

**Discretionary Foods and Relational Eating:
A Bioethnography of Nutrition Science and Daily Sustenance in Mexico City**

By

Hannah Marcovitch

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Thesis Advisor:

Elizabeth F.S. Roberts

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Abstract

The term “discretionary” is used in public health literature to describe calorie-dense foods and sugar-sweetened beverages commonly pegged as “obesogenic” (obesity-causing). This term implies that individuals act entirely out of personal will and judgment in their decisions to consume these items. In this paper, I will call to attention the individualizing nature of this term by contrasting it with observations about the *relationality* of food consumption and alimentary practices in Mexico City. I draw on data from a public health cohort study, the Early Life Exposures to ENvironmental Toxicants (ELEMENT) study, and the ethnographic fieldwork carried out by anthropologist Elizabeth F.S. Roberts (both situated in Mexico City) in an experiment with what Roberts has deemed a *bioethnographic* method. Using this method, I attempt to coordinate epidemiological and ethnographic methods in order to provide a more nuanced means of understanding rising obesity rates in Mexico City. Contrasting both the concept of *discretionary* foods and the epidemiological Food Frequency Questionnaire (a common dietary assessment tool) with ethnographic observation of food and eating, I seek to illuminate the complex network of relationships embedded in food consumption while also exploring the practice of mixed-methods research.

“What we like, what we eat, how we eat it, and how we feel about it are phenomenologically interrelated matters; together, they speak eloquently to the question of how we perceive ourselves in relation to others”

—*Sidney Mintz, Sweetness and Power*

Introduction

Inside the University of Michigan School of Public Health (SPH), soda is sometimes a joking matter. I meet monthly with a team of nutrition researchers who assure caterers time and time again that they do not need Coke at their next lunch meeting, that they don't drink soda in the School of Public Health. But without fail, Coca Cola products will be waiting for them at their next meeting. Maybe someone will even cave and drink one now and again, over a discussion of obesity prevention in schoolchildren in Mexico, which in 2013 the WHO designated as the world's fattest industrial nation (Tamayo y Ortiz 2016). Since 1993, this team of nutrition researchers based in the University of Michigan School of Public Health (SPH) has been part of a team working in partnership with the National Institute of Public Health (INSP) in Mexico City to examine the effects of chemical exposures, especially lead, on fetal and childhood growth and neurological development through the ELEMENT (Early Life Exposure to ENvironmental Toxicants) birth cohort study. When the study began, the United Nations had just declared Mexico City the most polluted city on earth (O'Connor 2010). Since then, 3 cohorts adding to over 1,000 mostly working class mother and child pairs have been recruited through *Seguro Social* (social security) clinics in Mexico City. As ELEMENT expanded, it began to collect data on further toxins (e.g., bisphenol A, or BPA, fluoride, and mercury) and new health concerns, like premature sexual maturation, obesity, and diabetes (Cantoral, et al. 2016; Kasper, et al. 2016; Moynihan, et al. 2017).

The discussion I have with the ELEMENT nutrition team about soda in our monthly

research meeting is lighthearted. It also seems like a missed opportunity for empathy. Public health experts' recommendations to combat obesity insist on reducing soda consumption. But here these same experts are, making recommendations to reduce soda consumption in a meeting that looks like a Coca Cola ad. Sure, they all have their refillable water bottles at the ready—but that sweet, bubbly soda is still tempting. Even where reliable water is at the ready, people fall victim to soda's allure; in this building, where there are bottle-filling water fountains around every corner; where they create the knowledge around soda's evil; where soda taxes are designed and promulgated. If nutrition researchers have trouble resisting the unwanted soda that finds its way into their meetings, how can they expect others—especially those without reliable water—to abstain?

For public health researchers in Michigan, saying no to soda is a *discretionary* act. They are choosing not to drink something they know—through scientific inquiry and health moralism—to be bad for them, in order to responsibly care for their bodies (Guthman 2011). They have recommended that everyone else do the same. They use the term “discretionary” in their literature to describe the calorie-dense foods and sugar-sweetened beverages commonly pegged as “obesogenic” (obesity-causing) (Aburto 2016; Clark 2012). *Discretion* is central to my analysis of nutrition science in Michigan and eating in Mexico City. The Oxford English Dictionary defines discretion as the “freedom to decide or act according to one’s own will or judgment”; thus, using the label “discretionary” to characterize these foods targets the individual as an independent decision-maker in regards to food consumption, leaving out the complex system of actors at play in determining food availability and accessibility. In this paper, I will call attention to the assumptions of individuality embedded in this concept by contrasting them with observations of the *relationality* of food consumption and alimentary practices in a working

class neighborhood of Mexico City. In working-class Mexico City, where these nutrition scientists situate their study, residents aren't expending energy to rid their lives of the drinks that provide bubbly, sweet chemicals and bring their families together. I will argue that drinking soda for these families is not a matter of discretion—it's anything but. I use the concept of relationality to critique attempts within public health and nutrition science to universalize knowledge and healthcare recommendations, as well as attempts to isolate nutrients and practices from the systems that produce them.

In this paper I examine the concept of *discretionary* foods along with the epidemiological Food Frequency Questionnaire (FFQ, a commonly used diet-assessment tool)—in order to illuminate the complexities and entanglements of nourishment, in epidemiology and nutrition science and in the lived reality of working class Mexico City. By analyzing these tools and observations of daily eating practices in Mexico City, I argue that neither the field of anthropology—in its essential assertion of food's relationality, and in the blame it places on public health for its standardized approach to nutrition—nor the field of public health—which relies heavily on nutritional science and an individualized framework of dietary choice—can alone provide us with the tools to understand and approach the contemporary “globesity” pandemic (Sanabria and Yates-Doerr 2015; WHO 2000). Instead, I offer an experiment in what anthropologist Elizabeth F.S. Roberts has termed *bioethnography*, in an attempt to coordinate epidemiological and ethnographic data and methods to think carefully about rising rates of obesity (Roberts 2015a).

Drawing on theories of scientific knowledge production in order to think about how facts are made and where they find their authority, I understand *discretionary* foods and the FFQ as objects enacted within public health that do different work than the concept of *relationality*

ubiquitous to the anthropology of food. And as I analyze the FFQ and the notion of *discretionary* foods, I keep in mind the relationships that surround each of these objects, both in epidemiological practice and in the lives they seek to explain.

Bioethnography

Bioethnography brings both epidemiological data and ethnographic data together. By deploying this method, I understand body-environment interactions to be entanglements, in which bodies and environments are involved in a complex network of interactions, and are reciprocally malleable. In proposing this bioethnographic approach, anthropologist Elizabeth F.S. Roberts calls for an integration of “biological and ethnographic data about the larger histories and life circumstances that shape health and disease” (Roberts 2015:2). Past attempts at examining the roles of culture in shaping human biology and behavior have differed from this approach in that they maintain culture and biology as distinct from one another; in doing so, this bio-cultural approach, as it has been called, “leaves unexamined the historical and economic conditions that continuously shape biological processes and scientific study itself” (Roberts 2015a:3). By contrast, bioethnography combines “two different methodological bundles—ethnographic observation and biological sampling—in a synthetic, symmetrical analysis that understands environment-body interactions as always relational, contingent, and constructed phenomena” (Roberts 2017b:1). Bioethnography relies on a comprehensive and interdisciplinary examination of causality to dismantle existing narratives within the fields of public health and anthropology. Neither sufficiently explores the *relationality* of environment-body interactions, but together they have more power to do so. Bioethnography is a call for researchers and thinkers

in these disciplines to experiment with collaboration in an attempt to more appropriately address widespread issues of health.

Roberts' ongoing experiment in bioethnography has been made possible through a collaboration with the ELEMENT study. Since the fall of 2012, Roberts has been attending ELEMENT meetings and spending time in ELEMENT laboratories at the University of Michigan. In March 2013, she began to conduct observations of project staff and participants in Mexico City, where she then spent fourteen months engaged in ethnographic research with a small subset of ELEMENT study participants. This sub-project, entitled "Mexican Exposures", now involves a team (that includes myself) working to develop the bioethnographic platform that will allow for the combination of her ethnographic data with ELEMENT's epidemiological data.

I joined the project in the fall of 2016, as an undergraduate student in the inaugural semester of Roberts' Mexican Exposures laboratory. She and postdoctoral fellow Camilo Sanz set up this laboratory in their effort to organize and manage the field data she collected from fifteen months living in Mexico City. Work in the Roberts lab involves a combination of qualitative coding media: we use the qualitative coding software Atlas.ti (see figure 1) to assign codes to her eighteen months' worth of field notes, and the online photograph organizer SmugMug (see figure 2) to code the photographs from the field. Each week, lab members spend five to six hours coding in the lab, slowly assigning meaning to the notes and photos. We also gather once a week to discuss new codes. The Mexican Exposures literature that she eventually publishes will inevitably hold traces of each of us, and the codes we have so carefully and collaboratively created.

