which both previous research and the free list results suggest are low status even while also being archetypal (or indigenous) Rajasthani ingredients. In other words, there may be a relationship between food prestige and preference in parents when sufficiently low status but traditional items are considered.

In contrast, there was a significant relationship between food prestige and popularity in adolescents. While far more adolescents than parents preferred novel foods like pizza, cake, chocolate, and cold drinks, adolescents were nonetheless also fond of high status but somewhat more traditional foods like pomegranate, almond, and *rasgulla*. That is, food popularity in adolescents did not suggest a preference for newer foods to the exclusion of other items or a preference for traditional fare to the exclusion of more novel foods.

The second observation—that a high prestige score depends on both means and knowledge—is apparent in participants' reasons for lifetime non-consumption of various foods (Figure 4). In particular, over half of participants had never eaten pizza. Moreover, of those participants, a third said that their non-consumption was due to a lack of familiarity with pizza or where to buy it. Similarly, though not as dramatic, over 20% of participants had never eaten a burger, with a third of lifetime non-consumers stating that this was because they had no knowledge of the item. Additionally, at least 5 participants reported lack of familiarity with paneer, coconut water, cake, sliced bread, packaged juice, or chocolate. Most of these items, particularly pizza and burgers, are comparatively recent introductions to India; thus, it is reasonable to expect that knowledge about them would be uneven.[39]

Taken together, these two points strongly suggest that the food prestige scale measures social class or the aspirations surrounding it, rather than simply food preferences. That is, the prestige scale captures disparities in individuals' motivation and ability (means and knowledge) to consume items bearing significant symbolic importance within the local class hierarchy. The

[39]This fits with the author's previous work in southern India showing that private school students are generally more familiar with novel or foreign foods (including pizza) compared to students attending government schools (Chapter 2 - Maxfield et al., 2016). Private school students tend to come from wealthier and better educated families, to speak English, and to have greater access to new media like the Internet. These factors likely explain private school students' greater cultural capital vis-à-vis foreign or novel foods compared to their government school peers.

existence of a disconnect between prestige and preference bears out in ethnographic work. For example, though millet is a low prestige food in Tamil Nadu, Finnis (2008) acknowledges that there are nonetheless people who continue to profess a penchant for the grain. These people note millet's health benefits or describe its taste agreeably even while recognizing that rice, not millet, is what a sophisticated household eats, that rice is what you offer to guests (Finnis, 2008).

Are there intrahousehold biases in prestigious food consumption?

The dietary prestige of different intrahousehold pairs was significantly and positively correlated in all cases (Figure 5). Thus, in general, being from the same household predicts broad similarities in dietary prestige, regardless of gender or age. In other words, as high-status food consumption increases for one participant type within a household, it generally increases for others as well. This is expected given that the majority of participants' main meals are consumed at home with the family. Nonetheless, boys had significantly higher average prestige scores than their sisters (Figure 5). There was no difference between mother-father pairs.

There are two main interpretations for the disparity between siblings. First, it may reflect gendered intrahousehold allocation decisions. Parents may offer more prestigious items to boys than girls. The second explanation rests on the observation that gendered social norms influence girls' ability to move through public spaces. Girls are comparatively restricted in their (independent) travel outside the home due to concerns surrounding sexual violence and reputation loss (Mehra et al., 2002). Thus, boys may have an advantage in accessing foods outside the home. As noted previously (Chapter 2 - Maxfield et al., 2016), prestige foods are often those items eaten away from home or sourced pre-packaged from outside the home.

Chi-squared analyses lend some support to both hypotheses (Table 6).[40] More specifically, during the past one week, boys were more likely than girls to have eaten burgers, packaged juice, and cold drinks, which are all outside home foods. But girls were advantaged in chocolate consumption even though this item is purchased from the market. Girls were more likely to have eaten cauliflower, potato, and *dahi*, which are all primarily at-home foods. However, boys were advantaged in milk consumption, and this generally occurs in the house. Notably, there were marked differences in boys' and girls' preference for milk and chocolate, respectively, which may underlie the consumption differences described (Figure 3).[41] Thus, these results hint at boys' greater freedom of movement beyond the domestic sphere coupled with girls' restriction to it. Still, any conclusions are ultimately tenuous. It could just as easily be argued that girls' advantage with respect to cauliflower, potato, and *dahi* indicates parental bias against boys at home. A more exhaustive food list is necessary to examine this hypothesis more explicitly.

On the other hand, previous research suggests that pro-male biases in adolescence are apparent in consumption disparities of "unitary" items (i.e., single serving items) (Aurino, 2017). Aurino (2017) argues that because Indian households tend to eat from the same pot, intrahousehold allocation biases for specific food types are often hard to distinguish. However, if present, these biases would be most apparent for unitary items because they are easier for parents to offer to a favored child (Aurino, 2017). For example, adolescent boys in her study were significantly more likely to consume fruit, milk, and eggs; these could be easily offered to specific children and

[40]Boys were more likely to have eaten non-vegetarian foods (eggs, goat, fish). However, in order to avoid religious confounding, these items were left out of the in-text analysis and do not contribute to the differences being discussed. The appendix contains versions of Figure 5 and 6 that include non-vegetarian foods.

[41]Interestingly, because milk carries a great deal of cultural importance, researchers have tied gendered differences in milk consumption, specifically, to parent-directed bias against girls (Fledderjohann et al. 2014; Gupta 1987; Jatrana 2003). Jatrana (2003) notes that girls who ask for milk are sometimes met with the retort—Do you have to plough the field that you need milk and ghee?" (*Kya tene hal jotna hai jo ghee-doodh chahiye*) (pg. 23).

withheld from others (Aurino, 2017). When considering the results reported here in light of this hypothesis, an interesting pattern is apparent. Except for meat (fish and goat), all of the foods for which boys reported more recent consumption than girls were unitary items (burgers, cold drinks, eggs, packaged juice, and milk). In contrast, except for chocolate, all of the foods that girls reported eating more recently than boys were items often consumed from a shared household pot (potato, *dahi*, cauliflower).

In addition to gendered differences within age groups, there were also significant prestige score differences across generations. (Figure 5). The average difference between parent–adolescent pairs was around seven to ten times larger than for mother–father pairs, regardless of the gender combination considered. Thus, adolescents eat ostensibly more prestigious diets than their parents. It is possible that this difference stems from parental buffering or channeling, wherein more prestigious foods are offered to adolescents when household access to them is limited. However, it seems far more likely that these findings reflect the limited popularity of more novel foods among parents.

Interestingly, the prestige score pattern between parent-adolescent pairs changes with socioeconomic status (Table 4). Specifically, girls' average prestige scores increase with a rise in household wealth. However, there is no consequent rise in the average difference between those same girls and their parents across wealth quintiles. This suggests that while dietary prestige in girls benefits from increasing household wealth, it does so at a rate similar to the benefit that parents' prestige scores receive. Additionally, and in contrast to girls, the average prestige score difference between boys and mothers (but not fathers) significantly decreases with increasing wealth. That is, mothers' and boys' diets become more similar the wealthier the family.

Again, there are two main interpretations for these results. First, this pattern could suggest changes in gender-biased buffering by parents at different levels of wealth. It could be argued that the social value contained in girls' diets improves as wealth increases because the whole household benefits from additional resources. That is, girls are offered more prestigious foods as the household's capacity to acquire them increases, but so too are other members (parents). The decrease in boys' prioritization relative to mothers could then be interpreted as a decline in food-related buffering as resource pressures relax. The alternative explanation is that cultural capital, food preferences, and aspirational consumption choices among parents (particularly mothers) change substantially with increasing socioeconomic status (Chapter 2 - Maxfield et al., 2016).

Finally, though the food prestige scores indicate a bias favoring boys over girls, anthropometric analyses find the opposite. Boys were more likely to be underweight than their sisters. Though contradictory to the food prestige results, these findings generally fit with national trends in India. More specifically, adolescent boys may now be more likely to exhibit underweight than adolescent girls (Patel et al., 2015). Similarly, mirroring the rapidly rising rates of overweight among Indian women (Luhar et al., 2018; Sengupta et al., 2015), mothers were more likely to be overweight than their husbands, while fathers were more likely to be underweight than their wives. Thus, disparities in access to food's social value diverge from the disparities suggested by measures assessing access to food's biological value.

6. Limitations

6.1 Sample

Final sample diversity, though useful for inferences about the broader applicability of study results, was ultimately a hinderance in many ways. For example, households originated from a variety of castes and religious affiliations. Despite restricting the sample to Level 1 and 2 slums,

several socioeconomic classes were represented, and the difference in living conditions and social atmospheres between any two slums was itself significant. The duration of a household's residency in Jaipur in addition to the permanency of its occupation therein varied throughout the sample. Disparities in school attendance are likely to have dictated younger adolescents' access to and use of government-provided lunches.[42] Finally, though most participants lived in the city center, peri-urban households were also included. All of these variables undoubtedly influenced respondent diets, limiting access to particular items and respondents' desire to consume them. Thus, future research with a more focused sample would substantially aid understanding of the pathways connecting gender and age to prestigious food consumption.

Additionally, it should be noted that none of the adolescent girls in this sample were married. Rajasthan has one of the highest child marriage rates in India; 20.3% of urban Rajasthani girls are married before 18 years (NFHS-4, 2016). Given that girls live with their husbands' families after marriage, the sampling strategy used here effectively excluded those girls from this study. Households in which adolescent girls remain unmarried until at least 18 years of age may be significantly different than households in which child marriage occurs. In particular, such households may be wealthier or better educated. This is likely to have biased study results.

6.2 Food Prestige Scale

There are a variety of ways that the food prestige tool could be improved. First, its accuracy would increase with the inclusion of more items. For example, when looking at the modified free lists, almonds and cashews were similarly prestigious compared to other sweets/dried fruits. However, only almonds were presented to informants during the ranking task. Had cashews also been ranked, it is reasonable to assume that they would be among the most prestigious items.

[42]India's Midday Meal Scheme provides free lunch to all government school pupils in 1st-8th standards, which covers children approximately 6-14 years of age.

Moreover, participants who responded "no" to having eaten almonds in a given time frame might have responded "yes" if asked about cashews. Yet, in the prestige tool's current iteration, such participants did not receive any points.

Second, the prestige tool only asks about the last time an item was eaten; it does not address frequency (or quantity) of consumption. For example, a person reporting almond consumption the previous day could be describing his or her first almond consumption of the entire year. In contrast, someone who reported eating almonds within 1 month, could have eaten almonds every day prior to that most recent reported consumption. Yet the former respondent would receive more points than the latter.

Third, this scale is unable to differentiate how context or quality (e.g., branding) affect food prestige. For example, certain cold drink brands may be higher status, but the scale did not allow for such differentiation.[43] Similarly, eating the same meal at home versus at a roadside eatery (*dhaba*) is likely to change the status that various foods carry. In the most extreme case, a lack of context means that participants who acquire scale items while begging receive the points for ostensibly high-status foods despite acquiring them in a low-status manner.

Fourth, it could be argued that the decision to include both single food items (e.g., cauliflower or almonds) in addition to prepared dishes (e.g., *dal bati churma* or pizza) biases participant responses. Prepared dishes necessarily contain more than one ingredient and also represent a greater time burden. Similarly, the pictures used to represent some items (e.g., cake) are arguably more appealing, which may also skew selections. However, while these factors may have influenced some participant answers, the two most prestigious items (almonds and pomegranates) were ultimately single ingredients with no obvious, additional embellishment in their presentation.

[43]Maaza, Limca and Thums Up are Indian-origin soda brands now owned by Coca-Cola or Pepsi. However, they are usually cheaper than Coca-Cola and Pepsi's namesake offerings.

Fifth, spices were originally intended for inclusion in the dietary recall tool but ultimately dropped because pilot work indicated that participants were unsure which spices had been used to prepare their meals. However, it is possible that some of the less commonly used and more expensive spices (e.g., saffron) would have been sufficiently recognizable and memorable. This possibility could be pursued in future research. Similarly, we did not ask about the prestige value of condiments (e.g., chutney or *achar* – Indian pickle) or after meal digestive aids (e.g., candy-coated fennel or dried *amla* – Indian gooseberry). Yet research in Costa Rica suggests associations between low condiment consumption and food insecurity; thus, condiment use may also be indicative of dietary prestige (Himmelgreen et al., 2006).

Finally, as with all tools dependent on dietary recall, participants' recollections are probably not very accurate. Individuals may have underestimated or overestimated how recently they ate any given item. Focal follows (Berbesque et al., 2016) or food diaries (Day et al., 2001) later analyzed for prestige would be more accurate alternatives and could be pursued in the future.

7. Conclusion

Locally specific measures of dietary prestige suggest that there are intrahousehold disparities in food distribution: adolescents consume more prestigious diets than their parents and boys consume more prestigious diets than their sisters. Several possible explanations for this pattern are possible, including gender-biased resource buffering, age-related differences in food preference, and gendered restrictions on household members' movements outside the home. Interestingly, the age- and gender-based biases suggested by the dietary prestige scale diverge from the pattern suggested by intrahousehold differences in BMI; however, this may reflect a global trend wherein food insecurity becomes divorced from energy undernutrition. Although dietary prestige may offer a useful window into intrahousehold food allocation, researchers hoping to use such measures must

determine whether the construction of locally specific scales is worth the time and resource investments that the process necessitates. Care should be taken in scale development to avoid the limitations encountered during the attempt described here.

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Chapter Four

Local measures of relative deprivation: Does prestigious food consumption predict mental wellbeing in Indian slums?

Hunger for mango cannot be appeased by eating tamarind
'Aama ki bhookh amlyan snu koni jave'
(Desire for a good thing cannot be satisfied by an inferior thing)

-Rajasthani Proverb-
(Pareek and Trivedi, 2014)

Abstract

This paper draws on the theories of relative deprivation and cultural consonance to examine whether low prestigious food consumption predicts anxiety, depression, and psychosocial stress in a food insecure population. We use ethnographic methods and multilevel models to test this hypothesis in a sample (n=650) of mothers, fathers, adolescent boys, and adolescent girls living in Indian slums. Controlling for food insecurity and other relevant covariates, we find that prestigious food consumption predicts decreases on both the Hopkins Symptom Checklist-10 and Perceived Stress Scale-10 among adults but not adolescents. These results offer evidence that the coping mechanisms employed in response to restricted food access may beget negative mental health outcomes via sociocultural pathways that relate to food's symbolic value.

1. Introduction

Over 800 million people worldwide are chronically undernourished (FAO, 2017). The number lacking food security—"access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"—is probably far greater (FAO, 1996; Weaver and Hadley, 2009). Most food insecurity research focuses on physical wellbeing, but there is growing recognition that food insecurity is also detrimental to mental health. In particular, food

insecure individuals are more likely to suffer from anxiety, depression, and psychosocial stress (Weaver and Hadley, 2009; forthcoming Tribble, Maxfield, and Hadley).

Yet, even as anxiety and depressive disorders increase worldwide (WHO, 2017), the pathways connecting food insecurity to psychological wellbeing remain unclear (forthcoming Tribble, Maxfield, and Hadley). Hypotheses concerning the nature of the relationship between food insecurity and mental health can be generally classed as either biological or sociocultural (Weaver et al., 2014). Biological explanations hinge on the observation that the coping mechanisms employed in response to restricted food access lead to reductions in dietary diversity and quality (Chandrasekhar et al., 2017; Na et al., 2016), and that low dietary diversity and poor diet quality are associated with malnutrition, particularly micronutrient deficiencies (Rah et al., 2010). These deficiencies, in turn, are linked to poor mental health outcomes (Bodnar and Wisner, 2005).

Sociocultural explanations recognize that, beyond fulfilling basic biological needs, eating is consumption, and thus an activity that conveys information about identity, status, and social relations to self and others (Barthes, 1997; Douglas, 2002). Food choices are a way to 'keep up' and participate effectively in social life (Ger and Belk, 1996), to signal the class to which you want to belong (Bourdieu, 1984), to perform valued self-construals, and to highlight the social relations you hope to form (Douglas, 2002). As such, non-consumption indicates exclusion, difference, or deficiency (Ger and Belk, 1996; Douglas, 2002). Food insecurity and mental health might thus be connected because the coping mechanisms that lead to alterations in the types and quantities of foods consumed reduce access to socioculturally significant foods, and these changes ultimately beget feelings of isolation, shame, and powerlessness (Hamelin et al., 2002; Piaseu et al., 2004). Such negative emotional experiences could eventually manifest as depression, anxiety, and psychosocial stress (Weaver and Hadley, 2009; Hadley and Crooks, 2012).

Despite the clear importance of food in social life, there is limited quantitative research linking food's sociocultural value to either food insecurity or mental health. The few available studies include work by Cary (2017), who found that eating specific, culturally important foods predicted percieved food insecurity in Nicaraugua; however, psychological wellbeing was not assessed. In Brazil, Dressler et al. (2007) showed that low prestigious food consumption was associated with psychological distress, but food insecurity was not controlled for. Finally, Weaver et al. (2014) found that food insecurity predicted prestigious food consumption in Brazil, but no significant relationship existed between food prestige and mental health outcomes.

