THESIS

FOOD INSECURITY AMONG IMMIGRANT POPULATIONS IN THE UNITED STATES

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ABSTRACT

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As households immigrate to the United States, abrupt environmental changes may impact household food security, health, and productivity. Persistent, cultural food preferences may affect a household's ability to achieve food security when removed from their country of origin, resulting in a higher incidence of food insecurity (FI) for immigrant households. Alternatively, a positive immigrant self-selection effect could result in healthy, wealthy, and highly motivated households deciding to immigrate, thus leading to a scenario where immigrant households are less likely to be food insecure than their native counterparts. Using a subsample of the Bureau of Labor Statistics' Current Population Survey Food Security Supplement, this study compares food security levels between immigrant and non-immigrant populations in the United States across Chinese, Indian, Mexican, and African immigrant populations and across varying household compositions. To compare the food security status of particular immigrant groups with their respective native counterparts, we implement a coarsened exact matching (CEM) method to match households on various observable characteristics. Following CEM, we estimate a linear probability model for each subgroup of matched strata, with immigrant status acting as the variable of interest. Additionally, we employ an Oaxaca-Blinder decomposition method to decompose differences in FI that are explained by mean native/immigrant differences in household characteristics and the relationship of those characteristics to FI. I find that immigrant populations vary greatly in FI incidence across both country of origin and household composition, and that the drivers of differential FI also varies between groups. For immigrants

from Mexico and West Africa, immigrant status is associated with a 3.53% and 7.59% decrease in the likelihood of achieving household food security respectively. Conversely, for immigrants from India and China, immigrant status increases the likelihood of achieving food security, at 5.98% and 2.51% respectively. Among Mexican immigrants, differential characteristics are the primary driver of the gap of food security, namely differences in education and occupation endowments. For Chinese and West African immigrants, however, differential returns to characteristics are the primary drivers of the gap in food security.

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Chapter 1- Introduction

As households immigrate to the United States, they are exposed to a new food culture and lifestyle that may impact their ability to maintain the same diet. Such environmental changes can have significant impacts on immigrant food security, health, and productivity. In fact, strong, persistent food preferences (Staehle 1934; Logan and Rhode 2010; Bronnenberg, Dube, and Gentzkow 2012) that are rooted in culture (Guiso Sapianza and Zinngales 2006; Fernandez 2010; Alesina and Giuliano 2015) may affect a household's ability to achieve food security when removed from the culture of their country of origin (Famine Inquiry Commission- 1943 Bengal Famine; Atkin 2016). Ultimately, this could lead to a higher incidence of food insecurity (FI) for immigrant households. Alternatively, certain immigrant subgroups may have cultural food behaviors and preference that provide better information on low cost, healthy cooking. Additionally, a positive immigrant self-selection effect could result in healthy, wealthy, and highly motivated people as the ones who make the decision to immigrate, thus leading to a scenario where immigrant households are less likely to be food insecure than their native counterparts (Kennedy et al 2006). In this way, it is likely that food insecurity prevalence is heterogeneous across immigrant groups.

The primary focus of this study is to compare food security levels between immigrant and non-immigrant populations in the United States across specific, diverse immigrant groups. Additionally, this study examines what household characteristics are associated with differences in FI between immigrants and natives. Specifically, we decompose differences in FI that are explained by mean native/immigrant differences in household characteristics and returns to those characteristics.

To date, there has been little research examining food insecurity across various immigrant groups. In a raw comparison between broadly defined immigrant/non-immigrant groups, Flores-Lagunes et al (2018) finds that immigrants are overall more likely to experience food insecurity (FI) than natives. Similarly, Chilton et al (2009) concludes that children of immigrant mothers are at increased risk of fair or poor health and household food insecurity than children of US born mothers. Borjas (2011) finds that immigrant children have significantly higher rates both of poverty and of program participation than do native children, but these rates vary widely among different groups of immigrant children depending in part on place of birth, parents, and national origin. Borjas' work and that of others provides motivation to disentangle the heterogeneity of economic hardship across diverse immigrant groups.

This research differs from previous investigations of immigrant food insecurity by performing a comprehensive analysis of FI incidence across varying immigrant subgroups and household compositions. Additionally, this study works to understand what specific attributes and circumstances lead to an increase or decrease in FI among these populations. This information is pertinent to the design and implementation of effective policies and programs to reduce food insecurity prevalence in the United States, ultimately minimizing negative externalities of FI and improving the health and productivity of society as a whole.