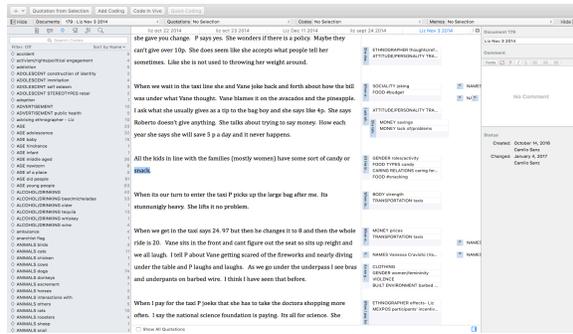


Figure 1: a screen in Atlas.ti includes a list of codes (left), field-note text with codes assigned to particular phrases (center), and space for memos (right)

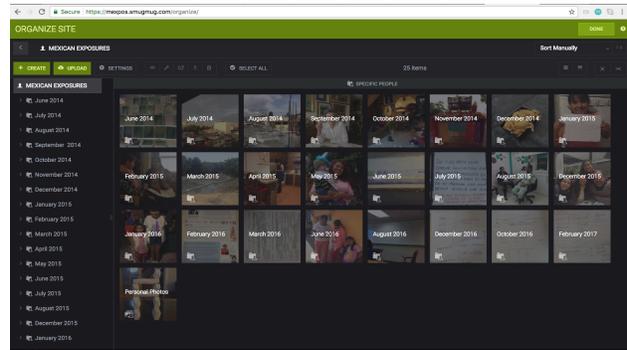


Figure 2: The SmugMug website chronically organizes Roberts' eighteen months of photos from the field. This allows us to easily find and code images from her time conducting ethnographic fieldwork in Mexico City.

Early in my project involvement, I took an interest in pursuing my own bioethnographic endeavor focusing on the complexity of food and eating, both in the lives of the working-class participants in Mexico City and for the ELEMENT research team in Ann Arbor. I began examining the ways that food and nutrition manifested themselves in Roberts' fieldwork, through coding the "food-focused" days of notes and photographs—which consisted of kitchen inventories, food shopping trips, and notes from her Mexican Exposures children's ELEMENT study visits. I began to understand the structure of daily life for her informants, and to think about where, when, and why they eat what they do. The data was complex, and not at all enumerated or epidemiological. I also began examining ELEMENT's dietary assessment information, which I began to link to what I was seeing in Roberts' ethnographic data about eating among families in Mexico City. During visits, ELEMENT staff administer a Food Frequency Questionnaire (FFQ)—which is a widely used and accepted diet recall tool—as a means of quantifying and then examining participants' diets.

Erica Jansen, a postdoctoral fellow in nutrition at SPH who works with the ELEMENT data, worked with me to coordinate ELEMENT and Mexican Exposures data. She spends much of her time running statistics and building charts from the ELEMENT diet data, thinking about

intersections between diet patterns and outcomes such as those related to behavior, development, and menopause (to name a few). Through meetings with Roberts, Sanz, and myself, Jansen became interested in trying to put together the ethnographic and epidemiological data. To understand epidemiological approaches to food and eating I began attending ELEMENT diet team meetings, which have become central to my understanding of the epidemiological data collection and research processes, and also to my interaction with the ELEMENT project.

Bioethnography is still in its infancy, and Roberts and Sanz are working continuously with ELEMENT researchers to coordinate and synthesize their data. As my research and collaboration have unfolded, I have discovered that there is no objective “bioethnography” waiting for me to uncover it. In an early article about bioethnography, Roberts laid out a schema for bioethnographic analysis; but it has become clear that the building process is arduous and will lead to different outcomes with every new focus and researcher (2015a). To quote and loosely interpret ethnographer and philosopher Annemarie Mol, “the object of manipulation (in our case bioethnography) tends to differ from one practice to another”, and thus the reality of bringing bioethnography into practice, is that its “reality multiplies” (Mol 2002:5). But the reality of bioethnography was never really intended to be one; and in many ways, Jansen and I are the first to put bioethnographic analysis into practice, creating the first of its many realities to come. By situating myself in the midst of a larger bioethnographic endeavor, coding fieldnotes, analyzing ELEMENT diet data, and attending diet team meetings, I have found myself participating in knowledge production itself.

Developing Bioethnography

I came to bio-ethnography in hopes of using its methodological toolbox to comprehensively analyze food patterns in Colonia Periférico, the working-class neighborhood of Mexico City where Roberts situates her ethnographic research with three of her six Mexican Exposures participant families. In examining the nutritional lives of these families through her field notes, I have examined how historical, political, and economic processes have found their ways into the bodies of the neighborhood's residents. This is especially salient in the wake of the implementation of the North American Free Trade Agreement (NAFTA), a trade liberalization accord signed into effect in 1994. NAFTA has greatly altered the landscape of food availability, prices, and quality in Mexico; while probably not the single cause, its correlation with rising rates of obesity and diabetes, cannot to be ignored. Post-NAFTA, sugar has saturated the Mexican landscape: the nation has seen an increase in its consumption of corn-derived sugar, as well as an increased availability of processed snack foods (which are often high in sugar) (Clark 2012). Through exploration of both Roberts's field notes and ELEMENT data as sources of primary knowledge, and from my own observations of ELEMENT nutrition team meetings, I have sought to integrate the context of NAFTA's implementation into the narrative of food and its network of meaning within this working-class Mexican context.

The process of operationalizing bio-ethnography presented more of a challenge than I had expected, and ultimately became much of my work. I assumed that I would find clear patterns in the field notes overall, but I spent weeks in the Roberts lab just coding a single day's activities. Jansen and I continued to meet regularly in the dedicated pursuit of a concrete bio-ethnographic accomplishment. We first built a chart that sought to somehow quantify and sort the food events that appeared in the ethnographic notes, hoping that through tracking food brands, meal timing,

quantities of food purchased, and social details of nutritional events, we would eventually be able to extract statistical meaning from the qualitative data.

Though this type of precise tracking aided me in thinking critically about such features of nutritional life in Colonia Periférico, it did not produce the means for quantitative evaluation we had hoped for. Roberts' notes aren't precise enough to quantify in any significant way. But this should not have come as a surprise; bioethnographic analysis is not meant to simply use ethnographic data to generate public health data—or vice versa. Instead, our commitment to bioethnography has forced Erica and I into creative shape shifting; when the chart did not provide the best way to do this, we turned to the pre-existing strengths of both ethnography and epidemiology; we chose to examine FFQ statistics and to think about their meaning in the context of the knowledge afforded by the field notes. I set to work coding, with no clear ideas as to what I was looking for, how I would find it, or what it would mean for the shape of my project. In those initial months, I had no idea that my process itself—rather than just its outcome—would be so central to my work.

It was through this directionlessness that I began to feel the tick of Roberts' daily life in Colonia Periférico, and the lives of her informants. Children came into focus in my thinking about eating events, as in my coding, I saw kids eating snacks at every juncture. Furthermore, public health literature often zeroes in on childhood obesity and food availability in schools as key topics. Through reading the notes, it became especially apparent that laws aimed to prevent sales of junk food and soda in schools have just moved these sales to the schools' immediate peripheries. One afternoon while standing on the street just after school let out, Roberts observes that “there are kids all with sugar snacks in their mouths. Or with Cheetos equivalents” (Roberts, FN Oct. 7:2014). While standing in line with Mexican Exposures participant Griselda at Bodega

Aurrera—a Wal-Mart-owned supermarket chain— she notes that all the kids in line with their mothers have some sort of candy or snack (Roberts, FN Nov. 3:2014). Food punctuates daily activity in Colonia Periférico, and the streets are lined with people eating and selling everything from tamales to pre-packaged snack cakes and potato chips. As I coded these notes and thought about the density of interaction with food, it occurred to me that, in a public health analysis, these types of food events would be labeled “discretionary”—a term that just didn’t seem to apply.

Discretion: Personal or Corporate Judgment?

So-called *discretionary* foods permeate the daily lives of residents in Colonia Periférico. But to call these foods *discretionary* (def.: available for use at the discretion of the user) assigns responsibility and blame to the consumer instead of recognizing the collection of circumstances that brings people to eat cheap caloric, processed, and sugary foods. In public health literature, discretionary foods are defined as “sugar-sweetened beverages (SSBs) and high saturated fat



Figure 1: this image from the National Institute of Public Health (INSP) in Mexico calls on citizens to prevent non-communicable disease (NCD) associated with obesity by "checking themselves", "measuring themselves", and "exercising". Publicity efforts such as these place burden on the individual to prevent obesity.

and/or added sugar (HSFAS) products, which include salty snacks, pastries (*pan dulce*), cookies, cakes, candies, chocolates, sweeteners, and ready-to-eat cereals (RTECs)” (Batis 2016). Beyond assuming

that the consumer chooses these foods, the use of the term *discretionary* to categorize these food and drink items reflects the individual- and behavior-based

recommendations that characterize anti-obesity policy in Mexico and globally. Food systems, and dietary decision-making more generally, do not happen in a vacuum though. Mexico's national anti-obesity policy was designed to take a multisectoral approach, but in its rollout has failed to provide structural or systemic intervention, focusing instead on education and changing behavior (Gálvez N.d.). "*Tu puede cambiar tu vida*" ("you are able to change your life") flashes across the screen as Mexican Exposures informants Alma and her daughter, Mar, turn on the T.V. in their house one afternoon (Roberts FN, Oct. 5:2017). "*Checate, midete, muevete*" (see Figure 3) is a catchy public health tagline plastered on billboards and posters, telling Mexicans that all they need to do to prevent obesity is "get medical screening, measure themselves, and exercise" (IMSS 2015).