This paper offers an additional data point by testing whether prestigious food consumption predicts mental health outcomes among food insecure individuals in India. It draws on two related theories to explain why such a relationship might exist: relative deprivation and cultural consonance. Relative deprivation occurs when individuals make comparisons between themselves and others with respect to the lifestyle goals promoted by society but find their own situation lacking (Runciman, 1966). Feelings of relative deprivation are known to harm psychological wellbeing (Marmot, 2004). Importantly, although relative deprivation and wealth are linked conceptually, individuals rarely make comparisons based on knowledge of actual incomes (Sweet, 2011). Rather, they rely on symbolic displays of status (Sweet, 2011).

Food's role as an important status marker (Barthes, 1997; Douglas, 2002) means that perceived inequalities with respect to food consumption, specifically, might affect mental health outcomes. Indeed, Hadley and Patil (2006) found that being food insecure during seasons of high food security predicted worse symptoms of anxiety and depression than being food insecure during seasons when most other households also were food insecure. In other words, relative food

insecurity—the perception that one fares worse than others with respect to food consumption—may engender social comparisons that negatively impact mental health (Hadley and Patil, 2006).

Cultural consonance is the degree to which a person's behavior matches the goals set forth in local cultural models, which can include the pursuit of particular lifestyle characteristics and symbolic status markers (Dressler and Bindon, 2000; Dressler et al., 2007). For example, where cultural models for "the good life" include certain household goods, individuals are generally motivated to acquire those items (Dressler and Bindon, 2000; Dressler et al., 2007). Low consonance with local, culturally valued lifestyles predicts poor mental health outcomes in a variety of contexts (Dressler and Bindon, 2000; Dressler et al., 2007; Sweet, 2010).

Food prestige is a cultural domain for which there appears to be a high degree of consensus within a variety of sociocultural settings (Newkirk et al., 2009; Oths et al., 2003; Weaver et al., 2014; Chapter 2 - Maxfield et al., 2016). Where individuals share a cultural model regarding the belief that some foods are more prestigious than others, they may aspire to consume those items or otherwise recognize their neighbors' inability to maintain the normative diet (Newkirk et al., 2009; Oths et al., 2003; Weaver et al., 2014; Chapter 2 - Maxfield et al., 2016). Low dietary consonance with respect to prestigious food consumption may thus signify low status, lack of control, poverty, or other marginalizing characteristics. In food insecure contexts, unwanted responses to dietary restrictions are sometimes described as a switch to "poor people's foods" (Hadley et al., 2012), and food insecure households report engaging in behaviors that prevent neighbors from recognizing markers of dietary marginalization (Hamelin et al., 2002).

In sum, this project posits that prestigious food consumption is a useful proxy for consonance with local cultural models about diet or, alternatively, serves as a salient measure of relative deprivation in contexts with high levels of food insecurity. To examine this, the following

specific hypotheses are tested among slum-dwelling mothers, fathers, adolescent boys, and adolescent girls in Jaipur, India: 1) low prestigious food consumption predicts poor mental health outcomes among the food insecure; 2) prestigious food consumption mediates the relationship between food insecurity and mental health; 3) the effect sizes relating prestigious food consumption to poor mental health vary across gender and age classes; 4) anthropometric measures of energy malnutrition predict poor mental health outcomes but do not negate the effect that prestigious food consumption exerts. If an association is found between prestigious food consumption and mental health in a food insecure population, it would provide further evidence that symbolic inequality (Carlisle et al., 2008; Sweet, 2011), food's sociocultural value, and relative food insecurity (Hadley and Patil, 2006) all matter for mental wellbeing.

2. Literature Review

2.1 Socioeconomic status and health

Studies in both historical (Antonovsky, 1967; Cohen, 1989) and contemporary populations (Marmot et al., 1987) document a relationship between socioeconomic status (SES) and health. SES variably predicts differences in communicable diseases like tuberculosis, AIDS, and Ebola (Farmer, 1996), chronic diseases like coronary heart failure (Kaplan, 1993), diabetes, and obesity (Everson et al., 2002), and psychiatric disorders like schizophrenia, alcoholism, and depression (Holzer et al., 1986). Moreover, as society- and community-level inequalities increase, morbidity and mortality rates worsen (Pickett and Wilkinson, 2015).

Cursory examination of the SES-health gradient suggests that it reflects increased physical threats to wellbeing for those at the bottom of the social hierarchy. Indeed, it has long been recognized that absolute poverty negatively impacts population health indicators, with the pathways connecting them seemingly straightforward (Lynch et al., 2000). At the most basic,

limited socioeconomic means preclude one's access to sufficient food, safe water, improved sanitation, adequate healthcare, and durable housing. Limited or inconsistent access to these resources, in turn, harms wellbeing. Additionally, low SES individuals must grapple with deprived and risky environments. Poverty predicts residence in neighborhoods with limited social services and failing infrastructure (Kawachi and Berkman, 2003), employment in hazardous working conditions (Adler et al., 1994), and exposure to violence (Adler et al., 1994). Based on such observations, it might be expected that the SES-health gradient rapidly plateaus beyond the poverty line—a so-called threshold model (Adler and Ostrove, 1999). Moreover, it could be reasonably assumed that societies ensuring acceptable living and employment standards for all members might thereby reduce or eliminate any SES-health gradient.

However, evidence from a variety of studies challenges the idea that absolute deprivation alone matters for wellbeing (Marmot, 2004; Pickett and Wilkinson, 2015). First, the Whitehall study (Marmot et al. 1984) found evidence that explicitly refuted the threshold model (Adler and Ostrove, 1999). Conducted in a cohort of British civil servants, the Whitehall study found that morbidity and all-cause mortality decreased with each additional step-up in occupational grade (Marmot et al., 1984; Marmot, 2007). This held true even as all individuals had health care access and steady employment (Adler and Ostrove, 1999). Moreover, while lifestyle factors (e.g., smoking) implicated in morbidities like coronary heart disease were more prevalent at the bottom of the occupational hierarchy, controlling for these factors did not eliminate the observed gradient (Marmot, 2007).

Second, the SES-health gradient has been shown to exist even in countries with strong social safety net programs (e.g., Nordic model countries), and thus for whose citizenries all basic material needs are ostensibly guaranteed (Marmot, 2007). In Sweden, early research showed that

mortality rates among male PhD holders was 50% lower than among those with 'just' higher tertiary education (e.g., lawyers, doctors and those with a master's degree) (Eriksson, 2001; Marmot, 2007). Moreover, this pattern persisted despite accounting for income, background (i.e., father's social class), marital status, and actual work type (Eriksson, 2001; Marmot, 2007). Thus, men who were not poor, had access to substantial social programs, and who lived in a comparatively egalitarian society still exhibited a status-health gradient.

Several hundred additional studies have since found evidence for an association between income inequality and a diverse set of population health outcomes, including teenage pregnancy, homicide, depression, obesity, and infant mortality (Pickett and Wilkinson, 2015). This association exists not only between countries but between states or territories within countries (Pickett and Wilkinson, 2015). Moreover, although it is difficult to demonstrate causality, the correlation between income inequality and population wellbeing (combined index of social and health outcomes) is so high that Wilkinson and Pickett (2015) conclude that "any alternative explanations would need to have extraordinarily strong effects" (pg. 320).

In view of such findings, many researchers argue that absolute deprivation alone does not explain SES-related trends in health. Instead, they point to the importance of subjective or relative poverty (Marmot, 2007; Pickett and Wilkinson, 2015).[44] That is, while income growth improves health for those at the very bottom of the socioeconomic hierarchy, the added benefit of increasing access to material resources eventually plateaus and psychosocial pathways predominate. Moreover, as societal inequality increases, status anxiety also rises (Layte and Whelan 2014); this

[44]Researchers have additionally proposed that the country- or community-level relationship between income inequality and population health exists because inequalities subvert social cohesion and lower cooperation (Wilkinson 1996). Low cohesion, in turn, may breed violence and disrupt social networks. Limited and untenable social networks are associated with a variety of poor health outcomes at the individual-level, particularly those related to mental wellbeing. Moreover, low cohesion and cooperation could reduce support for public programs that address absolute poverty. However, more recent reviews are generally more dismissive of this idea (Wilkinson and Pickett, 2015).

could amplify the importance that psychosocial pathways have in the etiology of numerous health problems and may partly account for the dose-dependent relationship between income inequality and population wellbeing (Layte and Whelan 2014; Pickett and Wilkinson, 2015). As framed by Sapolsky (2005), "…the disease consequences of feeling poor are often rooted in the psychosocial consequences of being made to feel poor [subordinate] by one's surroundings" (pg. 652).

A large and growing body of literature now offers concrete physiological explanations for the processes by which social status "gets under the skin" (Krieger and Smith, 2004; Hertzman and Boyce, 2010). The most well-documented candidate pathway relates to the hypothalamic-pituitary-adrenal (HPA) axis (Hertzman and Boyce, 2010), which is the body's stress response system (Chrousos and Gold, 1992). More specifically, the HPA axis links the central nervous system to the endocrine system and through its functioning enables organisms to respond to homeostatic challenges. The HPA axis is stimulated upon exposure to both physical and psychosocial stressors, with the resulting hormone cascade producing cortisol as its end result.[45] Cortisol has a variety of systemic effects, such that HPA axis dysfunction (e.g., excessive spikes in cortisol or long-term elevation of cortisol levels) has wide-ranging consequences for health, including depression, abdominal obesity, diabetes, cardiovascular disease (Rosmond and Björntorp, 2000), and lowered immune function (i.e., infection risk) (Cohen, 1999). Moreover, chronic overstimulation of the HPA axis yields high allostatic load, which has been connected to a variety of chronic health problems (McEwen, 1998), including depression (McEwen, 2003).

In order for any psychosocial stressor to stimulate the HPA axis, individuals must first recognize those stressors as threatening. As noted by Eisenberger and Cole (2012), strong social connections are critical for survival in social species, such that any indication those connections

[45] Cortisol is the primary glucocorticoid produced in humans.

are at risk would be a threat to survival. Thus, psychosocial threats related to exclusion (actual social disconnection) or evaluation (potential social disconnection) may activate the same neural "alarm system" that physical threats do (Eisenberger and Cole, 2012). Some of the earliest and most well-known evidence in this regard comes from comparative biology (Sapolsky, 2005). Studies with non-human primates find that low rank members of hierarchical species for whom social rank rarely changes or for whom rank is maintained via non-physical intimidation have worse health indicators (Sapolsky, 2005). Researchers posit that subordinate individuals experience a lack of control in social interactions and limited outlets for alleviating frustration (e.g., lower ranked individuals against which to vent aggression) (Sapolsky, 2005). Moreover, repeated and ever-present reminders of low rank leave subordinates in chronic anticipation of social challenges (Sapolsky, 2005). Importantly, these experiences correspond to increases in cortisol and other stress-related hormones, suggesting that rank-related psychological stressors act on health by stimulating the HPA axis (Sapolsky, 2005).

Research in humans suggests that social-evaluative threats (i.e., threats to the social self) are one of the primary psychosocial stressors implicated in increased HPA axis activity and consequent increases in cortisol (Dickerson et al., 2004).[46] Social-evaluative threats include judgements about one's social position or status, situations that jeopardize a person's self-esteem, and contexts wherein a stigmatizing condition or identity is revealed (Dickerson et al., 2004). Interestingly, many of the submissive behaviors adopted by non-human primates in response to status challenges exhibit strong correlates with nonverbal displays of shame in humans (e.g.,

[46] Social-evaluative threats have also been linked with additional physiological variables somewhat more directly implicated in chronic disease etiology but nonetheless indicative of the downstream effects of the stress response (e.g., resulting from sympathetic nervous system activation or rising glucocorticoid levels). For example, Woody et al. (2018) showed that social-evaluative threats lead to greater cardiovascular reactivity (i.e., increases in blood pressure and heart rate), and Dickerson et al. (2009) found that social-evaluative threats yield increases in pro-inflammatory cytokine levels.

hiding, ducking away, and gaze avoidance). And, indeed, social-evaluative threats in humans are often followed by a surge in self-conscious emotions like shame (Dickerson et al., 2004). Thus, shame may represent a conscious emotional indicator of social-evaluative threats acting to stimulate the HPA axis (Dickerson et al., 2004).

Despite substantial evidence in favor of the psychosocial pathway, the strength of the association between status and any given biomarker or health outcome is likely to exhibit inter-group, inter-individual, and even intra-individual variation. This occurs for several reasons. Early life experiences alter neuroplasticity in areas of the brain responsible for processing information, recognizing stressors, and mounting a physiological response; impairments to these systems brought about by early life material and social challenges predispose individuals to greater cortisol reactivity and allostatic load when faced with similar stressors during adulthood (e.g., limited capacity to habituate to stressors or to terminate the stress response, resulting in chronically elevated cortisol levels) (McEwen and Gianaros, 2010). Similarly, epigenetic changes stemming from early life environmental stressors can alter HPA axis function even while genetic predispositions and personality traits also influence individual responses to psychosocial threats (Hertzman and Boyce, 2010). Finally, as the psychosocial pathway all but necessitates a symbolic meaning system via which individuals recognize challenges to their social standing (Hertzman and Boyce, 2010), social-evaluative threats carry weight only insofar as a group has shared understandings of identity, stigmatization, and failure. To the extent that social expectations, status symbols, and reference groups differ between classes, communities, and genders or vary

throughout the life course, so too might the relationship between social position and health change for any given measure of rank.[47]

In sum, the health consequences for those at the bottom of the social hierarchy emerge not only from absolute resource deprivation, but from perceived psychosocial threats that, when recurrent in excess over a lifetime, contribute to HPA axis dysfunction (Hertzman and Boyce, 2010; McEwen and Gianaros, 2010).[48] The capacity for psychosocial threats to co-opt the neural "alarm system" and stress response triggered by physical challenges is an outgrowth of our evolutionary history as a social species (Sapolsky, 2005; Eisenberger and Cole, 2012). And this pathway may explain many of the population-level health differences correlated with socioeconomic inequality (Pickett and Wilkinson, 2015).

2.2 Setting

In 2013, Krispy Kreme opened its first Indian franchise and joined the growing number of international conglomerates and home-grown food companies hoping to capitalize on the deepening pockets of the country's expanding middle class. Meanwhile, rising per capita incomes allowed for increased dietary diversification across all socioeconomic levels, with notable shifts toward the consumption of animal products, fats, starchy root vegetables, wheat, refined carbohydrates, and fruits (Pingali and Khwaja, 2004). This so-called Westernization of Indian diets

[47]In line with this, one of the primary criticisms of the income inequality—health hypothesis (outside of materialist or neo-material positions) is the tendency for researchers to conflate income inequality and social inequality which, though correlated, actually speak to somewhat different dimensions of experience (Goldthorpe, 2012).

[48]This review has focused on the role that HPA axis functioning plays in linking social position and health because it the most well documented "candidate system" in that regard. However, other physiological mechanisms have also been identified (Hertzman and Boyce, 2010). Moreover, the health consequences of all these pathways are compounded when the stressors associated with feelings of subordination incite coping behaviors like substance abuse (Wills and Hirky, 1996) and overeating (Gibson, 2012). While such behaviors offer immediate relief against low-rank frustrations, they are ultimately harmful in aggregate.

and the rapid influx of new, processed foods underlies much of the country's contemporary surge in obesity, diabetes, and cardiovascular disease (Popkin, 2001; Shetty, 2012).

Yet, despite rapid economic development, India has not achieved the projected inroads into undernutrition usually seen in other countries with comparable economic gains (Deaton and Drèze, 2009; Pritchard et al., 2014). In fact, India continues to have some of the highest levels of underweight and stunting in the world (FAO, 2017). This pattern of rapid economic growth and large-scale dietary change coupled with a seemingly intractable undernutrition burden is so conspicuous and distinctive that economists refer to it as the 'Indian Enigma' (Deaton and Drèze, 2009; Pritchard et al., 2014). Indeed, despite increases in income and per capita expenditure, dietary energy intakes have remained stagnant or declined (Deaton and Drèze, 2009).[49]

Though a variety of explanations for this puzzle exist (Deaton and Drèze, 2009), the most relevant here is that offered by Banerjee and Duflo (2007), who suggest that the 'Indian Enigma' exposes flawed assumptions about how the poor spend their money. Consider that the Indian government defines its poverty line (in part) as the income necessary to satisfy average adult energy requirements—2100 calories in urban areas and 2400 in rural areas (Banerjee and Duflo, 2007; Sen, 2005). By this reckoning, those above the poverty line will have sufficient energy intakes, while those below it will not. In other words, to be poor is to be hungry (Banerjee and Duflo, 2007). Within this framework, food spending by the poor becomes synonymous with a robotic pursuit of more calories. Yet studies testing such assumptions ultimately reject them; in reality, poor households allocate 'spare' purchasing power toward more desirable, expensive calories or toward non-food items (Banerjee and Duflo, 2007).