In examining the rise of obesity and chronic disease in Mexico, it is crucial to think about not only behavior and eating patterns that have changed over the last two decades, but also the larger system of food distribution and marketing within new programs of economic development (Gálvez N.d.). The Mexican food landscape has shifted dramatically in the last 20 years, in the wake of NAFTA's sweeping trade liberalization, and the prevalence of obesity has increased in coincidence with the trade deal's implementation period. In many ways, it seems as though the United States has, through the implementation of NAFTA, exported obesity to Mexico. Moving away from an individualized framework of thinking about obesity, Clark et al. address environmental factors, hypothesizing:

1. The food environment (e.g., what types of food are available where and for what price) affects diet quality and an individual's risk of becoming overweight or obese.

2. Trade and trade policies influence the food environment. Specifically, evidence suggests that trade policy is one influence on food availability and prices (Clark 2012:54).

NAFTA certainly isn't the only reason for Mexico's rising obesity rates, but it has disrupted the nation's labor markets, and reorganized the economic incentives for specific imports and exports. NAFTA has accelerated Mexico's transition to a liberalized economy without creating the necessary conditions for responding to the economic, social, and environmental shocks of trading with two of the biggest economies in the world (Canada and the United States) (Fox 2010).

The trade agreement came on the backs of a series of neoliberal restructuring efforts in Mexico throughout the 1980s and 90s. Beyond restructuring the Mexican food landscape, NAFTA has also allowed foreign mining, agro-business, and banking corporations to dominate Mexico's corporate landscape. NAFTA has profoundly changed the labor market in Mexico. In the lead-up to NAFTA, the Mexican government weakened the collectivized *ejido* agrarian system, which had been a cornerstone of land access and agrarian livelihood for Mexican peasantry since the 1910-1919 Mexican revolution. Under the *ejido* system, much of Mexican farmland was cooperatively owned, and could not be bought or sold. This system presented one of the final substantial impediments to free trade, and was reformed in the interest of attracting foreign global investment (Yetman 2000). Additionally, since NAFTA's implementation, subsidized U.S. corn has flooded the Mexican market, further making small-scale farming an unfeasible livelihood. Faced with increasing poverty, these small-scale farmers—formerly safeguarded by the collectivized *ejidos*— are often faced with no choice but to accept low-wage

jobs in export industries, move to urban centers to find work, or migrate to the U.S. as farmworkers¹.

These economic shifts—while most pronounced in rural areas— also find their way into life in Colonia Periférico. In one visit, Mexican Exposures informant Alma discusses efforts to curb obesity, first mentioning the rules that have cropped up to define what types of food and beverage kids can and cannot bring with them to school. Then she explains that there’s one Friday a month when there is no school; instead, mothers and their children go to Wal-Mart, where a chef gives a one hour cooking demonstration “about how to cook with less oil and things like that” (Roberts, FN Nov. 1:2014). They then receive a discount on buying the food there.



Figure 2: Alma's shopping cart during a trip to the Wal-Mart owned supermarket Bodega Aurrera.

Inside these cooking classes are layers of neoliberal policies and values (Ayo 2012; Ericson, et al. 2000; Pastor and Wise 1997). Most blatantly, of course, the classes are held in Wal-Mart. Wal-Mart and its Mexican subsidiaries—such as Bodega Aurrera, where Alma buys her non-produce groceries— are driving out local grocery stores, and enticing customers with discounts. Neoliberal ideology, though, also informs the regime of individual-oriented lifestyle changes that the cooking demonstration upholds. Such practices question the healthfulness of Mexican women’s cooking techniques rather

¹ Neoliberalism can be understood as a political and economic approach that favors the expansion and intensification of markets, while at the same time minimizing market intervention. It is essentially a framework for governance beyond the state. At the core of neoliberal ideology are principals of minimal government intervention, market fundamentalism, risk management, individual responsibility and inevitable inequality as a consequence of choice. Since the 1982 debt crisis, Mexico’s economic approach has embraced privatization, liberalization, and deregulation as a strategy to alleviate national debt and stabilize the economy.

than the very presence of Wal-Mart in Mexico City. And with them, individualism and self-agency—core tenets of neoliberal ideology—presume to navigate the way out of the swamp of cheap processed foods.

A set of economic and political conditions and relations changes diet patterns in Mexico City and sends Alma to weekly cooking classes at Wal-Mart. This offers a keen example of neoliberal entanglement; geopolitical processes like agricultural privatization under NAFTA have drastically altered the food environment, but healthcare messages emphasizing individual behaviors, choice, and agency (think “drink less soda”, “exercise more”) emerge out of these same policy transformations (Clark 2012). Obesity in Mexico fits into a larger framework of globalization and neoliberal reform that complicates the idea that people are simply making decisions to drink soda or eat energy-dense food products. The word *discretion* invokes only the individual, ignoring the assemblage of environmental, economic, and political factors shaping food landscapes.

Relationality

Roberts spent much of her Mexico City fieldwork with ELEMENT participants engaging in food-related activities, such as shopping, meal preparation, and eating. Her experiences with the participants highlight the complexities embedded within food consumption. The global public health apparatus glosses over this complexity in its recommendations to cut back on the cheap, sugary, caloric foods that permeate everyday life in working class Mexico City; however, Roberts’ qualitative data provides insight into the sociality of eating, revealing ways in which a transforming food landscape shapes and is shaped by eating (Aburto 2016; Roberts 2017b). Through coding her daily notes, I attempted to think outside the paradigm of obesity statistics

and their prevalent narratives, exploring instead the influences of neighborhood ecology in food purchase and consumption.

Relationality is central to my analysis of food as it relates both to the ways that food and nourishment play out in Colonia Periférico and linear public health perceptions of obesity and its causality. Roberts' field notes provide me with rich examples of overlap between food, toxicant exposure, and trade policy in the daily lives of the Mexican Exposures participants. Roberts discusses the relationality of life in Colonia Periférico, and the ways in which daily life is dependent upon exchange. Reading about the participants' day-to-day surroundings, activities, and schedules has furthered my understanding of the interconnectedness of their *exposures*, which inevitably find their way one into another, and together take their place in the network of daily life. Food, I have learned, is a pervasive constant in the spaces of Colonia Periférico; cans and plastic containers leach endocrine-disrupting Bisphenol A (BPA) into food and drink; construction workshops and auto mechanics occupy the same space as stalls vending street food, bringing with them the fumes from spray paint, gasoline, and cement production; kitchens are sprayed with insecticide to prevent scorpion invasions; piles of garbage sit on the side of the streets, contributing to the hanging stench in the neighborhood's air (Roberts FN, Oct. 5:2014). But mostly the stink comes from a trash- and sewage-filled dam that sits on one side of the neighborhood. In addition to the stagnant smell, this dam provides a physical barrier between the neighborhood and the outside (Roberts FN, Sept. 5:2014). Nothing in Colonia Periférico is *discrete* or isolatable. As Annemarie Mol argues in *The Body Multiple*, reality is relational, and therefore "to be is to be related" (Mol 2002:54). It is with Mol's notions of reality that I approach both Roberts' fieldwork and my own; nothing floats in isolation, nothing is objective, and—most importantly—everything is *relational*.



Figure 3: the trash- and sewage-filled dam creates a barrier (and a stench) that keeps outsiders from entering Colonia Periférico.

It is through this understanding of relationality, and with the familiarity I gained of personal eating habits and preferences through my work with the field notes, that I was directed beyond the energy-balance hypothesis so commonly used to explain obesity (Hernández 2011; Perez-Escamilla 2016; Swinburn 2011). The energy-balance hypothesis is, most simply put, the idea that in order to maintain constant weight, calorie intake must equal calories expended. Change in bodyweight, then, is associated with an imbalance between energy intake and expenditure. Much of the public health literature commonly cites the idea of energy imbalance as a driving factor in the “global obesity epidemic”, suggesting that growing and excessive food supplies in high-income (and also increasingly in low- and middle-income) countries has contributed to higher energy intake (Rivera 2016; Swinburn 2011; Vandevijvere 2015). A concurrent decrease in physical activity fails to “balance” this increasing energy intake (Swinburn 2011).

I found the strong rhetoric of the energy balance hypothesis, alongside rhetoric of individual and corporate responsibility, embedded within Roberts’ field notes. For example,

during an interview with a Zumba class companion, Juana, Roberts asks what she and her husband, Fernando, perceive to be the biggest health problem:

They both say diabetes. Fernando talks about how the government is preoccupied with obesity. And that 7 out of 10 is obese. It's an epidemic. He says it's a *disorden* [disorder] and the fault is *medio de* [modes of] communication— you watch it and it advertises pizza and hot dogs. And people eat too much. They eat more without exercising. They have many relatives that are obese (Roberts , FN Feb. 3:2015).