What, then, makes some calories more desirable than others—so much so that poor Indian

[49] Notably, fat consumption has actually increased (Deaton and Drèze, 2009).

households might stretch tight budgets to attain them? Certainly "taste" is the most common explanation by far, with tasty foods generally assumed to be those high in sugar, fat, and salt because these three flavors are very nearly globally appealing (Moss, 2013). Moreover, entire corporate marketing strategies have been developed to target the "fortune at bottom of the pyramid" (Prahalad and Hammon, 2002), and these schemes emphasize low-cost, high-palatability, and extra-processed foods. Thus, it is undoubtedly true that food spending by the poor is motivated, at least in part, by the pursuit of "tasty" calories (Banerjee and Duflo, 2007), which are themselves more accessible to underprivileged communities and wallets than ever before.

Yet, if food preferences are shaped by palatability alone, what explains India's wide-ranging reverence for *ghee* (clarified butter) when cheaper cooking fats abound? Fatty foods may be desirable, but why are certain high-fat foods more desirable than others? Social scientists have long argued that "taste" is not entirely independent of social influence (Bourdieu, 1984). Rather, seemingly fine gradations between food items can reflect significant cultural distinctions. Moreover, these food preferences are largely class-defined and connected to a larger symbolic hierarchy that legitimizes upper-class fancies at the expense of lower-class favorites (Bourdieu, 1984). The poor are not immune to these messages and the meanings attached to high-status goods or foods. That is, the desirability of particular calories among poor consumers is surely shaped by their symbolic meaning within the local class hierarchy. And, indeed, the poor do appear intent on "eat[ing] their way into the middle class" (Fitchen, 1988, pg 397) as costly food spending by calorie deficient Indian households imitates the food habits of those with higher-incomes (Shah, 1983).

3. Methods

Data collection took place in Jaipur, the capital of the Indian state of Rajasthan. With over 3 million residents, it is the largest city in the state and the 10th largest in the country (Census of India, 2011). Slum residents make up around 16% of Jaipur's population (Jaipur Development Authority, 2014). Official estimates are not available for the number of households in each slum, but slum designation requires at least 20 households (Unpublished Government Document).

3.2 Instrument translation

Three assistants, a professional translator, and the author each translated the research tools. During roundtable discussions with a local anthropology professor, the most appropriate versions of each question were selected. Translations for all mental health scales were evaluated during a second roundtable overseen by a local psychology professor. The psychologist instructed assistants on correct use of the scales. We piloted the final questionnaires with 10 people. A different translator back-translated those instruments.

3.4 Sampling frame

We used an official government slum list to select samples; however, many slums on that list would not be considered such by most definitions (all basic civil services were present). This mirrors the observation that India's slums exhibit a diverse array of living conditions (Nolan, 2016). We elected to update the list in order to: 1) understand the distribution of living conditions across Jaipur's slums; and, 2) have a useful sampling frame. To achieve this, we categorized each slum from the list according to its "development level" on a scale of 1 to 3. Level 3 slums had all, or nearly all, basic civil services. These communities were not included in the sampling frame. All other slums were ranked Level 1 or 2 depending on overall condition and the number of services available to most households.

3.5 Selecting foods for a prestige scale

The author and three local assistants listed foods commonly available in Jaipur and grouped them into eight subdomains: fruits, vegetables, animal products, grains, legumes or pulses, sweets or dried fruits and nuts, pre-prepared or outside home foods, and beverages. We printed eight mats, with each depicting pictures of the foods in a single subdomain. We asked 80 participants to pick the five most prestigious items from each subdomain. Participants were equally distributed across mothers, fathers, boys, girls, Level 1 and Level 2 slums. We used random sampling to select four slums and convenience sampling to achieve participant quotas within them.

Participant answers were analyzed for frequency and saliency. Saliency is a measure that accounts for both item frequency and average item rank, such that items listed earlier and more often have higher salience (Smith and Borgatti, 1996). Based on these results, 31 items were identified for inclusion in the prestige scale; in general, the chosen items were those identified as most salient in a given domain. We chose 31 foods because this is comparable to other studies developing ranked lists of foods (Chapter 2 - Maxfield et al., 2016; Newkirk et al., 2009; Oths et al., 2003; Weaver et al., 2014) and allows for a manageable number of paired comparisons.

3.6 Developing a food prestige scale

We developed the food prestige scale using consensus analysis on participant responses to paired comparisons. Consensus analysis determines if participants share a single cultural model for a domain (Romney et al., 1986). Participants are all asked the same series of questions, and, where consensus exists, this method identifies the culturally correct "answer key." The consensus questionnaire used was a set of visual paired comparisons, wherein participants picked the most prestigious food from each pair of pictures. The "answer key" produced thus identifies the most prestigious food within each pairing.

Paired comparisons traditionally require participants to evaluate each item against every other item. The number of judgments participants complete increases rapidly with each additional item included (e.g., 190 comparisons for 20 items). To address this, we used the incomplete cyclic design outlined by Burton (2003) to reduce the number of judgments necessary for 31 items to 93.

An incomplete cyclic design normally requires a different, randomized questionnaire of paired comparisons for each participant, such that no participant makes all possible comparisons. However, such a design precludes the ability to conduct consensus analysis because participants are not all presented with the same comparisons (i.e., the same questionnaire). To address this, we used only five randomized questionnaires, with 24 to 27 people completing each (n=125) (Burton, unpublished correspondence). For each questionnaire, participants were balanced nearly equally across participant type and slum level. We used random sampling to select four slums and convenience sampling to select participants within them. These participants and slums were different than those visited previously.

Consensus analysis was conducted separately for each of the five randomized questionnaires. Results showed that consensus existed for each questionnaire. As such, we can surmise that consensus would also be found on a longer paired comparison task requiring all participants to make all possible comparisons. The total "wins" for each food across all five questionnaires were summed. This sum serves as a food's value in the prestige scale.

3.7 Cross-sectional survey sample

We conducted cross-sectional surveys with the mother, father, and all adolescent children (13-17 years) in 200 households; having at least 1 eligible adolescent was the only inclusion criterion. The data were initially collected across 10 slums—5 randomly selected Level 1 and 5

randomly selected Level 2 slums. These slums were different than those visited for the free lists and paired comparisons.

We canvassed each slum, numbering all entrances and major crossroads. We used a random number generator to select a starting location and asked every other household to participate until reaching our desired per slum sample size of 20 households. When a road forked, we used a random number generator to select our route.

We often had difficulty finding times to meet with fathers because many worked long hours. For this reason, we did not have a sufficient number of households for the desired sample size in one Level 2 slum. We randomly selected a sixth Level 2 slum to complete the sample.

3.8 Cross-sectional survey

Native Hindi speakers gender-matched to participants collected all cross-sectional survey data between December 2016 and April 2017. Each participant answered the Food Insecurity Experience Scale (FIES), the Hopkins Symptom Checklist-10 (HSCL-10), the Perceived Stress Scale-10 (PSS-10), a 31-item dietary recall, and demographic questions. We also collected height, weight, mid upper arm circumference, and triceps skin-fold thickness (SFT); the average for two measurements was calculated except where participants only allowed for one measurement. Data were collected on household goods, living conditions, household size, food expenditure, and religion in addition to the income, education level, and occupation of each member. The overall participation rate was 87%.

3.9 Measuring food insecurity

The FIES is an 8-item questionnaire that asks about an individual's experience with food-related difficulties (Ballard et al., 2013). This study used a 6-month recall period. The FIES questions are progressive in that they capture increasingly severe struggles associated with food

insecurity. The FIES focuses on personal experience and does not ask about other household members. The questions are binary, with total possible scores from 0 to 8. For chi-square analyses, respondents were categorized into 4 food insecurity levels: none (0), mild (1-3), moderate (4-6) and severe (7-8) (Table 2). For the correlation matrix, the FIES was treated as a quasi-continuous variable (Table 3). Because only one boy reported severe food insecurity, the FIES was dichotomized for the multilevel models: none or mild (0-3) versus moderate or severe (4-8).

3.10 Measuring anxiety and depression

The HSCL-10 is a short-form version of the Hopkins Symptom Checklist-25, a widely used scale measuring symptoms of psychological distress (Derogatis et al., 1974). Individuals specify on a 4-point Likert scale the frequency with which they experienced symptoms of anxiety and depression during the previous week: not at all, a little, quite a bit, or extremely. The point values for all questions are summed, yielding possible scores from 0 to 30. Participant answers to the HSCL-10 reflect their answers to other psychological distress scales developed specifically for South Asian contexts (Snodgrass et al., 2017; Syed et al., 2008), and symptoms included in the HSCL-10 map closely onto "tension," an idiom of distress common in India (Weaver, 2017).

3.11 Measuring perceived stress

The PSS-10 measures whether individuals appraise their life situation as stressful (Cohen et al., 1983). Individuals select how frequently they experienced ten stress-related scale items within the last month (never, almost never, sometimes, fairly often, very often). Taken together, these responses yield scores from 0 to 40. Unlike the HSCL-10, the PSS-10 does not measure psychiatric symptomology; however, given that stress is often antecedent to psychiatric disorders, high PSS-10 scores may indicate individuals at risk for such disorders (Cohen et al., 1983).

3.12 Visual tools for Likert scales

We adapted the method used by Kohrt et al. (2011) in Nepal to ensure that interviewers were not left to interpret responses to Likert questions (mental health questions). Participants were shown a drawing of water-filled cups arranged in a line. Each successive cup depicted an increasing amount of water and corresponded to a point on the Likert scale. Participants pointed to the appropriate cup in addition to answering verbally.

3.13 Dietary recall

The 31 foods in the prestige scale were included in a dietary recall tool. We asked participants how recently they had eaten each food: today/yesterday, 2 days prior, last week, last month, last 2-3 months, more than 3 months, never. These timeframes were those most commonly given during pilot work. Where participants gave alternative answers, their responses were recorded using the set timeframes. These timeframes were coded from 6 (today/yesterday) to 0 (never).

3.14 Statistical analyses

We calculated food prestige scores by multiplying the timeframe within which each food was most recently eaten (0-6) by its point value (i.e., total "wins" across five paired comparison questionnaires). Higher scores indicate more recent consumption of more prestigious foods. Raw prestige scores were scaled separately among parents and among adolescents (mean=0, sd=1).[50]

The wealth index was created from the factor loadings on the first dimension of a multiple correspondence analysis (MCA) conducted on a list of household goods and living conditions. Households owning an item or exhibiting a particular condition were awarded the point value of

[50]Chapter 3 shows that the relationship between preference and prestige is not the same for parents and adolescents. Thus, these social categories heavily influence individual affinities for particular items. Separating analyses by generation ensures that the reference group against which we measure individual deprivation is a more salient one.

the relevant factor loading, and these were summed. This sum is a household's wealth index score. Higher scores suggest greater wealth. The wealth index was scaled (mean=0, sd=1).

Five individuals had missing answers to one FIES question. Values were imputed following Bickel et al. (2000), wherein individuals are marked as saying "yes" to missing questions if they answered affirmatively to an item considered more severe. There were 6 and 24 missing, single-item responses to the HSCL-10 and PSS-10, respectively. These were addressed with individual means imputation.

Cronbach's alpha was used to assess the internal reliability of the HSCL-10 and PSS-10. A Cronbach's alpha above 0.7 is ideal. Rasch-model fit statistics and the Rasch-model reliability statistic were used to assess the FIES. Infit statistics measure how sharply each scale item discriminates compared to others. Items having infit statistics below 1 discriminate more sharply than average, whereas items having infit statistics greater than 1 discriminate less sharply. Ideal infit statistics fall between 0.8 and 1.2, with a target outer range of 0.7 to 1.3. Cronbach's alpha and Rasch-model fit statistics were calculated before missing value imputation.

Frequencies and percentages were calculated for categorical variables, while means and standard deviations were calculated for continuous variables. Differences between adults and adolescents, mothers and fathers, and boys and girls were assessed with chi-squared tests, Fisher's exact tests, and independent t-tests. Pearson correlation coefficients were calculated between the prestige score and all anthropometric and wealth-related variables. All bivariate significance tests were two-sided.

Adolescent BMI-for-age and height-for-age z-scores were calculated using the WHO AnthroPlus macro for R. Adolescents with BMI-for-age z-scores or height-for-age z-scores 2 or more standard deviations below the mean of the age- and sex-matched reference population were

considered underweight or stunted, respectively. Adults were marked underweight if their BMI fell below 18.5 and overweight if their BMI exceeded 24.9. Two individuals with missing BMI data and seven with missing SFT data were assigned the sample mean for their participant type. To facilitate analysis, the raw BMI scores were scaled within participant type (mean=0, sd=1).

Associations between food insecurity and either the HSCL-10 or PSS-10 were tested in the full sample while controlling for urbanicity, age, sex, wealth, water insecurity, BMI, and the household head's education level. These associations were also tested separately by participant type, but otherwise using the same model specifications. The prestige score was then added to these models to assess its strength as a mediator. In all cases, mixed effects models were also run; these included the aforementioned fixed effects as well as random intercepts for slum and household membership. However, inclusion of slum and household level random intercepts did not affect the overall qualitative interpretation. As such, and to avoid overfitting, the results from the simple linear regressions are presented. The residuals for the HSCL-10 model violated assumptions of normality; therefore, the HSCL-10 was log transformed. PSS residuals exhibited normality without transformation. Finally, the equality of prestige score regression coefficients was tested in a pairwise fashion between all participant types using the formula outlined by Paternoster et al. (1998). This was done for both the HSCL-10 and PSS-10.

4. Results

4.1 Saliency

In general, the most salient foods from each of the 8 subdomains were selected for inclusion in the paired comparisons (Table 1). Banana, apple and pomegranate were selected from the fruit category. Pea, tomato, potato, and cauliflower were selected from the vegetable category. Despite higher salience, okra was not in season during the cross-sectional survey and thus not selected.

Moong dal was selected from the pulses subdomain. Almond, *rasgulla*, chocolate, and cake were selected from the sweets subdomain. Cashew was not selected because it is too similar to almond in view of ensuring variety. Similarly, *rasgulla*, and *gulab jamun* are analogous sweets, so the more salient of the two was selected (*rasgulla*). *Paneer*, *ghee*, *dahi*, egg, goat, and fish were selected from the animal products category. *Kheer* is a sweet as well as an animal product; to avoid including too many sweets, *kheer* was not selected. Several types of milk were moderately salient in both the animal products and beverages subdomains. For this reason, all milk products were collapsed into one item (milk) and included as a beverage. Coconut water, packaged juice, milk, and cold drinks were selected from the beverages subdomain. Burger, *samosa*, pizza, *pani puri*, and *dal bati churma* were selected from the outside home subdomain. *Dal bati churma* was selected over maggi because *dal bati churma* is strongly associated with local Rajasthani cuisine. Rice, *double roti*, toast (rusk), and *roti* were selected from the cereals subdomain. Wheat flour was not chosen because it is the primary ingredient in *roti*, and this would have led to a nearly complete overlap in consumption.

Table 1. The most prestigious foods from 8 pre-determined subdomains (n=80). 31 foods were selected for ranking and inclusion in the dietary recall tool. In general, the most salient items were selected. Highlighted foods were included in the prestige scale.