This response synthesizes various narratives into an idea of why and how obesity interfaces with individuals and their relatives, as well as garners immense political attention. Juana and her husbands' explanations trace back easily to widespread public health claims and policies assigning individual responsibility to rising rates of non-communicable disease and obesity. And the energy balance hypothesis, with its equation of net balance in intake and output, is easy to latch onto in its simplicity. It aligns with a common conception that “all else being equal, the expected result of an increasingly sedentary lifestyle would have been weight gain” (Swinburn 2011:807). But there are multipronged problems with this theory.

First of all, all else is not equal. Energy intake rose not only as a result of increased caloric availability and a rise in sedentary lifestyle, but also because of related environmental push factors (e.g., pervasive marketing and availability of this higher caloric availability). Furthermore, all calories are not created equally and bodies do not recognize them identically; in an indirect (or possibly more direct) and quite literal sense, *relationality* (in this case genetic) is increasingly understood to be at the core of human interaction with food. Hannah Landecker emphasizes these emerging ideas in her piece “Food as Exposure”, discussing the ways in which the field of nutritional epigenetics is reconceptualizing historically held notions of metabolism

(which *did* hold the idea that all calories and micronutrients were created equally for all bodies). Studies are beginning to suggest that “different individuals may process the same food very differently, and that different foods have potential to shape the metabolic interface in very different ways”; this means that “two individuals eating precisely the same food may metabolize it quite differently” (Landecker 2011:173). Epigenetic studies are also pointing to the intergenerational factors at play in shaping metabolism, bringing biological evidence to the idea that “you are what your grandfather ate” (Landecker 2011:177). As such, food items become non-discrete, and we can no longer isolate them as having a single and measurable interaction with a single individual metabolism. Beyond the *relationality* of economic and political circumstances that lead people to certain foods, metabolic processes themselves become *relational* in their intergenerationality.

Landecker’s analysis of slowly shifting theories about metabolism begins to open up what Bruno Latour famously labels scientific black boxes. “Black box”, according to Latour, is a term used by cyberneticians “whenever a set of commands is too complex”, contending: “no matter how controversial they are, how complex their inner workings, how large the commercial or academic networks that hold them in place, only their input and output count” (Latour 1987:3). Public health nutrition recommendations are hinged on a wide variety of black boxes, namely those around isolatable biochemical categories of macronutrients and caloric intake (Landecker 2011). But in exploring the emerging field of nutritional epigenetics, Landecker reflects on the ways in which this field is slowly and radically beginning to open up and deconstruct the scientific black box holding the calorie and the macronutrient as fixed and universal objects. In questioning the presumed objectivity of historical scientific metabolism, both Landecker and the field of nutritional epigenetics begin to erode the stable black boxes that

give rise to the energy balance hypothesis, replacing its universalized inputs and outputs with an emphasis on individual difference and relationality.

Beyond human-human relations, human-environment *relationality* looms largely in emerging ideas of metabolism—and in ELEMENT’s research. Environmental estrogen BPA, for example, has been shown to cause reproductive changes and heavier weights in intentionally exposed animals. BPA is a pervasive chemical, found latent in many plastic bottles and food can linings; BPA is something in the food environment that is outside the individual’s control or perception, yet has potentially drastic effects on metabolism (Landecker 2011). The ELEMENT project, with its primary concern of studying chemical exposures, has placed significant emphasis into analyzing the effects of BPA exposure (Kasper, et al. 2016). But often, BPA exposure occurs through ingestion of food or drink; therefore, through understanding chemical and nutritional exposures as non-discrete, overlapping, and *relational* entities, food itself becomes a chemical exposure.

The field notes helped me to explore these various layers of relationality, which are all present and prevalent in life in Colonia Periférico. One day in particular, Roberts accompanies Carla and her entire family on a trip to the market outside of Colonia Periférico. After a long walk—with no complaints from the kids—they arrive first at the fish market, where Carla greets many of her neighbors, but insists that the better market is up the street. They continue to the next market, the one with the fresher and cheaper veggies, where Carla knows many of the vendors, greeting them along the way. She knows which stands she wants to stop at and from whom she wants and purchase, quickly deciding which items are or are not worth her while. At their first stop, “she asks for a kilo of onion, kilo of *limon* (limes), kilo of *papas* (potatoes), kilo of carrots, kilo of cucumbers, kilo of *jitomates* (tomatoes), kilo of tomatillos, kilo of *chicharo*

(snap peas)” (Roberts, FN Jan. 8:2015). They continue on, with Carla greeting the woman at the next stall before asking about her field bean and mushroom prices. She is momentarily distracted when she “sees a friends and kisses her”, before turning back and asking the stall owner how much her spinach is going for (Roberts, FN Jan. 8:2015). The trip is an expression of how relational life is in Colonia Periférico and its surrounding neighborhoods, and the extent to which deep ties of sociality permeate. But the market experience doesn’t end after Carla purchases somewhere in the ballpark of six kilos of veggies, all for less than seven U.S. dollars.

After purchasing kilos and kilos of vegetables from her personal vendors, they walk by a stall selling pizza, and Flora (Carla’s daughter) asks her for some. She says yes, dipping into the money she’d brought to purchase veggies. Samuel (Carla’s son) wants a sweet empanada, but the vendor is still cooking them, so he settles for a piece of pepperoni pizza. Carla— notably to Roberts— douses the slices in ketchup before handing them to her children. This market trip represents to me a strong departure from the food desert narrative in thinking about food access in Colonia Periférico. In the U.S., food deserts are areas with a high proportion of low-income residents who are constrained in their access to affordable, nutritious food because they live far from a large grocery store and do not have easy access to transportation (Bridle-Fitzpatrick 2015). The concept of a food desert has risen to prominence in public health efforts to explain obesity; however, as I see Carla’s family trip from market to market, where they purchase kilos of cheap vegetables alongside greasy pizza, Colonia Periférico is no food desert.

In Susan Bridle-Fitzpatrick’s article, “Food deserts or food swamps?”, she strongly emphasizes the need to expand research and thinking about food environment. She strengthens her argument—also qualifying her call to research in Mexico—by stating:

Research on food deserts has thus far been almost entirely confined to developed Anglophone countries. Yet the rapid socioeconomic and nutrition transitions that are occurring in developing countries, together with an emerging concentration of obesity in low-income communities, call for multidimensional evaluation of food access in communities of different SES in emerging economies. Such research is an important step in developing appropriate strategies to minimize disparities in diets and health and to facilitate more healthful nutrition transitions (Bridle-Fitzpatrick 2015).

Furthermore, she asserts the importance of understanding food environments beyond geographic mapping and with more complexity than categorizing food-store types in order to effectively evaluate healthy food access. One of the central arguments of her paper—and her assertion of the food desert’s analytical shortcomings—is the importance of a mixed methodology in researching and understanding food environments. In discussing her call to this methodology, she states:

Studies that look beyond residential spaces to examine individuals' practices and exposures within their actual activity and mobility spaces may better capture food environment influences. Qualitative and mixed-methods studies find that work schedules, time constraints, prices, personal mobility, safety, product quality and variety, perceptions of customer service and other store characteristics, and familiarity and habit also influence whether consumers use neighborhood food outlets or more-distant stores (Bridle-Fitzpatrick 2015:203).

Bridle-Fitzpatrick touches on many of the aspects of food that I began to notice while reading Roberts’ field notes, and brings attention to the ways in which food decisions are relational rather than isolated. In Carla’s market trip, I see many of the influencing factors Bridle-Fitzpatrick lists:



Figure 4: Alma unpacking after a day at the market

she passes up one market on her way to the one she prefers; she chooses her preferred vendors out of familiarity and trust; she decides which vegetables she will or will not purchase based on their prices. Her trip also counters the narrative that links obesity with food deserts by asserting the affordability and proximity of fresh fruits and vegetables—which is, albeit, coupled by the pervasive presence of processed and calorie-dense foods. This observation maps onto Bridle-Fitzpatrick’s argument that the areas she has studied in her mixed methods analysis are not food deserts. Rather, she calls them “food swamps, or areas that have adequate access to healthy foods but are inundated with opportunities to consume calorie-dense foods and drinks” (211).

Such is the case in Colonia Periférico, where “traditional” and “Western” foods mix and meld in residents’ diets. This observation does not lend itself to an easily packaged recommendation for more fruits and vegetables, as the commonplace food desert narrative would lead us to assume. As Roberts’ fieldnotes and photos attest, residents of working class neighborhoods have access to heaps of avocados, tomatoes, and pineapples. I have read logs detailing the carrots, lettuce, and apples in Griselda’s kitchen, and I have seen Alma unpacking grocery bags of papayas, tomatoes, and bananas. Roberts discusses this phenomenon in her essay “Food is Love: And then, so what?”, presuming her well resourced, Michael Pollan-reading audience holds that “fatness might be combated in Colonia Periférico if people just (i) ate more fruits and vegetables and (ii) made more home cooked meals – which together are somehow going to ‘solve’ obesity in the United States”. But, she argues, such a mindset emerges from “a

world of stable objects, of fruits and vegetables and measurable calories, instead of a relational world where food is love and more food is more love and more existence” (2015b:249).

She recounts that she has

Never eaten so many fruits and vegetables or so many home cooked meals as [she has] in Colonia Periférico. Gorgeous, ripe produce is cheap, and plentiful, just like sugar. This is no food desert. Most women have lives structured for time to cook and they do, with wonderful produce and a vast array of meats and grease and an abundance of cheap American processed foods, like canned tuna, mayonnaise and Jell-O (Roberts 2015b:249-50).

In this article, Roberts argues that life in working class Colonia Periférico holds little stability, and few things are certain. But one certainty is that “food is love”. Calorie-dense foods and sugary drinks provide a means of asserting love and relationality. Home-cooked meals hold this weight as well; but processed foods have become an irresistible addition to every eating experience with the ubiquitous availability of cheap sugar in the wake of NAFTA. As Roberts mentions, many of these processed foods make their way into carefully-prepared family meals, and are at the center of large gatherings and parties.



Figure 5: Stands selling processed snack foods (left) line the streets in Colonia Periférico. But they coexist with markets selling fresh fruits and vegetables (right), and plentiful home-cooked meals

NAFTA and its sweeping trade liberalization have ensured Wal-Mart, Coca-Cola, and Nestle access to Mexican markets (Clark 2012). These multinational powerhouses, with their shelves of processed junk food, coexist, though, with open-air markets selling fresh fruits and veggies, with local tortilla-makers, and with working class women who spend ample time cooking for their families. The ways that such processed and calorie-dense “discretionary” foods make their way into eating patterns in Colonia Periférico point me to the commonly cited concept of the “nutrition transition”. *Nutrition transition* is a term that has been coined by the public health community to characterize the shift in diet and activity patterns that have corresponded with increasing prevalence of obesity. Early literature described the nutrition transition as a widespread increase in consumption of added fat and sugar in the diet, and often a marked increase in animal food products contrasted with a fall in total cereal intake. Coupled with a move toward low-activity occupations, these dietary shifts have been implicated in the global rise in rates of obesity (Popkin 2001). Initially, this shift was highly associated with transitioning economies, but has increasingly applied to nations regardless of income (and often it is now most pronounced in the lowest income countries), as a result of globalized neoliberal trade policy. But this monolithic notion of the *nutrition transition* proves to be a scientific black box—only the input (a “healthy”, “thin” person eating a “traditional” diet) and the output (an “obese” person consuming a “Western”, “processed” diet) are considered in the field of public health.

The nutrition transition is a set of different dynamic processes that the public health community has reduced to one. To invoke Annemarie Mol, the presumed singularity of *the* nutrition transition removes it from the varied practices and circumstances that are bringing it

into being and sustaining it one place versus another. Mol contends: “objects come into being—and disappear—with the practices in which they are manipulated. And since the object of manipulation tends to differ from one practice to the other, reality multiplies” (Mol 2002:5). The ways that residents in Colonia Periférico are incorporating so-called “discretionary” foods into their diet isn’t the same as the ways these products find their way into neighborhoods in India or in Ghana—or even other neighborhoods in Mexico City. In Colonia Periférico, food decisions are governed by the principle that “food is love” and all that love entails—security, relationality, and togetherness to name a few things (Roberts 2015c). One day, Mar returns from school and pulls out an almost untouched lunch: she didn’t drink the water Alma had sent her because it had no flavor, and the sandwich held no interest. Upon hearing this, her mother goes and grabs a soda for them to share. On another day, Alma serves Mar a sweetened yogurt when she arrives home from school to make up for the lackluster sandwich and water she was allowed to have during the school day (Roberts, FN Sept. 23:2014). In Colonia Periférico, love is not about caloric frugality or about reducing sugar consumption. It is about delicious happiness. *Discretion* implies a black and white decision between “health” and “chronic disease”; this idea, however, is complicated differently in different places by food landscapes, emotions, and relationships.

The reality of *the* nutrition transition is not one; there is not *a* nutrition transition, rather there are *many* different ways that processed and caloric “Western” junk foods make their way into dietary patterns worldwide. And contrary to common discourse, this is not a new phenomenon. The idea that global diets are suddenly changing and that people everywhere are moving from their “traditional” diets to *a* “Western” diet is a simplistic assessment. Rachel Laudan points out that romanticised notions of the “traditional” diet fail to highlight that many “traditional” foods (e.g., English fish and chips; Hungarian goulash; the Swedish smorgasbord)

have been invented in the last two hundred years. Nostalgic concepts of past diets also presume that they were more healthful (e.g., less dangerous and better balanced) than our contemporary diets. But ingesting food is, and has always been, inherently dangerous, whether due to pesticides (now) or moldy and vermin-infested flour (in the past) (Laudan 2001). Furthermore, in his book Sweetness and Power, Sidney Mintz argues that food patterns have always changed over time in response to political and economic shifts. He claims that “webs of signification” give meanings to things like particular food items, and that the “traditions” that we associate with the way we grow, process, distribute, prepare, and eat our food have in large measure been constructed through the larger social processes of colonialism, development, and globalization (1985). So not only does the nutrition transition have multiple realities, but diet has been transitioning throughout history.

Despite this, the public health rhetoric of the nutrition transition is pervasive: Roberts’ landlady, Señora Natividad, explains to her “People are fat because they eat too much grease and junk food. And they don’t have time to cook at home” (Roberts, FN Sept. 27:2014). But from the field notes we also learn that many women (especially those without formal sector employment) spend much of their average day shopping for and preparing food for their families. In houses with extended families, the women have set schedules dictating who buys the food and cooks on which days. In Griselda’s house, for example, she cooks on Mondays, Wednesdays, and Saturdays. Her sister-in-law cooks Tuesdays, Thursdays, and Fridays. And her mother-in-law cooks on Sundays. The men never cook. The women in Colonia Periférico cook *comida* (mid-afternoon meal, usually the largest of the day) almost daily, shopping at a combination of local *tianguis* (open-air market), multinational supermarkets, and neighborhood corner stores to get the combination of snacks and meal foods that will most satisfy their families. The freezer is

nearly empty in every Mexican Exposures woman's kitchen, pointing to the “now”-ness of food purchasing and preparation. While waiting in line at the bakery one morning, Roberts fantasizes about writing an op-ed to counter all of the people from the U.S. who contend that cooking is the answer to combatting obesity. She pushes back against this common conception with her ethnographic observations, noting: “here, women cook, and cook well. But everyone eats so much junk food on top of that... I think there is something to be said about how I think these fat people are getting a lot of good vitamins and minerals and vegetables and they are fat (Roberts FN, Nov. 1:2014). Junk food punctuates daily existence for residents in Colonia Periférico—but many of them are also eating home-cooked meals daily.

This fusion that Roberts mentions, between pre-packaged and homemade worlds, is readily apparent in the inventories Roberts took of her informants' kitchens. They aren't, as we may be led to believe, different dietary worlds, but an ever-evolving one that incorporates increasingly available products. Griselda stores dried chile peppers in her empty Quaker oat containers. Alma makes tacos with canned tuna, and Jello sits next to *chicharron* (fried pork skins) in the refrigerator (Roberts, FN Oct. 2 and Nov. 14:2014). Mothers, wives, daughters, and sisters display their love for family members and loved ones through the food they serve. Carla makes *chicharron* to put in her homemade *gorditas* (fried stuffed corn cakes), because her children love them. Alma serves Mar the tuna tacos she loves, and Griselda buys cans of sardines so that her husband can have the sandwiches he likes.

When Roberts takes inventory of Alma's kitchen, Alma describes not only the foods she buys, but more emphatically explains *for whom* she has bought each item. Why so many oats? Her daughters—Mar and Dany—used to love oatmeal, but they stopped eating it, so now they sit untouched on a shelf. What explains the tall stack of tuna cans in the pantry? Dany loves tuna

with mayo, and Mar loves tuna tacos. Everyone except Alma's husband loves *crema* (similar to sour cream)—Jose prefers mayonnaise— so she buys both. Mar will eat *crema* on anything, even on bananas, which she sometimes eats as a snack (Roberts, FN Oct. 2:2014). As Roberts talks with Rosa (another Mexican Exposures participant) she is frying eggs for her son, Ruben, despite the fact that she is on a tight budget and the price of eggs has risen. When food is love, it's about more than just prices or just calories or just the diseases that it may or may not communicate. It provides satisfaction when so much else is uncertain, and brings pleasure that helps to protect from some of the dangers—violence, unemployment, extortion—of everyday life in Colonia Periférico. Foods do not fit into clean, discrete categories like “Western” or “traditional”; food is either “love” and “relationality” or it is not.

The Food Frequency Questionnaire

As I examined how diet manifests itself in the Mexican Exposures data, I simultaneously began, with Jansen's help, to look into the ways in which diet appears in the ELEMENT data. The FFQ is ELEMENT's foremost tool in gauging and analyzing its participants' diets. The FFQ is a tool commonly used in the field of public health for semiquantitative assessment of nutrient intake. In their article “Development, validation and utilisation of food-frequency questionnaires – a review”, Cade et. al define an FFQ to be:

A questionnaire in which the respondent is presented with a list of foods and is required to say how often each is eaten in broad terms such as x times per day/per week/per month, etc. Foods chosen are usually chosen for the specific purposes of a study and may not assess total diet (2002:567).