Fruits	Frequency	Salience	Vegetables	Frequency	Salience	Animal products	Frequency	Salience
Pomegranate	61	0.589	Okra[b]	31	0.268	Paneer	44	0.374
Apple	60	0.562	Pea	30	0.209	Ghee	40	0.328
Banana	37	0.274	Tomato	22	0.178	Dahi	34	0.254
Grape	33	0.23	Potato	23	0.172	Egg	35	0.25
Watermelon	26	0.166	Cauliflower	22	0.172	Kheer[f]	29	0.21
Papaya	25	0.149	Bitter gourd	20	0.163	Cow milk[g]	25	0.2
						Goat meat	26	0.199
						Buffalo milk[h]	27	0.197
						Fish	29	0.181
						Packaged milk[i]	18	0.151
Pulses/legumes	**Frequency**	**Salience**	**Sweets, etc.**	**Frequency**	**Salience**	**Outside home foods**	**Frequency**	**Salience**
Moong dal	64	0.6	Almond	60	0.539	Burger	41	0.352
Chane ki dal	59	0.463	Cashew[c]	42	0.343	Samosa	34	0.279
Rajma	44	0.39	Rasgulla	41	0.343	Pizza	25	0.242
Kabuli chana	49	0.374	Gulab jamun [d]	32	0.248	Patasi	27	0.241
Urad dal	40	0.261	Cake	29	0.188	Maggi [j]	22	0.18
Chana	43	0.245	Chocolate	25	0.187	Dal bati churma	20	0.163
Beverages	**Frequency**	**Salience**	**Cereals**	**Frequency**	**Salience**	**Spices**	**Frequency**	**Salience**
Coconut water	53	0.415	Basmati rice	38	0.336	Cardamom	43	0.349
Chai (tea)[a]	40	0.317	Double roti	41	0.311	Ginger	46	0.336
Packaged juice	40	0.262	Wheat flour[e]	33	0.293	Whole black pepper	39	0.325
Packaged milk	31	0.253	Toast	43	0.267	Saffron	30	0.297
Cold drink	31	0.242	Roti	30	0.257	Coriander leaves	34	0.242
Nimbu pani	36	0.226	Paratha	38	0.251			

a. Chai was frequently offered to the research team. As such, our presence influenced its consumption by respondents.
b. Okra was not in season for the entirety of the cross-sectional survey, arbitrarily giving some households an "advantage" in the recall tool.
c. Almonds and cashews are very similar. The contexts in which they are consumed are effectively identical.
d. Rasgulla and gulab jamun are very similar. The contexts in which they are consumed are effectively identical.
e. Wheat flour is the primary ingredient of wheat-based roti. Thus, these items are generally redundant.

f. We already intended to include 6 items from the animal products category—3 vegetarian and 3 non-vegetarian. Kheer fell just outside the three most salient/prestigious vegetarian animal products.
g. The image presented was 'fresh cow milk.' However, as packaged cow milk was selected in the beverage category, fresh cow milk was not included so as to limit the number of beverages and allow for other animal products to be selected.
h. Buffalo milk was not selected to avoid confusion with 'packaged milk' during paired comparisons.
i. Packaged milk was included, but counted as a selection from the beverage category.
j. Dal bati churma is a dish very strongly associated with traditional Rajasthani cuisine. It was also one of the few items free listed multiple times as a 'prestigious' food during pilot work (without prompting via the mats as visual aids). The author felt that including dal bati churma would provide a more interesting point of analysis than including maggi.

4.2 Consensus analysis

Following consensus analysis, the ratio of the first to the second eigenvalue was greater than 4:1 for each paired comparison questionnaire (4.288; 5.711; 9.160; 7.837; 4.724). A ratio of 3:1 or greater is evidence of a single cultural model, with 4:1 or greater being ideal (Weller, 2007). The five most prestigious foods identified by summing the "wins" across all questionnaires were almond, pomegranate, cake, pizza and apple (Figure 1). The five least prestigious were tomato, potato, toast, cauliflower and *moong dal*.

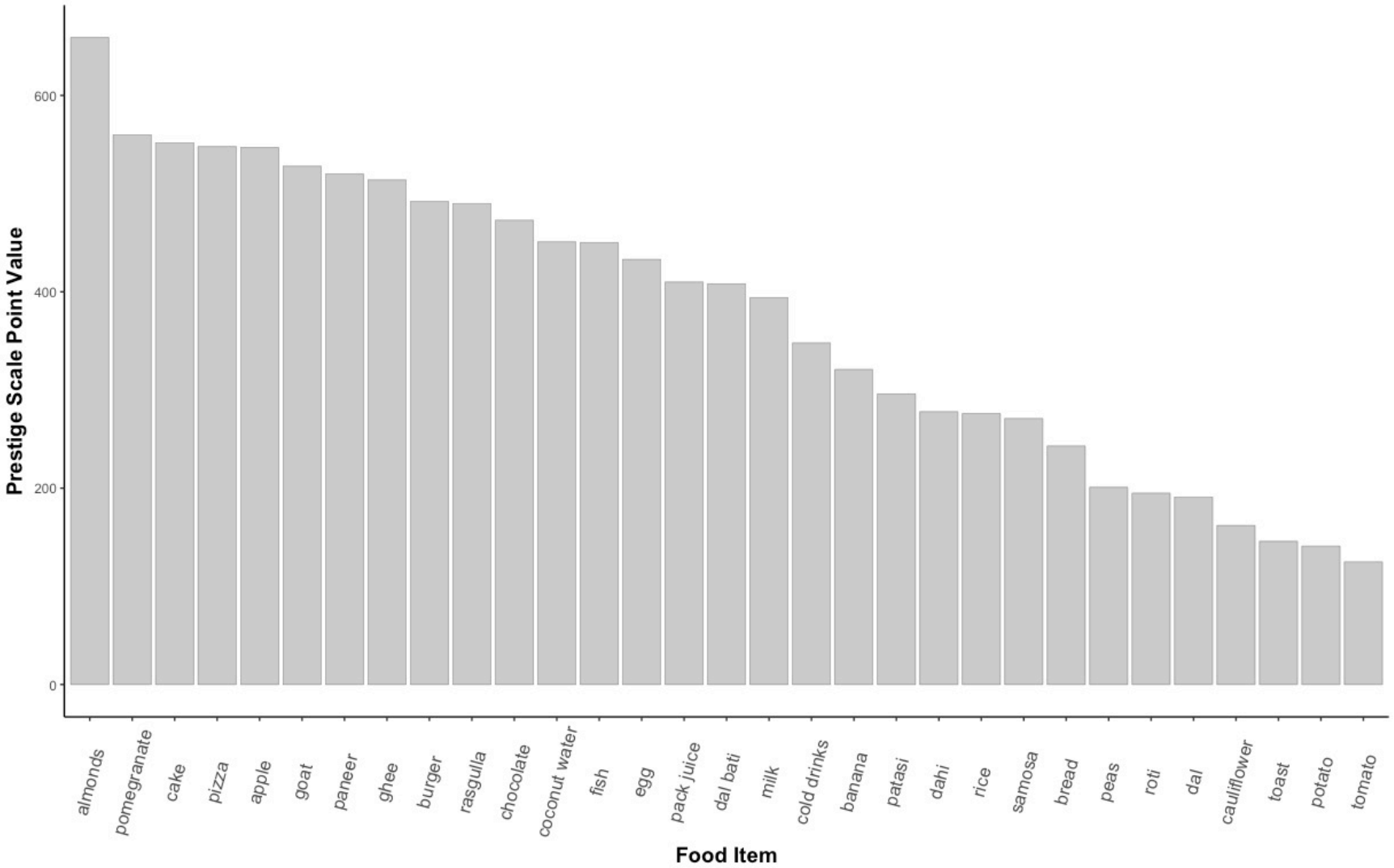

Figure 1. Point values for items in the food prestige scale. Point values are the number of times each food was selected as most prestigious by participants (n=125) during paired comparisons.

4.3 Scale statistics

Cronbach's alpha was 0.88 for the HSCL-10 and 0.74 for the PSS-10, suggesting good internal reliability for both. Notably, however, the PSS-10 did not perform as well in adolescents as in adults. Considered separately, Cronbach's alpha for the PSS-10 in adolescents was only 0.63, which is below the accepted cutoff of 0.7. Moreover, two scale items were negatively correlated. As such, PSS-10 results are not presented for adolescents.

Rasch-model infit statistics for the FIES ranged from 0.66 to 1.37. This falls slightly outside the target range (0.7 to 1.3). However, the Rasch-model ordering for item severity was the same as suggested by the FAO (Ballard et al., 2013). When considering infit statistics as a function of item severity, the three least severe items discriminate less sharply than the rest of the scale, and, consequently, the remaining items discriminate more sharply. This pattern matches that observed by Sethi et al. (2017) in their review of experienced-based food insecurity measures in India: items assessing less severe experiences have less satisfactory infit statistics in Indian samples.

4.4 Descriptive statistics

The final sample included fathers (n=167), mothers (n=187), boys (n=148), and girls (n=148) from 194 households (Table 1). Approximately two-thirds of the sample reported some food insecurity, with 37% experiencing mild levels, 14% experiencing moderate levels, and 15% experiencing severe levels. Mean HSCL-10 and PSS-10 scores were 8.1 (sd=6.9; adults and adolescents) and 16.2 (sd=7.6; adults only), respectively. Taken together, 23% of the sample was underweight and 13% was overweight. For adults, 66% had no education, 25% had a primary education, 8% had a secondary education, and 1% had completed at least some college. Approximately 11% of participants were Muslim while the rest were Hindu; however, given that

around 85% of Muslim households in the sample were resident in a single slum, religion is not included in further analyses because it ultimately assesses slum membership rather than religious difference.

4.5 Bivariate statistics

The difference in food insecurity severity between adults and adolescents was significant ($p<.001$) as was the difference between mothers and fathers ($p<.001$) and between boys and girls ($p<.001$) (Table 1). Mothers had significantly higher mean HSCL-10 ($p<.001$) and PSS-10 ($p<.001$) scores than fathers. Girls had significantly higher mean HSCL-10 scores ($p=.009$) than boys. There were significant differences in education between mothers and fathers ($p<.001$), and some evidence for a difference between boys and girls ($p=.089$). Mothers differed significantly from fathers in weight status ($p=.022$) as did girls and boys ($p=.001$). Adolescents had significantly higher food prestige scores than parents ($p<.001$), but there were no significant differences between genders when considering food prestige scores within age classes (mothers and fathers, $p=.156$; boys and girls, $p=.456$).

There were significant, negative correlations between prestige score and food insecurity across all participant types (fathers $r=-0.438$, $p<.001$; mothers r=--0.265, $p<.001$; boys $r=-0.175$, $p<.05$; girls r-0.261, $p<.01$) (Table 3, A&B). Correlations between prestige score and wealth-related variables were not consistently significant across participant types; however, the wealth index and prestige score exhibited a significant positive relationship in all cases (fathers $r=0.274$, $p<.001$; mothers $r=0.286$, $p<.001$; girls $r=0.282$, $p<.001$) except for boys, for whom there was a positive trend (boys $r=0.159$, $p<.10$). Prestige scores were not significantly associated with BMI or SFT in boys or fathers. In mothers but not girls, higher prestige scores predicted higher BMIs

(0.203, p<.01). The association between prestige score and SFT fell above p<.10 level in both mothers (0.128) and girls (r=0.148).

Table 2. Descriptive and bivariate statistics for variables in the multilevel models.

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
Age										
Min	13	20	13		22	20		13	13	
Max	70	70	17		70	60		17	17	
Mean(sd)	29.0 (14.6)	40.8 (8.9)	14.8 (1.5)		43.7 (9.4)	38.3 (7.7)		14.9 (1.4)	14.8 (1.5)	
Sex				p=.523						
Male	315 (48%)	167 (47%)	148 (50%)		167 (100%)	0 (0%)		148 (100%)	0 (0%)	
Female	335 (52%)	187 (53%)	148 (50%)		0 (0%)	187 (100%)		0 (0%)	148 (100%)	
Urban				p=.532			p=.951			p=.347
Peri-urban	154 (24%)	80 (23%)	74 (25%)		37 (22%)	43 (23%)		33 (22%)	41 (28%)	
Urban	496 (76%)	274 (77%)	222 (75%)		130 (78%)	144 (77%)		115 (78%)	107 (72%)	
Food Insecurity				p<.001				p<.001		
None	225 (35%)	90 (25%)	135 (46%)		57 (34%)	33 (18%)		71 (48%)	64 (43%)	
Mild	238 (37%)	123 (35%)	115 (39%)		62 (37%)	61 (33%)		66 (45%)	49 (33%)	
Moderate	90 (14%)	60 (17%)	30 (10%)		30 (18%)	30 (16%)		10 (7%)	20 (14%)	
Severe	97 (15%)	81 (23%)	16 (5%)		18 (11%)	63 (34%)		1 (1%)	15 (10%)	
Water Insecurity				p<.001				p<.001		
None	394 (61%)	196 (55%)	198 (67%)		111 (66%)	85 (45%)		113 (76%)	85 (57%)	
Moderate	140 (22%)	76 (21%)	64 (22%)		25 (15%)	51 (27%)		27 (18%)	37 (25%)	
Severe	116 (18%)	82 (23%)	34 (11%)		31 (19%)	51 (27%)		8 (5%)	26 (18%)	

	All (n=650)	Adults (n=354)	Adolescents (n=296)	p-value	Fathers (n=167)	Mothers (n=187)	p-value	Boys (n=148)	Girls (n=148)	p-value
HSCl-10				p<.001			p<.001			p=.009
Min	0	0	0		0	0		0	0	
Max	28.0	28.0	26.0		28.0	28.0		21.1	26.0	
Mean(sd)	8.1 (6.9)	10.0 (7.2)	5.8 (5.6)		6.8 (5.9)	12.8 (7.1)		4.9 (5.0)	6.7 (6.1)	
PSS-10							p<.001			
Min		0			0	0				
Max		36			36	36				
Mean(sd)		16.2 (7.6)			13.6 (6.7)	18.6 (7.6)				
Education				p<.001			p<.001			p=.089
None	313 (48%)	233 (66%)	80 (27%)		87 (52%)	146 (78%)		32 (22%)	48 (32%)	
Primary	244 (38%)	89 (25%)	155 (52%)		55 (33%)	34 (18%)		87 (59%)	68 (46%)	
Secondary	89 (14%)	30 (8%)	59 (20%)		23 (14%)	7 (4%)		28 (19%)	31 (21%)	
Higher	4 (1%)	2 (1%)	2 (1%)		2 (1%)	0 (0%)		1 (1%)	1 (1%)	

Table 3. (A) Pearson correlation coefficients between food prestige, wealth-related and anthropometric variables.

FATHERS	HH Wealth Index	HH Income	HH Food Expenditure	Food Insecurity[a]	Prestige Scale	Body Mass Index
HH Wealth Index	1					
HH Income	0.317***	1				
HH Food Expenditure	0.091	0.229**	1			
Food Insecurity[a]	-0.374***	-0.379***	-0.123	1		
Prestige Scale	0.274***	0.238**	0.132^{+}	-0.438***	1	
Body Mass Index	0.151^{+}	-0.095	-0.037	0.017	0.084	1
Skin-fold Thickness	0.239**	-0.044	-0.056	-0.031	0.037	0.660***
MOTHERS	HH Wealth Index	HH Income	HH Food Expenditure	Food Insecurity[a]	Prestige Scale	Body Mass Index
HH Wealth Index	1					
HH Income	0.351***	1				
HH Food Expenditure	0.106	0.241***	1			
Food Insecurity[a]	-0.518***	-0.261***	-0.061	1		
Prestige Scale	0.286***	0.085	0.038	-0.265***	1	
Body Mass Index	0.344***	0.046	0.187*	-0.138^{+}	0.203**	1
Skin-fold Thickness	0.219**	-0.054	0.134	-0.091	0.128^{+}	0.624***

Note: [a]Quasi-continuous (0 to 8). $^{+}$p<.1; *p<005; **p<.01; ***p<.001

Table 3. (B) Pearson correlation coefficients between food prestige, wealth-related and anthropometric variables.

BOYS	HH Wealth Index	HH Income	HH Food Expenditure	Food Insecurity[a]	Prestige Scale	Body Mass Index	Skin-fold Thickness
HH Wealth Index	1						
HH Income	0.333***	1					
HH Food Expenditure	0.009	0.071	1				
Food Insecurity[a]	-0.206*	-0.051	0.181*	1			
Prestige Scale	0.159^{+}	0.059	-0.115	-0.175*	1		
Body Mass Index	0.064	0.084	-0.030	0.017	-0.040	1	
Skin-fold Thickness	0.137^{+}	0.002	-0.078	-0.031	0.078	0.203**	1
Height-Age z-scores	0.093	0.048	-0.123	-0.040	0.00002	0.128^{+}	0.198*
GIRLS	HH Wealth Index	HH Income	HH Food Expenditure	Food Insecurity[a]	Prestige Scale	Body Mass Index	Skin-fold Thickness
HH Wealth Index	1						
HH Income	0.319***	1					
HH Food Expenditure	0.156^{+}	0.314***	1				
Food Insecurity[a]	-0.454***	-0.141^{+}	-0.044	1			
Prestige Scale	0.282***	0.100	-0.012	-0.261**	1		
Body Mass Index	0.101	0.113	0.150^{+}	0.0005	0.060	1	
Skin-fold Thickness	0.092	0.073	0.004	-0.096	0.148^{+}	0.709***	1
Height-Age z-scores	-0.075	-0.046	-0.157^{+}	0.101	0.132	-0.128	0.072

Note: [a]Quasi-continuous (0 to 8). $^{+}$p<.1; *p<005; **p<.01; ***p<.001

4.6 Multivariate statistics

In a multilevel model controlling for urbanicity, age, sex, wealth, and the household head's education level, moderate-severe food insecurity was significantly associated with higher HSCL-10 scores (b=0.324, p<.001) (Table 4). When prestige score was added, the coefficient for food insecurity remained significant (b=0.302, p<.001), while prestige score exhibited a significant negative correlation (b=-0.062, p<.001). In separate models parsed by participant type, prestige score was significantly associated with the HSCL-10 in parents (fathers b=-0.068, p<.01; mothers b=-0.121) but not adolescents. However, the p-value for the relationship between prestige score and psychological distress in boys was fairly low (boys p=0.093; girls p=0.216). After dropping non-vegetarian foods from the prestige scale (goat, fish, eggs), the relationship between dietary prestige and the HSCL-10 fell below .05 in boys but remained large among girls (not shown in tables). BMI was not significantly associated with the HSCL-10 for any participant type except girls, for whom it was negatively correlated (b=-0.054, p<.05).

In a multilevel model controlling for urbanicity, age, sex, wealth, and the household head's education level, moderate-severe food insecurity predicted higher PSS-10 scores (b=5.979, p<.001) while BMI was not significantly associated (Table 5). When prestige score was added, it exhibited a negative correlation with the PSS-10 (-2.099, p<.001); food insecurity remained a significant predictor (b=5.035, p<.001). When considering fathers and mothers separately, both food insecurity (fathers b=4.517, p<.001; mothers b=5.368, p<.001) and prestige score (fathers b=-1.628, p<.01; mothers b=-2.4845, p<.001) were significant predictors of the PSS-10, while BMI was not significant for either participant type.

Prestige score regression coefficients were not significantly different between mothers and fathers (z=1.702, p=0.089) in models predicting the HSCL-10. There was also no significant

difference in prestige score regression coefficients between mothers and fathers (z=1.172, p=.241) in models predicting the PSS-10.

Table 4. Simple linear models predicting log-transformed HSCL-10 scores.

	Full Sample		Fathers		Mothers		Boys		Girls	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Intercept	2.653***	2.629***	2.469***	2.518***	2.886***	2.891***	2.644***	2.668***	1.942***	1.958***
	(0.033)	(0.033)	(0.109)	(0.107)	(0.120)	(0.110)	(0.245)	(0.244)	(0.248)	(0.250)
Male	-0.139***	-0.138***								
	(0.022)	(0.022)								
Age	0.004***	0.004***	0.004	0.002	0.001	-0.001	-0.004	-0.007	0.047**	0.045**
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.016)	(0.016)	(0.016)	(0.016)
Urban	0.047	0.081**	0.108*	0.113*	-0.010	0.076	0.044	0.078	0.038	0.046
	(0.025)	(0.025)	(0.049)	(0.047)	(0.051)	(0.049)	(0.052)	(0.054)	(0.053)	(0.055)
Wealth index	-0.087**	-0.074**	-0.063	-0.046	-0.139*	-0.102	-0.144*	-0.133*	-0.009	-0.005
	(0.028)	(0.028)	(0.053)	(0.052)	(0.058)	(0.053)	(0.057)	(0.057)	(0.061)	(0.062)
Primary education[a]	0.062*	0.073**	-0.034	-0.015	0.090	0.098*	0.092	0.096*	0.096	0.098
	(0.025)	(0.024)	(0.047)	(0.046)	(0.049)	(0.045)	(0.049)	(0.049)	(0.054)	(0.054)
Secondary education[a]	0.019	0.053	-0.040	0.007	0.030	0.096	0.094	0.105	-0.017	-0.009
	(0.035)	(0.034)	(0.065)	(0.066)	(0.070)	(0.065)	(0.069)	(0.069)	(0.073)	(0.074)
Food insecurity[b]	0.324***	0.302***	0.325***	0.276***	0.261***	0.228***	0.447***	0.447***	0.312***	0.307***
	(0.027)	(0.026)	(0.050)	(0.051)	(0.048)	(0.044)	(0.083)	(0.082)	(0.056)	(0.056)
Moderate water insecurity	0.111***	0.103***	0.134*	0.108	0.085	0.060	0.094	0.095	0.132*	0.131*
	(0.027)	(0.026)	(0.057)	(0.056)	(0.051)	(0.047)	(0.057)	(0.057)	(0.052)	(0.052)
Severe water insecurity	0.091**	0.094**	0.139*	0.144*	0.078	0.088	0.008	-0.001	0.131*	0.132*
	(0.030)	(0.030)	(0.057)	(0.056)	(0.053)	(0.048)	(0.094)	(0.094)	(0.061)	(0.061)
BMI[c]	-0.021*	-0.019	-0.006	-0.005	-0.020	-0.011	-0.022	-0.020	-0.055*	-0.054*
	(0.011)	(0.010)	(0.020)	(0.020)	(0.022)	(0.020)	(0.024)	(0.023)	(0.024)	(0.024)
Prestige Score[d]		-0.062***		-0.068**		-0.121***		-0.040		-0.015
		(0.011)		(0.023)		(0.021)		(0.022)		(0.025)
Observations	650	650	167	167	187	187	148	148	148	148
R^2	0.416	0.443	0.383	0.415	0.304	0.418	0.257	0.276	0.362	0.364

Note: [a]Household head education level [c]Scaled within participant type *p<.05; **p<.01; ***p<.001
[b]Moderate and severe (FIES 4-8) [d]Scaled separately within parents and within adolescents (mean=0, sd=1)

Table 5. Simple linear models predicting PSS-10 scores.

	Full Sample		Fathers		Mothers	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	15.832***	16.591***	9.551***	10.732***	19.230***	19.333***
	(1.807)	(1.728)	(2.547)	(2.517)	(2.783)	(2.604)
Male	-3.346***	-3.535***				
	(0.722)	(0.689)				
Age	-0.034	-0.064	0.015	-0.013	-0.102	-0.135*
	(0.040)	(0.038)	(0.051)	(0.050)	(0.063)	(0.060)
Urban	0.749	1.663*	1.832	1.962	-0.185	1.596
	(0.810)	(0.788)	(1.139)	(1.112)	(1.182)	(1.159)
Wealth index	-2.660**	-2.121*	-1.634	-1.236	-3.798**	-3.038*
	(0.911)	(0.873)	(1.250)	(1.227)	(1.344)	(1.266)
Primary education[a]	0.786	1.155	0.567	1.030	0.911	1.084
	(0.782)	(0.748)	(1.092)	(1.077)	(1.127)	(1.055)
Secondary education[a]	-1.162	0.122	-1.738	-0.609	-0.827	0.534
	(1.108)	(1.078)	(1.529)	(1.539)	(1.617)	(1.536)
Food insecurity[b]	5.979***	5.035***	5.684***	4.517***	6.053***	5.368***
	(0.792)	(0.772)	(1.168)	(1.204)	(1.111)	(1.049)
Moderate water insecurity	0.918	0.426	1.697	1.054	0.490	-0.043
	(0.859)	(0.823)	(1.326)	(1.312)	(1.180)	(1.109)
Severe water insecurity	0.642	0.789	1.016	1.124	0.434	0.644
	(0.891)	(0.850)	(1.347)	(1.315)	(1.222)	(1.144)
BMI[d]	-0.316	-0.202	-0.329	-0.313	-0.008	0.171
	(0.345)	(0.330)	(0.476)	(0.465)	(0.515)	(0.483)
Prestige Score[c]		-2.099***		-1.628**		-2.484***
		(0.353)		(0.545)		(0.486)
Observations	354	354	167	167	187	187
R^2	0.338	0.399	0.209	0.247	0.292	0.380

Note: [a]Household head education *p<.05; **p<.01; ***p<.001
[b]Moderate and severe (FIES 4-8)
[c]Scaled separately within parents and within adolescents (mean=0, sd=1)
[d]Scaled within participant type (mean=0, sd=1)

5. Discussion

This study tested the hypothesis that prestigious food consumption predicts mental health outcomes in a food insecure population. More specifically, prestigious food consumption was hypothesized to assess consonance with cultural models about diet. Alternatively, prestigious food consumption might act as a local status marker against which social comparisons are made, such that lower prestige scores indicate higher relative deprivation. Low consonance and high relative deprivation could, in turn, precipitate higher self-reported anxiety, depression, and stress (Dressler and Bindon, 2000; Marmot, 2004).

Results suggest that prestigious food consumption does indeed predict measures of anxiety, depression, and psychosocial stress. Controlling for relevant covariates, higher prestigious food consumption predicted lower scores on both the HSCL-10 and PSS-10. However, when participants were parsed by age and gender, the relationship between food prestige and mental health remained for parents only. No significant association existed between food prestige and the HSCL-10 when considering girls or boys alone.

Second, this study tested the hypothesis that anthropometric indicators predict mental health outcomes. Malnutrition, particularly of micronutrients, predicts depression (Bodnar and Wisner 2005). The coping mechanisms associated with food insecurity, namely a reduction in the quantity or quality of foods consumed, could lead to such deficiencies (Hadley and Crooks, 2012). Anthropometric indicators like BMI do not directly measure micronutrient deficiencies, but micronutrient deficiencies are likely common in individuals exhibiting anthropometric markers of protein-energy malnutrition.

Yet anthropometric indicators were not consistently associated with mental health outcomes.[51] In the full model examining all participant types, BMI was not predictive of the HSCL-10 or PSS-10. However, BMI was significantly associated with the HSCL-10 when considering girls alone.

Third, this study examined whether prestigious food consumption mediates the relationship between food insecurity and mental health. Given that coping mechanisms associated with food insecurity yield changes in food quality, quantity, and variety (Hadley and Crooks, 2012), reductions in prestigious food consumption also are likely. Indeed, the ability to eat "preferred foods" is specifically asked about in the FIES. As such, any mediation of the food insecurity—mental health relationship by food prestige could indicate that food prestige represents a more precise operationalization of the dietary limitations asked about in the FIES.

The evidence for this hypothesis is mixed; the coefficients relating food insecurity to mental health marginally decrease for parents when food prestige is added to the models, with the effect size reduction ranging from around 11% to 21%. However, it is not clear whether this change reflects true mediation by the prestige score or, alternatively, a confounding between the mediator and an unidentified SES variable. This is particularly true given the relatively small percentage drops in coefficient size as well as the theoretical correlations between the prestige score and SES, for which there is some evidence in the bivariate correlations (i.e., associations with wealth index).

In light of its limited strength as a mediator, the predictive power of the prestige score suggests that it taps an underlying construct beyond food preference, variety, or quality as these are all asked about in the FIES. Indeed, previous analyses with this sample suggest that food prestige and popularity are not correlated in parents (Chapter 3). Moreover, an analysis of the foods

[51]SFT, MUAC, and height-for-age z-scores (scaled within participant types) were also not significant mental health predictors.

contained within the prestige scale ands participants' variable familiarity with some of the highest status items suggests that a certain amount of cultural capital is required to achieve top prestige scores (Chapter 3). Thus, the prestige scale may not substantially mediate the food insecurity—mental health relationship in parents because it measures class status and social position more so than food insecurity. And, indeed, the coefficients relating the wealth index to HSCL-10 scores in mothers and the wealth index to PSS-10 scores in fathers were rendered non-significant when dietary prestige was added to those models.

Alternatively, it might be presumed that the lack of a relationship between food prestige and mental health in adolescents occurs because the FIES includes questions regarding food preference; other analyses with this dataset show that food prestige and preference are correlated in both boys and girls (Chapter 3). That is, the FIES question regarding preference might already account for all variation in HSCL-10 scores that prestigious food consumption would otherwise explain. However, even when food insecurity is dropped from the models, food prestige still exhibits a nonsignificant association with psychological distress in both boys and girls (boys $p=0.093$; girls $p=0.216$). On the other hand, after removing non-vegetarian foods from the prestige scale (fish, goat, eggs), the p-value for the association dropped below .05 in boys. It is not entirely clear why altering the scale in this way offers stronger evidence for the proposed relationship, but the impetus for this change stems from the religious dietary restrictions practiced by some Hindus. It is possible that class-dependent differences in the likelihood that Hindus follow a vegetarian diet account for the observed pattern. That use of a vegetarian prestige scale did not provide strong evidence for a relationship in girls may reflect gendered differences in the consumption of non-vegetarian foods (Chapter 3) or some more complicated interaction between gender, class, age, and religious dietary norms.

Fourth, this study tested the hypothesis that relationships between prestigious food consumption and mental health vary among fathers, mothers, boys, and girls. Disparities in intra-household resource allocation are common in South Asia, and there is some evidence that women and girls are disadvantaged compared to men and boys when it comes to food allocation, specifically (Miller, 1997; Harris-Fry et al., 2017; Haddad et al., 1996). Thus, women and girls might be the first to experience reductions in prestigious food consumption where resources are scarce. And, indeed, both FIES scores (Chapter 1 – Maxfield, 2019) and prestigious food consumption (Chapter 3) were found to vary by age and gender in this sample. In particular, girls had significantly lower food prestige scores than boys.[52,53] This state of affairs could, in turn, boost the salience of food prestige as a marker of relative deprivation among girls.

The evidence for this hypothesis is mixed. Prestigious food consumption was not a predictor of mental health outcomes in girls. Evidence for the relationship in boys was stronger but still rather tenuous; a more convincing result in boys was obtained following post-hoc manipulations of the prestige scale, but this a somewhat suspect approach. Moreover, there was no significant difference in prestige score coefficients between mothers and fathers in models predicting PSS-10 scores. And there was only marginal evidence that the prestige score coefficient predicted HSCL-10 scores more strongly in mothers compared to fathers (i.e., $p<.1$). Thus, slight differences in food preference between the genders could underlie these patterns.

Though not an explicit *a priori* hypothesis, it is somewhat surprising that prestigious food consumption and average food expenditure per household member (>5 years old) did not exhibit significant bivariate correlations. Similarly, average food expenditure did not predict mental health outcomes, while prestigious food consumption did. Barring errors in expenditure estimates, two

[52] Note: Intrahousehold gender comparisons in adolescents were restricted to n=46 (Chapter 3).
[53] Mothers and fathers had statistically similar food prestige scores (Chapter 3).

explanations might account for these results. First, individual reports of prestigious food consumption might reflect intrahousehold food allocation disparities, while per person expenditure averages do not. Second, dietary recalls are notoriously inaccurate (Day et al., 2001); the timeframes used in this study were even more retrospective than standard, such that individual recalls would be unlikely to match actual per person expenditures were those available. However, whereas dietary recall inaccuracies detract from the validity of findings about nutritional difference, this study sought to examine reported food consumption as a marker of *perceived* dietary inequality. In other words, it matters less what people actually eat and more how they view their consumption relative to others.

Finally, it could be argued that the prestige scale is associated with mental health outcomes because it dovetails with measures of dietary diversity or quality, and thus nutritional status. Although results are mixed, studies have found associations between particular dietary patterns and depression, anxiety, or stress (Quirk et al., 2013). For example, fish and other seafood items are often singled out as protective against depression due to their high omega-3 fatty acid contents (Grosso et al., 2016). As fish was included in the prestige scale described here, it is thus possible that a high prestige score evaluates disparities in omega-3 fatty acid consumption. Similar reasoning could be extended to the other scale items in that their cumulative nutritional impact is what actually underlies the relationships observed between prestigious food consumption, the HSCL-10, and PSS-10.

However, in view of the results from Chapter 3, it could alternatively be argued that nutrition researchers misjudge what dietary quality measures actually estimate. Chapter 3 demonstrated a tight relationship between a food's prestige and the proportion of people having eaten it within a given timeframe (Chapter 3; Figure 2). The correlation between prestige and

consumption was strongest at 1 week, a coincidentally common recall period for tools assessing dietary quality. This suggests that survey-based measures of dietary quality may be as likely to gauge class status and relative deprivation as they are to assess nutritional difference. Moreover, this would help explain conflicting results from the literature regarding the association between depression and specific foods like fish (Albanese et al., 2015). As the prestige of a given item varies across contexts (or between genders and age groups), so too might its predictive power for mental health fluctuate.

5. Limitations

This study's primary limitation was its commencement shortly after the Indian government's attempt to combat "black money" via demonetization—that is, voiding the two highest denomination notes as legal tender (equivalent to $7.50 and $15 USD). This created cash supply shortages throughout India, the everyday effects of which persisted for several months. As a result, slum households with an otherwise strong SES were cash-strapped and, consequently, may have experienced higher symptoms of psychological distress. This event could explain why standard SES measures did not consistently predict mental health outcomes in this sample.[54] Similarly, the difficulties experienced in purchasing everyday items or in receiving cash wages may have led individuals to adopt food-related coping mechanisms in which they would not otherwise normally engage. This could yield higher overall food insecurity or lower prestigious food consumption than normally exists. Finally, demonetization could have introduced a time bias into the sample—households interviewed early in the survey faced demonetization-related cash shortages closer to data collection than those interviewed later.

6. Conclusion

[54]Total household income, average income per member, average food expenditure per member, and ration card status were also not significant mental health predictors.

The results reported here are only marginally consistent with the hypothesis that dietary prestige mediates the association between food insecurity and mental health. The relative importance that psychosocial and nutritional pathways have in linking food insecurity to mental wellbeing remains unclear. Substantially more research is needed that tests these competing ideas.