As part of their development assessments, ELEMENT researchers administered FFQs to the study's participants beginning at one year of age, for the first five years of a participant's life. There have been multiple revisit phases for ELEMENT cohorts, in order to track later stages of development. One is called the P20 phase, and studies prenatal lead exposure, early childhood growth, and sexual maturation, and another seeks to gauge the fetal origins of neurobehavior through examining metabolic interactions between lead and cholesterol (Cantoral, et al. 2016:2). Each of these also utilizes the FFQ to characterize its participants' diets.

FFQs are generally used in epidemiology and nutrition science to think about diet as an exposure in relation to health outcomes. Public health researchers use the questionnaires because they have been designed and tested to be reproducible and relatively accurate surveys sufficiently simple to use in large epidemiological studies (Willett, et al. 1985). The two most widely used formats are the Willett and the Block questionnaires, each of which emphasizes different components of the diet. The FFQ has proven to be useful as a large-scale diet assessment tool as it is easy to administer and inexpensive to process (Wirfalt, et al. 1998). ELEMENT uses the FFQ as its dietary assessment tool because it “allows the identification of dietary indicators that can be employed to compare the intake of nutrient-rich food and its association with risk factors. [It] also [helps] to establish food-intake patterns in the population” (Rodríguez-Ramírez 2009:S524).

The FFQ was first developed and administered in the United States dietary context in the mid 1980s, but has been replicated with differing categories for use in other countries (Franceschi, et al. 1993; Hernandez-Avila, et al. 1998; Navarro, et al. 2001). Modified versions of Willett's FFQ are now commonly used in the U.S. to assess dietary intake, usually as it relates to chronic disease development and toxic exposure (Hu, et al. 1999). The ELEMENT project

uses a variation of the Willett protocol, as researchers measure levels of specific micronutrients whose uptakes are associated with various environmental toxicants (e.g., calcium uptake and lead exposure) as well as blood toxicant levels (e.g., mercury, cadmium) (Ettinger, et al. 2006; Moynihan, et al. 2017).

In an article published using ELEMENT data, the study's FFQ is described as "a semi-quantitative, food frequency questionnaire designed to estimate usual dietary intake over an extended period of time prior to completion of the questionnaire" (Tellez-Rojo 2004). The ELEMENT FFQ has 110 foods grouped into ten categories, plus beverages. Ten frequency values are used to calculate the average daily intake of a given category. The frequencies are then multiplied by the standard serving size to calculate average daily intake. ELEMENT participants are administered an FFQ that is the same Willett-based questionnaire as that used in the 2006 Mexican National Health and Nutrition Survey (ENSANUT). The questionnaire is

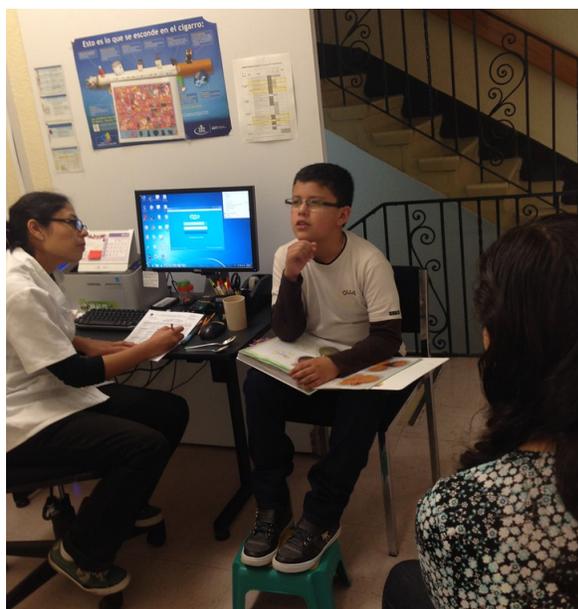


Figure 6: an ELEMENT nutritionist administers the FFQ to a participant in the P20 study, while his mother sits by to help

administered directly to the participant children, whose mothers are present for assistance. It uses a one-week recall period, asking about daily and weekly consumption. ELEMENT nutritionists then calculate the participants' average daily caloric intake based on the responses. The FFQ responses allow ELEMENT researchers to make general statements about their populations' diets, as well as assess associations between food consumption and various anthropometric outcomes.

The FFQ's validity in quantitative assessment is commonly criticized for bias and imprecision, and I have never heard an ELEMENT researcher discuss the FFQ without some sort of disclaimer about its weaknesses (Wirfalt, et al. 1998). When we discuss our statistics, Jansen always mentions that they know the FFQ responses are full of error. At one of the Thursday morning diet meetings, she and I spoke about our collaboration in a presentation entitled: "A Day in the Life of an ELEMENT Family: an examination of diet with a mixed-method approach". While tracing a day of eating in Alma and Mar's lives, we discussed the specific data points we have explored with the field notes. The epidemiologists in the room were not shy about their own distaste for the FFQ, and did not hold back in disqualifying its accuracy. For them, as for so many other public health researchers, the FFQ maintains its stability only in the absence of a better tool to take its place. Though epidemiologists rely on black boxes (such as those of the macronutrient and the calorie) to make their categorizations and conclusions about the FFQ, the FFQ itself is by no means one of these black boxes. Researchers in SPH know that every food quantity reported is likely inaccurate, and that responses may be missing certain foods just because participants have forgotten about them. They use the data as a means of ranking individuals' consumption in relation to one another, rather than to measure objective quantities of consumption. The FFQ finds its epidemiological meaning through assessing *relationality*. It does not measure people as individual consumers, but in relation to one another. *Discrete* individuals' data provides nothing; just like life in Colonia Periférico hinges on relationality, so does the FFQ.

But if realities are multiple, then how do we think about the existence of the U.S.-developed FFQ in Mexico City? ELEMENT researchers in Ann Arbor, Toronto, and Boston are creating statistics from this data, are building facts and recommendations. They hope, as

scientific practices do, to “produce knowledge that, called *universal*, can travel widely”(Mol 2002:114). But are they considering that Mexican families are not eating the same breakfast or lunch, and same dinner at the same times or with similar foods? Or that no one is drinking single-serving bottles of soda, but instead drinking straight out of two-liter bottles?

One Thursday morning a month, I glimpse into the world where these answers are produced by attending the ELEMENT diet team’s meetings in the University of Michigan School of Public Health. At one meeting, the team was discussing a research project that seeks to plot biomarkers (such as blood pressure and BMI) against specific dietary groupings (called factors) commonly constructed from food groups in FFQs. One of the food groups on the table up for discussion one week was labeled “cream-based vegetable soups”. Part of the way through discussing the results, one of the ELEMENT diet team members pointed out that they thought *crema de verdura* (the FFQ category in Spanish) was not, in fact, cream-based vegetable soup. It was pureed vegetable soup without cream. Pureed vegetable soup has an entirely different set of presumed health implications than cream-based vegetable soup.

Cream-based vegetable soup belongs in the “transitioning” diet pattern, while pureed vegetable soup fits squarely into the so-called “prudent” diet pattern. Once that researcher learned that the soup isn’t cream-based, her statistical results immediately switched from being a possible point of concern about obesity and chronic disease to one of potentially healthy implications. Cream-based vegetable soups, though they are still more statistically correlated with the “prudent” factor because of their vegetables, contain high-fat dairy, a group slightly more correlated with the “transitioning” factor. Furthermore, the other vegetable groups on the questionnaire have a correlation coefficient twice as strong as that of the “cream-based” soups, which in reality namely consist of pureed vegetables. Attending that ELEMENT diet meeting

reinforced for me the importance that anthropology and public health work to combine their knowledge to strengthen one another. Without a more comprehensive understanding of the food landscape in Mexico City, how can epidemiologists categorize dietary patterns or give relevant nutrition recommendations? The “prudent” and “transitioning” factor groupings carry with them the singularizing assumptions of the nutrition transition, continuing to dichotomize and romanticize the Mexican food landscape.

These observations, while they inform my understanding of how ELEMENT creates knowledge from data, do nothing to coordinate our practices. Jansen and I put bioethnography into action, then, when our presentation concluded in stating a key takeaway to be: “the ‘nutrition transition’ has resulted in a creative mixture of ‘traditional’ food and ‘Westernized’ food ([which] can complicate trying to classify diets)” (ELEMENT Diet Meeting Presentation, March 16). This statement, after reading Yates-Doerr, Latour, and Mol, felt somewhat dilute to me on a personal level because it still accepted the “nutrition transition” framework. But its simplicity is a gesture of hope that anthropology and epidemiology can in fact meet somewhere that suits them both. Our presentation fascinated the ELEMENT diet team members. Some of the researchers in the room expressed that they had simply never thought about these factors of daily life when they conducted their FFQ analyses. This moment presented me with the strongest potential for influence I’ve experienced in my months involved in the project, and strengthens my hope in the possibility of bioethnographic success.

Illuminating Uncertainty

At the beginning of my involvement with the project, I had high hopes in the evidence that would emerge through working with the ELEMENT statistics. These were quickly clouded

by confusion and doubt as Jansen and I began to run the initial statistical tests on FFQ data. After we met in a computer lab at the University of Michigan School of Public Health, I reflected in my field notes on the trepidation I felt:

The statistics, though we somehow believe in numbers to hold a black and white truth, are wholly based in self-report and nutritionist-translated quantity measurements. The standard deviations are huge and some of the reported daily caloric intakes do not match with other data (namely BMI), which makes me question any sort of aggregate statistics that would be calculated or conclusions that would be made (Marcovitch FN, Jan. 9:2017).