That prestigious food consumption was nonetheless associated with HSCL-10 and PSS-10 scores could reflect the links between dietary prestige and social class; obtaining a high food prestige score requires not only financial means but an inclination toward luxury foods and knowledge regarding which foods are high status. Given that these associations were present in adults despite controlling for wealth, energy undernutrition, and food insecurity, this paper offers additional evidence for the idea that locally relevant symbolic status markers like food are worth considering during discussions on the psychosocial links between status and mental wellbeing.

7. Future Research

There are several steps that future research should take to better understand the importance of food's symbolic value for mental health in food insecure populations. First, increasingly context-specific measures are warranted. Slum residence in Jaipur closely tracks religion and caste membership. Yet caste- and religion-based variations in food prestige were obscured within the more generalized scale developed here. Similarly, developing prestige scales specific to gender and age classes might reveal altered effect sizes. Second, measures of micronutrient intake, rather than anthropometric measures of protein-energy malnutrition, would help further tease apart the relative importance of food's biological and social value for shaping psychological distress. Finally, where this study considered only prestige, research should examine whether other aspects of food's symbolic value are important for mental health outcomes.

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Conclusion

This conclusion is intended to reiterate key findings from this dissertation by bringing together topically similar points otherwise scattered throughout the individual papers. In combining that information, a few additional but rather more tentative hypotheses are suggested that were not broached within the papers themselves. To facilitate this, commentary is structured around the three data gaps first highlighted in the introduction: 1) proximate pathways connecting resource insecurity and mental health; 2) alternative measures of intrahousehold resource deprivation; 3) comparative data on the relationship between food insecurity, water insecurity, and mental health from South Asia and from urban areas.

Relative deprivation as a proximate pathway between resource insecurity and mental wellbeing

This project's primary goal was to expand the limited body of literature on the proximate pathways that connect resource insecurity to mental health. This objective was addressed most explicitly in Chapter 4, which tested the hypothesis that relative deprivation mediates the relationship between food insecurity and depression, anxiety, or stress. Under the assumption that food's salience as a local status marker might be heightened in contexts with high rates of food insecurity, relative deprivation was defined according to the overall prestige of an individual's diet (Weaver et al., 2014). It was hypothesized that individuals unable to eat high-status diets might experience feelings of inadequacy, failure, shame, and subordination, which ultimately manifest as symptoms of psychological distress.

Interestingly, while prestigious food consumption was found to predict mental wellbeing, it did so independently of food insecurity. In other words, prestigious food consumption tapped an ostensibly separate construct than that assessed by more standard measures of food access. As laid out in Chapters 2 and 3, this underlying construct likely was social class. Knowledge of prestige

foods in southern India varied with indicators of socioeconomic status (Chapter 2), and some individuals in Jaipur were entirely unfamiliar with certain high-status items (namely pizza) (Chapter 3). In addition, a preference for prestige foods was not constant across the sample; adults were generally less inclined toward prestige foods than adolescents (Chapter 3). Thus, achieving a high food prestige score hinged not only on financial means but cultural capital and an inclination toward aspirational consumption choices (Chapters 3).

It is still possible that the prestige associated with different diets links food insecurity to mental health but that this only occurs when those diets are truly low status. Feelings of inadequacy and subordination may not accompany a failure to eat well but a failure to avoid socially unacceptable diets. This hypothesis could potentially be tested with measure based on famine foods or a series of questions about marginalizing food behaviors (e.g., begging, borrowing, accepting meals from those in lower castes, and stretching meals by adding water or other additives). However, the latter option would probably bear significant overlaps with available food security scales, particularly the Coping Strategy Index. And this begs the question: do the scale items in experience-based measures already capture whatever weight dietary prestige carries in linking food insecurity to mental health (i.e., by asking about reductions in food quality, variety, and preference)? The results from this study seem to suggest as much.

On the other hand, results from Chapter 1 did offer indirect support for the broader hypothesis that relative deprivation matters for the resource insecurity-mental health relationship. As evidenced by free list responses, water-related concerns were extremely common within Jaipur's slums. Yet water insecurity had limited predictive power for mental health outcomes when food insecurity was controlled for. Food problems, in contrast, were rarely mentioned by participants even as food insecurity exhibited a significant, positive relationship with

psychological distress. This fits with other studies finding associations between water insecurity and mental health in areas where water is *not* commonly considered a major community stressor (Workman and Ureksoy, 2017; Stevenson et al., 2012). Taking these findings together, it may be that the distress associated with resource insecurity is greater when individuals feel relatively more resource deprived than their neighbors. Conversely, if people feel that everyone around them suffers similarly, resource stressors are ostensibly less emotionally upsetting.

A small collection of studies provides additional support for this idea—at least as it pertains to food insecurity. Two studies from Africa have shown that the strength of the relationship between food insecurity and psychological wellbeing fluctuates seasonally; the relationship is stronger during the dry season when most households are food secure and weaker during the rainy season when food insecurity is more prevalent (Hadley and Patil, 2006; Cole and Tembo, 2011). The authors suggest that relative food insecurity might account for this pattern. That is, subjective comparisons with other households engender anxiety and stress about one's own food situation, and these negative emotional experiences are heightened when being food insecure is anomalous in the wider community (Hadley and Patil, 2006; Cole and Tembo, 2011). In the same vein, a more recent study using data from the Gallup World Poll found that the strength of the relationship between food insecurity and subjective wellbeing is stronger in countries with a lower probability of food insecurity (Frongillo et al., 2018).[55,56] Although the authors suggest that these results indicate "hedonic adaptation," their actual interpretation aligns closely with the relative food insecurity hypothesis:

[55]Subjective wellbeing was assessed using the daily experiences index, which asks respondents about feelings of worry, sadness, stress, and anger among others (Frongillo et al., 2017; Frongillo et al., 2018).
[56]The relationship between food insecurity and subjective wellbeing was also stronger in more developed (Frongillo et al., 2018) and higher income countries (Frongillo et al., 2017).

> Experiencing food insecurity is more common and normative in these countries, and the reference norms for food-insecure people may be directed at others experiencing food insecurity rather than those who are food secure. People's subjective well-being is affected not just from their own standard of living but also from their level of consumption relative to their peers (pg. 334).

Ultimately, however, the relative resource insecurity hypothesis requires far more direct evidence if current interpretations are ever to move beyond speculation. It is easy to imagine other reasons for the seeming mismatch between the preponderance of people who feel that water insecurity is a problem in slum communities and water insecurity's limited association with mental health when controlling for food insecurity. For example, another tentative hypothesis is that resource insecurity's importance for mental wellbeing depends, in part, on the sense of responsibility one feels for the deprivations experienced. An individual may feel accountable for his or his household's food security but believe that larger government structures are to blame for inadequate community water access. Research in one Mumbai slum suggested that the vast majority of people believed responsibility for providing water to the community fell on local politicians (40.7%), the municipal system (33.4%), or other parties (e.g., local water vendors) (27.4%); just 4.6% singled out slum residents themselves (Subbaraman et al., 2013). Yet, despite the fact that many households experienced water deprivation, water poverty (<20 liters per capita per day) was not found to predict mental wellbeing in that community. Food insecurity (>5 days without enough money to buy food), on the other hand, was significantly associated with one's risk for a common mental disorder (Subbaraman et al., 2014). Echoing the sentiment in that research, one free list respondent in Jaipur suggested that his household would handle limited water supplies by complaining to the water board. If people feel absolved of responsibility for certain types of resource insecurity but not others, this could shape their experiences with scarcity in ways that move beyond the immediate problems those deprivations pose for daily activities.

Alternative measures of intrahousehold allocation: experience-based scales and food prestige

This study also aimed to understand how resource disparities vary within households. It was expected that women and girls would report worse resource insecurity than boys and fathers, respectively, while parents would report greater resource insecurity than their children. Although several studies have attempted similar analyses among adults or between generations (Coates et al., 2010; Coates et al. 2010; Kumar and Quisumbing 2013; Tsai et al. 2016), there is little work comparing male and female adolescents (but see Hadley et al. 2008). Moreover, what data exists has been primarily restricted to perceived food insecurity, with no studies examining intrahousehold disparities in perceived water insecurity across generations or between boys and girls (but see Wutich and Ragsdale, [2009] and Tsai et al., [2016], which consider gendered water insecurity in adults).

As indicated in Chapter 1, intrahousehold disparities generally existed as expected. That is, perceived food and water insecurity were most severe among mothers and least severe in adolescent boys. Fathers and girls fell in the middle, with fathers faring worse with respect to food insecurity, while girls exhibited marginally worse water insecurity. As the original hypotheses were predicated on gender-biased parental buffering, the observed resource distributions were primarily interpreted as an outcome of this coping strategy. In addition, a cursory examination of the results from Chapter 3 similarly suggests that prestige foods are diverted to adolescents at the expense of adults (note: an analysis of generational preferences complicates that interpretation).

In either regard, the data collected were at best a descriptive accounting of the "end result" of the resource allocation process. In-depth analyses regarding *why* certain allocation decisions occur were ultimately beyond the scope of this project. More to the point, the data presented here cannot speak to the myriad conflicts, tensions, and personal histories that foreground any given allocation decision. Even phrases like "household coping strategy" imply that all members support

the processes that lead to the resource distributions observed and, further, that they engage in some degree of resource pooling (Wilk, 1989). Yet it is quite possible or even quite likely that this characterization is in error.

In this vein, additional ethnographic work is necessary to open the "black box" of intrahousehold decision-making and elucidate how the recorded disparities actually come about. Previous research provides evidence that the interaction between gender, serving order, and food insecurity is a key contributor to women's food-related disadvantage in South Asia (Chorghade et al., 2006; Gittelsohn, 1991; Madjdian and Bras, 2016; Palriwala, 1993). More specifically, where food sources are limited, the individuals responsible for food preparation may not receive equitable portions. Because women and adolescent girls are usually tasked with cooking, household food scarcities may affect them first or most severely (Chorghade et al., 2006; Gittelsohn, 1991; Madjdian and Bras, 2016; Palriwala, 1993), particularly when those scarcities are sudden and unexpected (Harris-Fry et al., 2017).[57] Several authors have indicated that luxury or prestige foods are the primary items offered to men first or exclusively (what Gittelsohn [1991] calls "channeling") and that girls or adult women miss out on while waiting for other household members to eat their fill (Gittelsohn, 1991; Madjdian and Bras, 2016; Palriwala, 1993). Though the results from Chapter 3 could be interpreted in multiple ways, one reading suggests that male favoritism via "channeled" foods shapes differences in dietary prestige between adolescent boys and girls. Not only were boys' diets significantly more prestigious than those of their sisters, but a number of the items that boys were more likely to have eaten within the past 1 week were "unitary"

[57] It is worth noting that household structure varied across the sample. Some households exhibited the traditional joint family dynamic seen in South Asia, while others consisted of a nuclear family. Several households were comprised of a single parent and child, while others had a second parent living elsewhere. These differing household structures undoubtedly influenced resource allocation decisions in ways that cannot be distinguished with the data available because the prevalence of any given household structure was too limited to draw solid conclusions about the differences between them.

or single-serving items. According to Aurino (2017), such items would be easiest for parents to discriminate with.

Given these observations, it might be prudent to ask whether decisions about intrahousehold water allocation follow similar trajectories. It is possible that the social processes that give rise to water disparities are similar to those that underlie food disparities. Results from Chapter 1 suggest that women and adolescent girls were disadvantaged in water security compared to men and adolescent boys from their own households. As with food-related tasks, women and adolescent girls are generally responsible for most water-related chores (Das and Safini 2018; Ray 2007). Thus, the question becomes, do similar ideas about serving others before oneself underlie pro-male biases in water distribution? Or, in line with the hypothesis that food allocation biases are predicated on economic utility and bargaining power, are individuals who provide the largest financial contributions to the household prioritized when the water for drinking and bathing is in short supply? Where possible, slum households keep the water they use for washing, bathing, and cleaning separate from their potable supply, which is collected from special sources or otherwise filtered, treated, and boiled (Subbaraman et al., 2013; Das and Safini, 2018). However, when significant scarcities arise, they will dip into those less desirable reserves for drinking and cooking (Subbaraman et al., 2013; Das and Safini, 2018). When potable water is running low, is the remaining supply "channeled" to certain household members in a manner reminiscent of prestige foods? Results from Chapter 1 could be indicative of such a situation. More specifically, when husband and wife pairs disagreed about the safety of their water, more women than men expressed concern that the water they drank was dangerous.

However, as with the conclusions about intrahousehold food allocation, this interpretation is extremely tentative because no direct information was collected on the processes that underlie

water allocation decisions. The questions in the WIES were ultimately measures of perception. The question about drinking water safety did not assess actual water quality nor did it explicitly ask about forgoing potable water for someone else's benefit. This makes it is possible that the observed disparities in perceived water insecurity reflect gendered social roles. Because women and adolescent girls are responsible for most water-related chores, this sharpens their familiarity with household water scarcities and, presumably, increases affirmative responses to experiential water insecurity measures. Moreover, with respect to perceptions about water safety, it seems likely that the individuals responsible for collecting water would be most aware of any contamination or sanitation problems associated with their water source.

It is also possible that the results observed in Chapters 1 and 3 reflect gendered differences in individuals' movements outside the home. Greater freedom to move independently of other household members would increase access to additional food or water sources and income opportunities. Indeed, a more considered analysis of the evidence from Chapter 3 in light of previous research from Chapter 2 suggests as much. Boys were more likely to have eaten several "outside home foods" within the past week, while girls were more likely to have eaten several of the characteristically "at home foods."

Resource insecurity—mental health relationship case study: urban India

A variety of sociocultural, infrastructural, and ecological variables may influence the relationships between resource insecurity and mental health in ways that researchers are only beginning to consider. For example, one recent study found tight correlations between household food and water deprivation in 21 different low- and middle-income countries (Brewis et al. 2019)[58] but noted that the links between food and water insecurity at each field site were nonetheless

[58]This study was published after the paper in Chapter 1 was accepted. Thus, it is not discussed in that paper.

shaped by livelihood- and diet-related variables specific to each setting. This dissertation adds comparative data from a study site that exhibits an interesting combination of contextual factors that stand to influence the proposed water-food-mental health nexus.

First, Jaipur is a major metropolitan center. Although previous research in rural areas suggests that both food and water scarcity are independently important correlates of psychological distress (Stevenson et al., 2012; Stevenson et al., 2016; Workman and Ureksoy, 2017), the close associations between water security and smallholder livelihoods muddle analyses in those settings. By conducting this dissertation project in a large urban area, that complication was eliminated. Moreover, as outlined in the introduction, observations at the study site and in work by other researchers suggest that living in slums complicates food and water security in unique ways. Different types of resource insecurity (i.e., of food, water, energy, and sanitation) overlap substantially—both in the sense that access to each resource is dependent on the same income pool and in the sense that insufficiencies in one resource affect the household-level availability of other resources.

Second, Jaipur is located in India, which is home to a substantial percentage of the global population facing food and water deprivation (FAO, 2017; Mekonnen and Hoekstra, 2016). Furthermore, researchers have long suggested that intrahousehold resource allocation in South Asia exhibits gender- and age-based biases that may not exist elsewhere, particularly with respect to food allocation (Harris-Fry et al., 2017; Haddad et al., 1996). Despite these observations, comparatively little research on resource insecurity and mental health comes from either India or South Asia as a whole. Results from this study suggest that there are gender differences in the relationship between both food and water insecurity and mental health: except among fathers, water insecurity did not predict mental health outcomes when food insecurity was controlled for.

Context-specific aspects of the food and water insecurity experience could have influenced the pattern observed, especially given that water insecurity remained significantly associated with psychological distress in fathers even as mothers reported worse overall water scarcity. As discussed in Chapter 1, gendered social norms in India may affect individual familiarity with resource scarcities. Women are tasked with the bulk of food-related responsibilities, and many of these responsibilities involve water use trade-offs. This makes it possible that food and water insecurity overlap substantially for women in this setting. Conversely, in contexts where men and women are relatively more equally tasked with household food and water chores, or where food insecurity is not a major problem, water insecurity might display the expected relationship with mental wellbeing in both genders. Ultimately, in order to confirm whether the conclusions drawn here bear out cross-culturally, more studies examining food and water insecurity as joint predictors of mental health in South Asia are needed.

Third, Jaipur is the capital of Rajasthan, a state covered primarily by semi-arid scrubland and host to India's largest desert. As a result, the area in and around Jaipur has few natural reservoirs, experiences recurrent droughts, and cycles through extreme summer temperatures that make dehydration a very real threat. In response, local food cultures have developed methods for managing limited water supplies, including a large corpus of famine foods (Bhandari, 1974), drought-resistant crops, and dishes that require less water. These factors could make food-related strategies for coping with water insecurity somewhat more "successful" in Rajasthan compared to other socio-ecological contexts; however, it remains to be seen whether those adaptive practices carry over in any significant way to Rajasthan's urban slums.

Interestingly, though identification of specific water-sparing recipes was not a primary focus of data collection, eleven free list respondents mentioned using less water to make food (e.g.,

"*When making food, use only half a pot of water*") or making meals that required less water (e.g., "*Don't make food that requires a lot of water*") as a way to manage scarcities. It is thus conceivable that the competing influences on food prestige include not only price, tradition, indigeneity, modernity, and identity as discussed in Chapters 2 and 3, but also those foods' costs in terms of other resources like water and energy (i.e., from long cooking times in the face of high fuel prices). Moreover, the aforementioned study by Brewis et al. (2019) concluded that urban households were somewhat more likely to make dietary changes in response to water scarcities than rural households. In other words, concessions with respect food variety and preference are more common approaches for dealing with water insecurity in urban areas.

A cursory test of the difference in prestige scores between those reporting no water insecurity and severe water insecurity suggests a trend in this direction ($t= 2.11$, $p<.05$); however, as this is just a bivariate test, other wealth-related variables could explain that pattern. Moreover, many of the food items in the prestige scale are not prepared at home (e.g., cake) or could be eaten without any preparation (e.g., banana). Finally, adding the prestige score to the models in Chapter 4 did not affect the association between water insecurity and mental health.

Conclusion

First, this dissertation finds that both food and water insecurity are predictors of mental wellbeing in Indian slums. However, water insufficiency's effect on mental health appears to act primarily through its impact on food insecurity, particularly among women and adolescent girls. This probably reflects their heavy day-to-day involvement with most food- and water-related tasks, which overlap substantially. Second, the relationship between resource insecurity and mental health may be shaped by individuals' perceptions of their relative deprivation. However, relative food insecurity does not appear to be reckoned based on the prestige of one's diet. Third,

experience-based measures of food and water insecurity provide some indication that resources are distributed unequally within households. However, these results are probably also shaped by gendered norms about one's social role and freedom of movement outside the domestic sphere. Measures of prestigious food consumption may be one additional avenue to understand intrahousehold food disparities, but differences in personal preference, particularly between generations, complicate interpretations of those results.

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APPENDIX

Appendix Item 1. Respondent completing modified free list task (vegetable domain).

Appendix Item 2. Respondent completing paired comparison booklet (ranking task).

Appendix Item 3. Respondent answering HSCL-10 questions via visual Likert scale.

Appendix Item 4. Modified free list mat for fruit subdomain.

. **Appendix Item 5.** Modified free list mat for vegetable subdomain

Appendix Item 6. Modified free list mat for sweets/dried fruit/nuts subdomain.

Appendix Item 7. Modified free list mat for animal products subdomain.

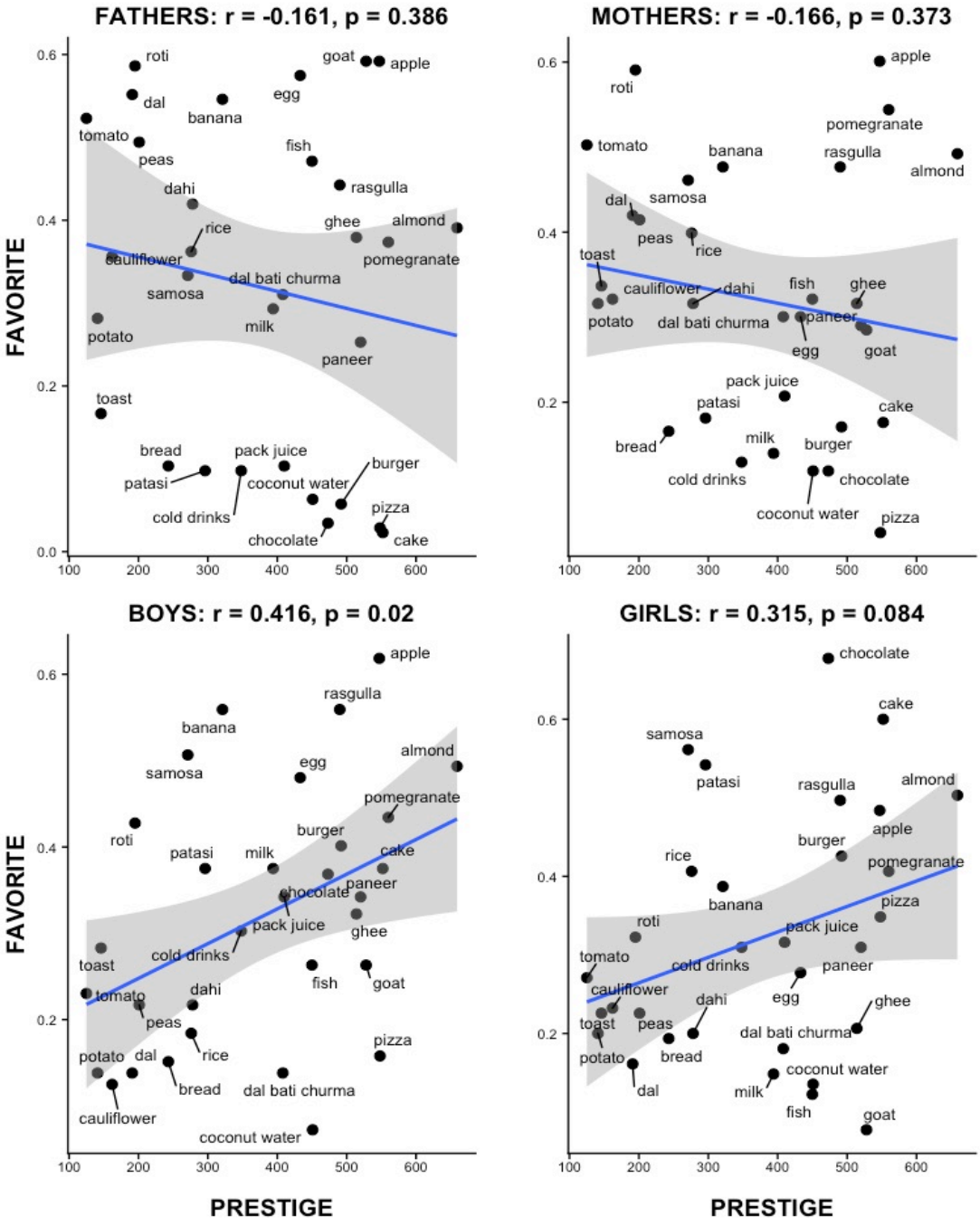
Appendix Item 8. Modified free list mat for pulses subdomain

Appendix Item 9. Modified free list mat for cereals subdomain

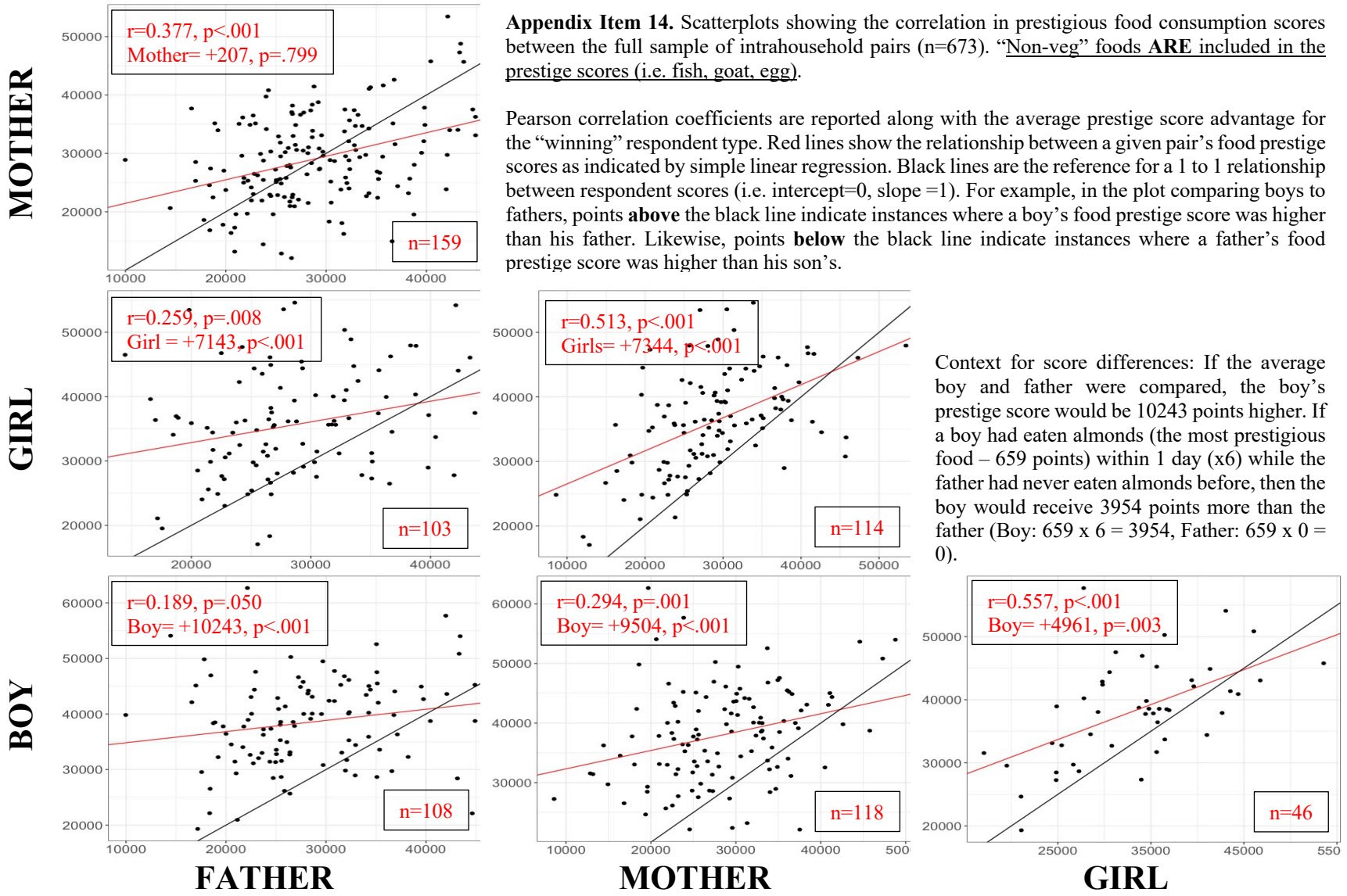
Appendix Item 10. Modified free list mat for beverages subdomain.

Appendix Item 11. Modified free list mat for prepared dishes/outside home foods subdomain.

Appendix Item 12. Modified free list mat for spices subdomain.



Appendix Item 13. Correlation between food prestige and the percent of mothers, fathers, boys or girls selecting that item as a favorite food (n=673). Non-veg foods **ARE** included.



Appendix Item 14. Scatterplots showing the correlation in prestigious food consumption scores between the full sample of intrahousehold pairs (n=673). "Non-veg" foods **ARE** included in the prestige scores (i.e. fish, goat, egg).

Pearson correlation coefficients are reported along with the average prestige score advantage for the "winning" respondent type. Red lines show the relationship between a given pair's food prestige scores as indicated by simple linear regression. Black lines are the reference for a 1 to 1 relationship between respondent scores (i.e. intercept=0, slope =1). For example, in the plot comparing boys to fathers, points **above** the black line indicate instances where a boy's food prestige score was higher than his father. Likewise, points **below** the black line indicate instances where a father's food prestige score was higher than his son's.

Context for score differences: If the average boy and father were compared, the boy's prestige score would be 10243 points higher. If a boy had eaten almonds (the most prestigious food – 659 points) within 1 day (x6) while the father had never eaten almonds before, then the boy would receive 3954 points more than the father (Boy: 659 x 6 = 3954, Father: 659 x 0 = 0).

Appendix Item 15. T-tests comparing the average prestige score difference between intrahousehold parent-adolescent pairs in the 1st wealth index quartile and the 4th wealth index quartile. The average overall prestige score for adolescents in the 1st and 4th wealth index quartiles are also compared using t-tests. Results are presented separately by gender.

*PRESTIGE SCORE CALCULATED WITH NON-VEG FOODS (GOAT, EGG, FISH)	**1st Quartile Average Monthly Per Person Income**	**4th Quartile Average Monthly Per Person Income**	**p-value**
BOYS	n=32	n=21	
Average Prestige Score	39,652	40,977	p=.599
Average Prestige Score Difference compared to Mothers	12,845	9,019	p=.075+
GIRLS	n=25	n=18	
Average Prestige Score	35,387	39,653	p=.036*
Average Prestige Score Difference compared to Mothers	7,414	7,256	p=.948
BOYS	n=28	n=23	
Average Prestige Score	40,132	40,897	p=.732
Average Prestige Score Difference compared to Fathers	13,288	9,173	p=.123
GIRLS	n=24	n=18	
Average Prestige Score	34,642	37,727	p.138
Average Prestige Score Difference Compared to Fathers	7,619	5,807	p=.453

Appendix Item 16. T-tests comparing the average prestige score difference between intrahousehold parent-adolescent pairs in the 1st wealth index quartile and the 4th wealth index quartile. The average overall prestige score for adolescents in the 1st and 4th wealth index quartiles are also compared using t-tests. Results are presented separately by gender.

*PRESTIGE SCORE CALCULATED WITH NON-VEG FOODS (GOAT, EGG, FISH)	**1st Quartile Household Wealth Index**	**4th Quartile Household Wealth Index**	**p-value**
BOYS	n=33	n=25	
Average Prestige Score	36,629	38,665	p=.346
Average Prestige Score Difference compared to Mothers	9,958	5,066	p=.021*
GIRLS	n=31	n=32	
Average Prestige Score	32,962	38,473	p=.004**
Average Prestige Score Difference compared to Mothers	6,891	6,921	p=.987
BOYS	n=30	n=23	
Average Prestige Score	36,961	38,505	p=.489
Average Prestige Score Difference compared to Fathers	9,610	5,878	p=.162
GIRLS	n=25	n=28	
Average Prestige Score	31,879	39,419	p<.001***
Average Prestige Score Difference Compared to Fathers	5,133	8,353	p=.208

Appendix Item 17. Household-level variables and assets for those with available household data (n=194).

Furniture	
None	23 (12%)
Cot	155 (80%)
Chair	104 (54%)
Table	49 (25%)
Bed	84 (43%)
Stove	
None/Other	4 (2%)
Coal Stove	164 (85%)
Gas Stove	14 (7%)
Electric Stove	110 (57%)
Food Preparation	
None	86 (45%)
Pressure cooker	95 (49%)
Mixer	38 (20%)
Fridge	56 (29%)
Livestock	
None	157 (81%)
Chicken	15 (8%)
Cow/buffalo	25 (13%)
Laundry	
None	110 (58%)
Press	44 (23%)
Sewing machine	67 (35%)
Laundry machine	11 (6%)
Temp Control	
None	24 (12%)
Fan	157 (81%)
Cooler	111 (57%)
AC	0 (0%)
Water Temp	
None	170 (88%)
Heating rod	24 (12%)
Geyser	0 (0%)

Phone	
None	14 (7%)
Keypad phone	169 (87%)
Smartphone	64 (33%)
Television	
None	43 (22%)
Non-LED	146 (75%)
LED	10 (5%)
Satellite Dish	127 (65%)
Computer	
None	184 (95%)
Desktop	6 (3%)
Laptop	5 (3%)
Transportation	
None	60 (31%)
Bicycle	86 (44%)
Motorcycle	84 (43%)
Car	10 (5%)
Housing Materials (*kacha vs pucca*)	
No perm materials	43 (23%)
Permanent Floor	135 (71%)
Permanent Walls	142 (74%)
Permanent Roof	65 (34%)

Location	
Urban	150 (77%)
Peri-urban	44 (23%)
Monthly Household Income (rupees)	
min	1500
max	60000
mean (sd)	12000
Education	
None	109 (56%)
Primary	60 (31%)
Secondary	23 (12%)
Higher	2 (1%)
Ration Card Type	
Above Poverty Line	155 (82%)
Below Poverty Line	35 (18%)
Owns Farm Land	
Yes	48 (25%)
No	142 (75%)

Appendix Item 18. Household-level expenditure variables for those with available data (n=194).