My education has been grounded in both the life and social sciences, so I am no stranger to placing my trust in numbers. But in light of that afternoon in the computer lab, I began to think about where they had come from; FFQs are self-reported surveys, aimed at capturing average daily nutritional intake. In reflecting on our preliminary statistical results over email correspondence, Jansen stated:

Kids who reported eating more vegetables, less refined grain, and more whole grain had a higher body mass index. I really can't seem to make sense of that at all! Unless it has something to do with inaccurate reporting— kids who are heaviest could be over-reporting their healthy food consumption (Jansen, email Dec. 27:2016).

These uncertainties have informed our search for a larger picture, leading us to think about how to accurately understand what kids are actually eating, and why FFQ statistics look the way they do. Our collaboration has evolved significantly since our first meeting. Though each attempt at analysis has taken longer than anticipated, no step has been unnecessary. Each iteration of our partnership has brought us to the next.

When I received the FFQ responses from Erica, beyond the fact that I had no idea how to read them, it was my first time seeing any purely numerical project data, which marked another turning point in my bioethnographic endeavor. We first considered the possibility of applying Roberts' field notes to the statistics, which led us to the idea of separating the data from the six ELEMENT participant children in her Mexican Exposures study. Though six— in the realm of statistics— is no reasonably significant sample size, we could have concrete standards of comparison using children whose lives have been studied both quantitatively and qualitatively. We hoped to use these data as a point of departure in analyzing the numbers we saw and the habits that appear in Roberts' daily field notes, and that it might lead us toward specific points of interest in the FFQ.

We began our exploration by choosing four food categories that served to highlight a spectrum of designated health values (e.g. *obesogenic, healthy*): tortillas, vegetables, meat, and sugar-sweetened beverages. We hoped that, with statistics that Erica generated from these categories, notable patterns would begin to emerge, and that we could use these patterns to think about how FFQ categories operate within daily life in Colonia Periférico. The Mexican Exposures kids' data, we hoped, would serve as the overlap in the ethnographic/epidemiological Venn diagram for food data, and that it would be our key to illuminating the FFQ's numbers.

Rather than focus on poking holes in the validity of the FFQ, I will point to a moment when my knowledge of everyday life in Colonia Periférico made me think twice about how the FFQ produces statistical results. This case highlights that none of the facts produced, nor the way they are produced, exist in isolation, but are all built from a collection of ideas, policies, and values. The FFQ responses are relational both with these policies and (as I've already pointed out) with each other. This case has proven to be a compelling jumping off point for my

bioethnographic collaboration with Jansen; it does not point directly to a solution for filling the cracks in the FFQ, but exposes the nuance and variation embedded within eating practices. It helps us to think about the ways in which dietary habits are as much—if not more—about safety and love as they are about fuel and energy, and informs us of the ways in which food consumption—just like knowledge creation—is a relational network, not to be effectively measured by gauging isolated parts.

Vegetables offer an excellent window into understanding the difference between discretionary and relational foods. As such, I will examine the appearance of vegetables both in and out of the FFQ to explore how vegetables in Mexico City are entirely different than the vegetables an ELEMENT researcher based in the U.S. eats. Vegetables in Colonia Periférico, however, are likely captured in the FFQ to reflect the ELEMENT researcher's understanding of vegetable consumption. With this case study, I am not attempting to disregard or disqualify the FFQ data, but rather seeking to consider and illuminate the numerous and varied ways in which context weighs heavily on results. This case has furthermore prompted me to think about effective ways to open black boxes of scientific and mathematical knowledge beyond simply identifying them as reductionist. The ethnographic data has helped us to illuminate the processes that unfold between the FFQ's input (participant responses) and output (statistics).

What Categories Leave Unexamined

What do you think when someone tells you to eat your vegetables? Maybe it's a bag of baby carrots and ranch dressing or possibly a spinach salad with tomatoes and cucumbers. Maybe you dread bombardment yet again by the kale craze. You may not, however, be considering the bowls of soup, sauces, or sandwiches you'd had that included veggies. Neither, it

seems, are the ELEMENT participants in their FFQ responses nor the researchers in their conclusions. The vegetable categorization asks participants to report the frequency with which they consume: tomatoes, avocado, broccoli, cauliflower, carrots, squash, lettuce, chard, spinach, other greens, cactus leaf, green beans, cucumber, zucchini, and cabbage. The FFQ also gauges consumption of onion, tomato, and chili peppers in salsas, as well as soups with vegetables.

In effect, vegetable consumption ties into notions of bodily health and “good” nutrition, because that’s what comes into play in epidemiological analysis and conclusions. Much of the rhetoric around obesity and the nutrition transition hinges on the assumption that people are eating too many processed and energy-dense foods and not enough fruits and vegetables. Fruits and vegetables are diametrically opposed to *discretionary* foods in the dialogue about global obesity; presumably, if people *chose* (using their own will or good judgment) to eat more fruits and veggies, then they would not be obese. I have focused on vegetables (rather than fruits, for example) for a couple of reasons. Primarily, I have done so for simplicity’s sake, as a means of limiting my analytical scope. Moreover, vegetables— as opposed to fruits— are less frequently consumed in their artificial or sweetened forms. But I have also chosen to look into vegetable consumption because I began to notice patterns in notes, photos, inventories that matched with neither generalized discussions of obesity nor the reported FFQ data.

When Roberts accompanies participant families (usually mothers) on their excursions to *tianguis*, she notes the vast quantities of tomatoes, onions, chili peppers, tomatillos, lettuce, and carrots purchased at amazingly low prices. Many families go to these markets “every day for tomatoes or veggies. They go to the supermarket for soap or oil” (Roberts, FN Sept. 10:2014). This routine doesn’t match with ideas about food deserts, which are based partially on the tenet that “healthy” foods are less available or more expensive in low-income areas. Assuring access

to fresh fruits and vegetables has been a key objective in obesity prevention policy (Tellez-Rojo 2004). However, if these women are shopping for vegetables almost daily, the lack of availability of “healthy” options is not causing them to become obese. This mismatch between commonplace public health rhetoric and considerations of everyday life in Colonia Periférico further sparked my interest in looking into the vegetable as a category of interest. Safety, for example, is a theme that pervades all decision-making in Colonia Periférico, whether consciously or not.

Concerns of safety have become a key sticking point for me in my thinking about vegetables in the FFQ and in daily life in Colonia Periférico. While I can—and often do—grab a raw carrot to crunch on, there are various factors preventing a resident of Colonia Periférico from doing the same. The most fundamental concern is that of finding and conserving clean water.

Water is not a given in Colonia Periférico; Alma discusses how she “does not have water during the day. It starts again at night... so they have to wash at night”



Figure 7: A water filter that gets rid of bacteria in a Mexican Exposures informant’s kitchen

(Roberts, FN Sept. 6:2014); Roberts’ landlady, Señora Nati, turns off her water at night. But beyond water as a valuable and limited resource, it is an issue of safety. Some water comes piped in from the streets, and some comes from water tanks—called *tinacos*— that are housed on people’s roofs. Residents also purchase water from large barrels. Señora Nati tells Roberts that there are people in Colonia Periférico who drink the water and have no stomach problems. Some people boil their water, adding chloramine. The water that comes from the pipes also has chloramine in it (Roberts, FN Sept. 12:2014). Obtaining

potable water is not a given in Colonia Periférico; the potable water that exists is not only limited, but as Señora Nati conveys, in order to assure its safety, it is laden with its own chemical exposures and requires disinfectant. But even then, Alma says that “all of [their] water comes from the *garafon*. Even boiled and even to wash veggies” (Roberts, FN Oct. 2:2014). Understanding the complexities of water access and cleanliness in the neighborhood is vitally linked to understanding the why and how of eating practices—especially with fruits and vegetables, which must be washed prior to consumption.

Roberts’ field notes contain many references to the details of veggie-preparation, and the wide range of efforts that go into preparing vegetables for use. One step, though, that seems ubiquitous is that of applying disinfectant to the veggies in the washing process. In Rosa’s kitchen, there are several types of vegetable cleaner disinfectant (Roberts, FN Mar. 30:2015), Alma tells Roberts that she puts a few drops of disinfectant in whenever she washes veggies (Roberts, FN Oct. 2:2014). This pervasive presence of vegetable-specific disinfectant speaks to the large amount of effort these women must exert toward to the ends of safely eating veggies. And also partially explains Roberts’ observation that “they don’t eat very many fresh veggies, mostly cooked. And most fruit goes into juice” (Roberts, FN Oct. 5:2014). ELEMENT thinks mainly about lead, BPA, and mercury as prevalent toxic exposures, but women in Colonia Periférico must account for the very real possibility that vegetables and water are both toxic exposures. And furthermore, they must reconcile these fears of toxicity with messages from anti-obesity campaigns calling on mothers to feed their families more vegetables and fruits and drink more water.