MONTHLY		MONTHLY		MONTHLY		YEARLY	
Milk, Dahi, Paneer		**Eggs, Fish, Meat**		**Firewood**		**Clothes, Shoes**	
Don't purchase	12 (6%)	Don't purchase	56 (29%)	Don't purchase	99 (51%)	Don't purchase	0 (0%)
median	40	median	250	median	600	median	5000
Vegetables		**Bus Fare**		**Education**		**Weddings, Festivals**	
Don't purchase	4 (2%)	Don't purchase	87 (45%)	Don't purchase	70 (36%)	Don't purchase	2 (1%)
median	50	median	150	median	750	median	3000
Fruit		**Petrol**		**Medical**			
Don't purchase	42 (22%)	Don't purchase	110 (57%)	Don't purchase	25 (13%)		
median	100	median	300	median	500		
Cereals		**Cigarettes, Paan**		**Rent**			
Don't purchase	5 (3%)	Don't purchase	57 (29%)	Don't purchase	177 (91%)		
median	350	median	125	median	1150		
Pulses		**Alcohol**		**Electricity**			
Don't purchase	2 (1%)	Don't purchase	110 (57%)	Don't purchase	96 (49%)		
median	50	median	140	median	800		
Sugar, Salt, Spices		**Cooking Oil**		**Phone Bill**			
Don't purchase	0 (0%)	Don't purchase	187 (96%)	Don't purchase	22 (11%)		
median	250	median	70	median	150		
Outside Food		**LPG Gas**		**Water**			
Don't purchase	117 (60%)	Don't purchase	84 (43%)	Don't purchase	161 (83%)		
median	100	median	600	median	150		

		1 DAY		2 DAYS		1 WEEK		1 MONTH		2-3 MONTHS		>3 MONTHS		NEVER	
		B	F	B	F	B	F	B	F	B	F	B	F	B	F
1	Rice			X	X										
2	Apple					X	X								
3	Milk	X											X		
4	Pea	X	X												
5	Pomegranate					X					X				
6	Roti	X	X												
7	Packaged Juice							X			X				
8	Almond							X	X						
9	Cauliflower	X	X												
10	Banana					X	X								
11	Pizza													X	X
12	Dal			X	X										
13	Rasgulla					X			X						
14	Cake							X	X						
15	Samosa					X	X								
16	Dal Bati							X	X						
17	Burger							X					X		
18	Fish	X	X												
19	Dahi						X	X							
20	Coconut Water							X			X				
21	Patasi			X					X						
22	Tomato	X	X												
23	Goat											X	X		
24	Egg					X	X								
25	Potato	X	X												
26	Paneer					X							X		
27	Bread					X	X								
28	Toast	X	X												
29	Chocolate	X											X		
30	Ghee	X	X												
31	Cold Drinks							X					X		

Appendix Item 19. Example responses to the food prestige tool by one intrahousehold father (**f**)-boy (**b**) pair. GREY cells are foods for which the father and son gave different answers. GREEN cells are where the father and son gave the same answer. RED cells are where the boy reported eating an item more recently than the father. YELLOW cells are where the father reported eating an item longer ago than the boy.

The difference between this father and son's prestige scores was 10,370 and thus comparable to the average difference for all father-son pairs (10,090 without meat, 10,243 with meat). The father responded yes to one out of eight food insecurity question (Q1: worry about food sufficiency). The boy responded no to all food insecurity questions.

Appendix Item 20. Actual counts for Chapter 1, Figure 2 showing intrahousehold pairwise comparisons for each question in the Food Insecurity Experience Scale (FIES).

FOOD INSECURITY EXPERIENCE SCALE (FIES)

MOTHERS

	BOYS				GIRLS				FATHERS			
Q	Discordant out of 118 pairs	Mother Yes	Boy Yes	Q	Discordant out of 114 pairs	Mother Yes	Girl Yes	Q	Discordant out of 159 pairs	Mother Yes	Father Yes
1	70 (59.3%)	68 (97.1%)	2 (2.9%)	1	50 (43.9%)	44 (88.0%)	6 (12.0%)	1	70 (44.0%)	57 (81.4%)	13 (18.6%)
2	59 (50.0%)	47 (79.7%)	12 (20.3%)	2	53 (46.5%)	45 (84.9%)	8 (15.1%)	2	79 (49.7%)	57 (72.2%)	22 (27.8%)
3	60 (50.8%)	56 (93.3%)	4 (6.7%)	3	51 (44.7%)	41 (80.4%)	10 (19.6%)	3	76 (47.8%)	62 (81.6%)	14 (18.4%)
4	51 (43.2%)	50 (98.0%)	1 (2.0%)	4	35 (30.7%)	30 (85.7%)	5 (14.3%)	4	52 (32.7%)	38 (73.1%)	14 (26.9%)
5	49 (41.5%)	48 (98.0%)	1 (2.0%)	5	42 (36.8%)	39 (92.9%)	3 (7.1%)	5	62 (39.0%)	49 (79.0%)	13 (21.0%)
6	48 (40.7%)	45 (93.8%)	3 (6.2%)	6	36 (31.6%)	32 (88.9%)	4 (11.1%)	6	56 (35.2%)	40 (71.4%)	16 (28.6%)
7	38 (32.2%)	35 (92.1%)	3 (7.9%)	7	31 (27.2%)	27 (87.1%)	4 (12.9%)	7	53 (33.3%)	35 (66.0%)	18 (34.0%)
8	38 (32.2%)	37 (97.4%)	1 (2.6%)	8	29 (25.4%)	27 (93.1%)	2 (6.9%)	8	47 (29.6%)	38 (80.9%)	9 (19.1%)

FATHERS

Q	Discordant out of 108 pairs	Father Yes	Boy Yes	Q	Discordant out of 103 pairs	Father Yes	Girl Yes
1	49 (45.4%)	47 (95.9%)	2 (4.1%)	1	39 (37.9%)	24 (61.5%)	15 (38.5%)
2	39 (36.1%)	25 (64.1%)	14 (35.9%)	2	45 (43.7%)	28 (62.2%)	17 (37.8%)
3	41 (38.0%)	30 (73.2%)	11 (26.8%)	3	47 (45.6%)	24 (51.1%)	23 (48.9%)
4	29 (26.9%)	28 (96.6%)	1 (3.4%)	4	31 (30.1%)	18 (58.1%)	13 (41.9%)
5	27 (25.0%)	24 (88.9%)	3 (11.1%)	5	31 (30.1%)	17 (54.8%)	14 (45.2%)
6	30 (27.8%)	25 (83.3%)	5 (16.7%)	6	31 (30.1%)	19 (61.3%)	12 (38.7%)
7	31 (28.7%)	23 (74.2%)	8 (25.8%)	7	31 (30.1%)	19 (61.3%)	12 (38.7%)
8	21 (19.4%)	15 (71.4%)	6 (28.6%)	8	27 (26.2%)	15 (55.6%)	12 (44.4%)

GIRLS

Q	Discordant out of 46 pairs	Girl Yes	Boy Yes
1	14 (30.4%)	12 (85.7%)	2 (14.3%)
2	20 (43.5%)	12 (60.0%)	8 (40.0%)
3	18 (39.1%)	15 (83.3%)	3 (16.7%)
4	9 (19.6%)	9 (100%)	0 (0.0%)
5	9 (19.6%)	9 (100%)	0 (0.0%)
6	14 (30.4%)	9 (64.3%)	5 (35.7%)
7	12 (26.1%)	7 (58.3%)	5 (41.7%)
8	9 (19.6%)	7 (77.8%)	2 (22.2%)

Appendix Item 21. Actual counts for Chapter 1, Figure 2 showing intrahousehold pairwise comparisons for each question in the Water Insecurity Experience Scale (WIES).

	WATER INSECURITY EXPERIENCE SCALE (WIES)											
	BOYS				GIRLS				FATHERS			
MOTHERS	Q	Discordant out of 118 pairs	Mother Yes	Boy Yes	Q	Discordant out of 114 pairs	Mother Yes	Girl Yes	Q	Discordant out of 159 pairs	Mother Yes	Father Yes
	1	44 (37.3%)	43 (97.7%)	1 (2.3%)	1	29 (25.4%)	23 (79.3%)	6 (20.7%)	1	57 (35.8%)	42 (73.7%)	15 (26.3%)
	2	49 (41.5%)	44 (89.8%)	5 (10.2%)	2	37 (32.5%)	24 (64.9%)	13 (35.1%)	2	60 (37.7%)	47 (78.3%)	13 (21.7%)
	3	49 (41.5%)	46 (93.9%)	3 (6.1%)	3	36 (31.6%)	23 (63.9%)	13 (36.1%)	3	58 (36.5%)	44 (75.9%)	14 (24.1%)
	4	28 (23.7%)	27 (96.4%)	1 (3.6%)	4	22 (19.3%)	14 (63.6%)	8 (36.4%)	4	41 (25.8%)	21 (51.2%)	20 (48.8%)
	5	28 (23.7%)	24 (85.7%)	4 (14.3%)	5	31 (27.2%)	19 (61.3%)	12 (38.7%)	5	38 (23.9%)	28 (73.7%)	10 (26.3%)
FATHERS	Q	Discordant out of 108 pairs	Father Yes	Boy Yes	Q	Discordant out of 103 pairs	Father Yes	Girl Yes				
	1	23 (21.3%)	20 (87%)	3 (13%)	1	29 (28.2%)	11 (37.9%)	18 (62.1%)				
	2	27 (25%)	20 (74.1%)	7 (25.9%)	2	31 (30.1%)	9 (29%)	22 (71%)				
	3	26 (24.1%)	22 (84.6%)	4 (15.4%)	3	28 (27.2%)	8 (28.6%)	20 (71.4%)				
	4	20 (18.5%)	19 (95%)	1 (5%)	4	23 (22.3%)	12 (52.2%)	11 (47.8%)				
	5	10 (9.3%)	7 (70%)	3 (30%)	5	24 (23.3%)	9 (37.5%)	15 (62.5%)				
GIRLS	Q	Discordant out of 46 pairs	Girl Yes	Boy Yes								
	1	11 (23.9%)	11 (100%)	0 (0.0%)								
	2	13 (28.3%)	11 (84.6%)	2 (15.4%)								
	3	12 (26.1%)	11 (91.7%)	1 (8.3%)								
	4	7 (15.2%)	7 (100%)	0 (0.0%)								
	5	9 (19.6%)	9 (100%)	0 (0.0%)								

Appendix Item 22. Hindi-English dictionary for items included on each of the "free list" mats.

FRUITS (beginning 1st row left to right)				VEGETABLES (beginning 1st row left to right)			
	English	Similar plant	Hindi		English	Similar plant	Hindi
1	muskmelon		kharbuj	1	jackfruit		katahal
2	banana		kela	2	cauliflower		phool gobhi
3	custard apple		sitaphal	3	cabbage		patta gobhi
4	phalsa	black currant	phalsa	4	Indian eggplant		baingan
5	papaya		papita	5	green mango		kaccha aam
6	pear		naashpaati	6	daikon radish		mooli
7	grapes		angoor	7	pea pods		katar
8	strawberry		strawberry	8	cucumber		kakadi
9	mango		aam	9	ridge gourd		turee
10	lychee		lychee	10	okra		bindi
11	bor	jujube	bor/ber	11	pumpkin		kaddu
12	pineapple		anaanas	12	yellow onion		peela pyaaj
13	gooseberry		amla	13	green chickpeas		hara chana
14	apple		seb	14	bitter gourd		karela
15	java plum		jamun	15	green beans		hari fali
16	guava		amrud	16	bottle gourd		lauki
17	lemon		nimbu	17	red radish		laal mooli
18	pomegranate		anar	18	sweet potato		shakarkand
19	coconut		naariyal	19	tomato		tamaatar
20	wood apple		bael	20	ker	capers	ker
21	watermelon		tarbuj	21	Indian tomato		desi tamaatar
22	canary melon		sharda	22	pointed gourd		parval
23	plum		aloo bukhara	23	round gourd		tinda
24	orange		santara	24	peas		matar
				25	yellow pepper		peela shimla mirch
				26	red pepper		laal shimla mirch
				27	karonda	natal plum	karonda
				28	kachri	wild cucumber	kachri
				29	taro		arbi
				30	potato		aloo
				31	corn		makka
				32	spinach		paalak
				33	carrots		gajar
				34	cluster beans		guar fali
				35	green pepper		hara shimla mirch
				36	beets		chukandar
				37	red onion		laal pyaaj
				38	gunda	gum berry	gunda
				39	mushrooms		mushroom

SWEETS, DRIED FRUIT, NUTS (beginning 1st row left to right)			
	English	Description	Hindi
1	chocolate		chocolate
2	pastry		pastry
3	rasgulla	doughy milk balls curd in sugar syrup	rasgulla
4	jalebi	deep-fried flour soaked in sugar syrup	jalebi
5	sweets	ghee-based	mithai (incl: barfi, laddu)
6	gulab jamun	fried doughy balls of milk curd in sugar syrup	gulab jamun
7	cake		cake
8	dates		khajur
9	almonds		badam
10	raisins		kishmish
11	dried figs		anjeer
12	kulfi	denser, custard-like ice cream	kulfi
13	ice cream		ice cream
14	dates2		
15	walnuts		akhrot
16	cashews		kaaju
17	peanuts		moongphali
18	pistachios		pista
19	halwa	sweet pudding (pictured is laapsi - broken wheat halwa)	halwa

ANIMAL PRODUCTS (beginning 1st row left to right)			
	English	Description	Hindi
1	packaged milk		packaged doodh
2	packaged curd		packaged dahi
3	goat milk		bakari ke doodh
4	clarified butter		ghee
5	rice pudding		kheer
6	paneer		paneer
7	cow milk		doodh
8	fresh curd		dahi
9	chicken		murgh
10	goat meat		bakara
11	buffalo milk		bakare ka maans
12	buttermilk		chaach
13	egg		anda
14	fish		machhali
15	lassi	sweet yogurt drink	lassi

PULSES (beginning 1st row left to right)			
	English	Description	Hindi
1	black chickpeas		kala chana
2	red lentils		masoor dal
3	kidney beans		rajma
4	black-eyed peas		lobiya
5	split pigeon peas		toor dal
6	split black lentils		urad dal
7	chickpeas		chana
8	split mung bean		moong dal

GRAINS, CEREALS (beginning 1st row left to right)			
	English	Description	Hindi
1	basmati rice		basmati chawal
2	rice		chawal
3	chickpea flour		besan
4	wheat flatbread		roti
5	rusk		toast
6	bulgur		daliya
7	wheat flour		gehoon
8	corn flour		makki ka atta
9	sliced bread		doube roti
10	stuffed flatbread		paratha
11	pearl millet		bajara
12	rice flakes		poha
13	puffed rice		murmura
14	tapioca pearls		sabudana

BEVERAGES (beginning 1st row left to right)				OUTSIDE HOME FOODS, PREPARED DISHES (beginning 1st row left to right)			
	English	Description	Hindi		English	Description	Hindi
1	fresh juice	mango depicted	juice	1	chole kulche	leavened flat bread and chickpea curry	chole kulcha
2	local alcohol		desi sharab	2	idli sambhar	rice cake and spicy tomato soup	idli sambhar
3	cold drinks	soda (sometimes packaged juice)	cold drinks	3	pav bhaji	buttered rolls and vegetable curry	pav bhaji
4	beer		beer	4	french fries		french fries
5	lassi	sweet yogurt drink	lassi	5	kachori	fried dough filled with pulses	kachori
6	lemon soda water		nimbu pani	6	pasta		pasta
7	packaged juice (mango)	mango depicted	pack juice	7	dosa	crepe of fermented rice and lentil batter	dosa
8	chai		chai	8	poha	spiced rice flakes	poha
9	sherbet	sweet fruit flower syrup in water	sherbet	9	samosa	vegetable or pulse stuffed fried dough	samosa
10	packaged milk		pack doodh	10	burger	vegetarian (e.g. potato-based)	burger
11	buttermilk		chaach	11	maggi	ramen noodles	maggi
12	coffee		coffee	12	bread pakora	fried bread slices	bread pakora
13	imported alcohol		pardesi alcohol	13	vegetable puffs	like veg popover	veg puffs
14	coconut water		naariyal pani	14	biryani	spiced rice (can include meat)	biriyani
15	bottled water		bottle pani	15	bhaji	vegetable fritters	bhaji
				16	sandwich		sandwich
				17	chowmein/noodles		chowmen
				18	upma	semolina porridge	upma
				19	biscuits		biscuits
				20	namkeen	salty finger foods	namkeen
				21	chole bhature	leavened fry bread and chickpea curry	chole bhatura
				22	dal bati churma	hard wheat rolls, lentils, sweet wheat	dal bati churma
				23	pizza		pizza
				24	chips		chips
				25	kurkure	Corn puffs	kurkure
				26	bhel puri	savory puffed rice and vegetables	bhel puri
				27	dhokla	savory cake of fermented batter	dhokla
				28	patasi	fried shell with savory water and pulses	patasi

SPICES (beginning 1st row left to right)			
	English	Description	Hindi
1	cumin		jeera
2	cardamom		elaichi
3	fennel		sauph
4	garlic		lahsun
5	black peppercorn		kali mirch
6	chili powder		laal mirch
7	mustard seeds		sarson/rai
8	clove		laung
9	fenugreek seeds		methi dana
10	coriander seeds		sukha dhaniya/beej dhaniya
11	ginger		adarak
12	curry leaves		kari patte
13	fenugreek leaves		methi
14	turmeric		hadli
15	green chili		hari mirch
16	tamarind		imli
17	coriander leaves		dhaniya
18	mint		pudenna
19	sesame seeds		til
20	saffron		kesar
21	bay leaves		tej patte
22	cinnamon		daalcheeni