Figure 8: Griselda displays the disinfectant drops she uses to wash her lettuce

Lettuce is the vegetable paradox: it is raw and it is everywhere. Griselda and Roberts go to a neighbor's house to celebrate the day of the Virgin of Guadalupe, where Rosa serves *pozole* (a traditional meat and corn stew) with “the usual lettuce, onion, radish” (Roberts, FN Dec. 11:2014). As Roberts takes inventory of Griselda's kitchen, she notes the bowl of shredded lettuce soaking in a bowl on the counter. Griselda then uses it to garnish their tacos for that afternoon's *comida* (the large afternoon meal)(Roberts, FN Oct. 2:2014).

Carla's fridge is no exception to this lettuce trend (Roberts, FN Nov. 18:2014). Lettuce—and the occasional onion or radish—is the only vegetable that appears without fail in every woman's kitchen and at every social gathering. When I see lettuce on countertop after countertop and in meal after meal, I understand that it must be, in some way or another, an expression of that love that goes into food.

Women soak and disinfect the lettuce, investing significant labor into something that I assume pleases their families. Lettuce, the commonplace raw vegetable, joins crema and chile sauce as a condiment, and is always set out to accompany favorite dishes such as *tacos*, *tostados*, *sopes*, *flautas*, and *pozole*. Though some of these foods are eaten on a regular basis, many of them mark special occasions, which are often celebrated as large and social gatherings. So women invest significantly in spreading love on these occasions. They use some of their precious and limited potable water to do so. Lettuce, then, must be held in high esteem if women are

willing to use some of the clean water they have purchased—along with disinfectant drops— in order to carefully wash it and serve it to their families alongside a vast majority of meals.

Mostly, though, people in Colonia Periférico eat their vegetables cooked into dishes or pureed into sauces. Marcella serves *picadillo* with peas mixed into the ground beef, alongside a



Figure 9: tomatillos and chiles boiling before being made into a green salsa

soup with green beans, corn, chile, and pieces of meat; Carla throws tomatoes in a blender and then puts chiles and tomatillos in a pot to make salsa for her version of *picadillo* (which contains carrots potatoes, and onions in addition to the peas Marcella put in hers). Griselda serves Roberts and her assistant ethnographer, Vane, white rice with peas and carrots accompany corn cakes and chicken, which are covered in a homemade green

salsa. Señora Nati ladles Roberts a bowl of meat soup brimming with vegetables. One afternoon after a trip to the *tianguis*, Alma cooks a meal of tomato soup, sausage, and green salsa. And the list of goes on.

These meals all contain vegetables, but I'm unconvinced that the FFQ can accurately capture them. They're not appearing in people's diets in discrete form. They're not isolated or separable. But the structure of the FFQ does exactly that. This led me to wonder: in their reporting, do ELEMENT participants remember those peas and carrots that were in their rice or their *picadillo*? Sure, there are categories for these types of consumption, but can participants accurately recount all of the meals they covered in homemade green salsas? What about the lettuce they sprinkled? Of course, these concerns hold true with any self-reporting recall survey.

But to further complicate data analysis, many of the ELEMENT researchers are examining this data from the United States, where consuming raw veggies is not only possible and safe, but also is assumed. Eating vegetables, in the U.S. context, often happens in discrete dishes. “What veggie do you want?” I remember my mom asking when she served nightly family dinner. I’d answer “broccoli”, or “spinach”, or “cauliflower”—she’d steam or sauté some, and put a portion on everyone’s plate. I don’t see people in Colonia Periférico eating many dishes made up of exclusively vegetables. I also don’t see them eating raw vegetables. But what do these differences mean for ELEMENT’s analysis? In making conclusions and recommendations, do ELEMENT scientists think about water infrastructure influencing food choices?

This is precisely what ethnography brings to a mixed methods approach. I discovered that I could not adequately understand vegetable consumption without first considering water infrastructure, which led me back to the history of Mexico City—one entirely predicated on water manipulation. The Aztecs first built the city on a lakebed, with the idea of “living with nature”. Then, the conquering Spaniards arrived with their determination to overpower nature and subdue the lake. They replaced Aztec canals with streets, draining the lake and clearing the city’s forests. As a result of this history, Mexico City now expends significant resources in importing roughly 40 percent of its water from distant sources. And this water must be pumped more than a mile up into the mountains that house the city, which comes at a significant carbon price. But despite all this effort and energy expended, 20 percent of the city’s residents still do not have reliable running water. Many of the city’s poorest residents must, if they can, pay for truck-delivered water. Not to mention that as all of this goes on, the city—resting on volcanic soil and porous clay—is sinking (Kimmelman 2017).

The leaky and unreliable pipes, Roberts asserts, carry potable tap water to her

informants—when they work, that is—but they may be lined with lead. So, as ELEMENT researchers study the detrimental health outcomes associated with lead, where do their findings fit in with the public health message to drink water—potentially contaminated or otherwise expensive and flavorless water— instead of cheap and delightful soda? And more so, as Roberts suggests:

Water is simply not reliable. It doesn't always run and it's not experienced as safe to drink. Working to make water more available, more reliable, and less expensive than soda might be impossible when Mexico is now Coca Cola's number one market in the world, and the largest consumer of bottled water in the world (Roberts 2017a).

In a world where building trust through sociality is paramount to survival, water is not reliable. Trucks selling water cannot always permeate Colonia Periférico's boundaries; but other deliveries—Coca Cola, for one—always get in. Coca Cola can be relied on where water cannot (Roberts 2017a:22). Which brings me back to thinking about vegetable consumption.

Conclusion

Vegetables do not exist in isolation from the systems—like water infrastructure— that shape daily life in Colonia Periférico. Public health recommendations to eat more vegetables can't change that. With this in mind, I look at the FFQ and think about water's stable existence in the lives of ELEMENT researchers and its unreliability in the lives of Colonia Periférico's residents. When I began thinking about vegetables, and about deconstructing the FFQ, water was not on my mind. But as I thought more and more about vegetable consumption, I found it increasingly difficult to think about anything *but* water. I lamented not spending months of research reading books about water infrastructure in Mexico City alongside those of knowledge

production and sugar consumption. After reading notes of daily life in Colonia Periférico, water and its precariousness permeate my understanding of vegetables. But this type of broad and *relational* thinking doesn't play into ELEMENT's diet analysis. This case further solidifies the importance of using ethnography to help address issues of health; I began looking at veggies in an attempt to deconstruct the Food Frequency Questionnaire, and ended up thinking about what it means to live in a sinking city where municipal water is pumped up mountains, and where many working class and marginal citizens must buy potable water from a truck that may or may not arrive. When the Coca Cola truck never fails and the Wal Mart-owned supermarket never closes, soda and Wonder bread are infinitely more reliable than water and raw veggies.

In Colonia Periférico, the qualitative data fills a hole in scientific fact production around vegetable consumption. People simply aren't eating vegetables in the discreet manner that the FFQ categorization is designed to capture. Furthermore, vegetable consumption in the neighborhood is relational and entangled—ultimately, I understand it to be a case of food as *relational protection*. In using vegetables as a proxy for “healthful” food consumption, the public health apparatus does not account for the ways in which the reality of vegetable consumption (just like soda consumption) is relational, and is an enactment of security and love. When water is unsafe, unreliable, expensive, and scarce, families who don't eat fresh vegetables are not being ignorant to what is healthy; rather, they are preventing illness and increasing the stability of their families.

In an attempt to deconstruct the concept of a “discretionary” food or drink, I have pointed out that food decisions in Colonia Periférico are not adequately understood as involving individuals exercising their “freedom to decide or act according to [their] own will or judgment” (OED). Poor water infrastructure is not an issue of personal judgment. Neither is corporate

infiltration. The *relationality* of food systems is central my exploration of ELEMENT's FFQ. Through my collaborative work in coordinating epidemiological and ethnographic data, I have complicated the individualizing and universalized practices commonly used in public health by asserting the dependence objects have on relations that hold them together in a particular time and place. Nutrients and practices are not isolated from the systems that produce them. Vegetables in the U.S. are not vegetables in Colonia Periférico; the Coca Cola in the University of Michigan School of Public Health is not the Coca Cola that Alma gives Mar when she comes home from school. One is about calories and sugar content and the other is about love.

However, in my attempt at bioethnographic analysis, I must admit that I have fallen short of my goals. The points I've made, the analysis I've done, and the conclusions I've come to are ultimately asymmetrical; they privilege anthropology over public health, and continue to place blame squarely on individualizing public health practices. I came into this work with the hope of doing more than simply using ethnography to critique individualizing public health practices, but that was easier in intention than it has been in practice. My work is more critical of the public health apparatus than effective bioethnography can afford to be. I have spent much of this paper taking pieces of public health policy, rhetoric, and practice and discussing what anthropology brings to the table to make them better fit the lived realities they seek to analyze and change, but have not given sufficient attention to what public health contributes to the anthropological side of research and analysis. This points to the lofty goals, though, that I proposed in this paper, and that we hold more broadly with the bioethnographic method; as such, this shortcoming is more illuminating than it is disappointing as we continue to pursue bioethnographic analysis. I came into this project knowing it would not follow academic conventions, and with the hope of being able to break those conventions down. Though this paper's outcome is not what I had

envisioned, it speaks both to the difficulty of bringing methods from very different disciplines together, and the slow and iterative process that solidifying this bioethnographic method will be.

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