It is important to work towards decreasing FI prevalence in the United States because FI is associated with multiple negative implications beyond just physical hunger, including decreased productivity, negative impacts on mental health, poor childhood health outcomes, and micronutrient deficiency (Chilton 2007, Collin 2009, Skalicky 2005; Gundersen and Kreider 2009). Additionally, there is evidence that immigrant populations may experience heightened

externalities of FI due to limited access to health insurance (Derose et al 2009), public assistance (Borjas 2002), and housing hardships (Huang and King 2018).

For our analysis, we use the Food Security Supplement from 1998 - 2017, which is a taken from a sub-sample of the Bureau of Labor Statistics' Current Population Survey. This data includes a 12-month food security variable that defines households as either food secure, low food secure, or very low food secure. Importantly, the CPS data identifies immigrants to the US, their country of origin and their year of arrival. Using this information, we compare Chinese, Indian, Mexican, and West African immigrant populations to native US populations. Within each group we examine smaller subgroups based on household composition. These include households with two adult partners, male single households, and female single households.

To compare the food security status of immigrant groups to their native counterparts, we first match natives and immigrants using coarsened exact matching (CEM). This method matches households on observable characteristics including county of residence, education level, household income, family size, and the year and month that the survey was administered. By using CEM, we minimize bias in the estimation of the treatment effect, in this case, immigrant status (Stuart 2010). Following CEM, we estimate linear probability model for each subgroup of matched strata, with immigrant status acting as the variable of interest. We find that immigrant status is a significant indicator of food security status for every subgroup, but varies in sign according to country of origin and household composition. Overall, immigrant status is associated with a 1.34% decrease in the likelihood of achieving household food security (significant at $p<.01$). For immigrants from Mexico and West Africa, immigrant status is associated with a 3.53% and 7.59% decrease in the likelihood of achieving household food security respectively. Conversely, for immigrants from India and China, immigrant status

increases the likelihood of achieving food security than comparable natives, at 5.98% and 2.51% respectively. These results suggest that immigrant subgroups are highly heterogeneous. Two possible explanations for what is driving differential food security incidence across immigrant subgroups include differential immigrant self- selection effects and the impact of cultural food preferences on household food behavior.

In an effort to better understand what is driving the native/immigrant gap in food security incidence across immigrant subgroups and household compositions, we employ an Oaxaca-Blinder style decomposition to understand how mean differences in household characteristics and returns to those characteristics explain differences in FI between immigrants and natives. We also employ CEM weights to the decomposition to control for immigrant endogeneity. We find that among aggregated married immigrants and Mexican immigrants, differential characteristics are the primary driver of the gap of food security, namely differences in education and occupation endowments. For Chinese and West African immigrants, differential rate of returns to characteristics is the primary driver of the gap in food security. For Indian immigrants, differences in characteristics and returns to these characteristics similarly contribute to the gap in food security incidence. Not only do immigrant populations vary greatly in food security incidence across country of origin and household composition, the drivers of differential food security levels vary between groups.

Identifying which populations are the most vulnerable to food insecurity is important for policy makers when considering legislation that impacts access to public assistance addressing food related hardships. In addition, the drivers of food security incidence vary across populations, and programs that are targeting food related hardships among immigrants ought to tailor their approach to address the specific obstacles that populations are facing.

Chapter 2- Literature Review

Determinants of Food Insecurity Incidence

There is an abundance of research across disciplines working to understand what characteristics and circumstances contribute to food insecurity around the globe. Smith et al (2017) used the FAO's food insecurity scale to identify the top 5 risk factors associated with the largest increase in the likelihood of experiencing food insecurity around the world: low levels of education, weak social networks, low levels of social capital, low household income, and being unemployed. Within the context of the US, negative income shocks, high food prices, household location changes, and changes in household size increase the probability of being food insecure, while SNAP participation is estimated to reduce the probability of being food insecure, though findings are mixed depending on the model specification (Swann 2017; Coleman-Jensen et al 2013). In addition, assets such as human capital (e.g., lower financial management skills) (Gundersen and Garasky 2012), physical assets (e.g., renting rather than owning a dwelling), and financial assets (e.g., limited savings, lack of access to credit)(Fitzpatrick and Coleman-Jensen 2014), are protective against food insecurity over negative income shocks and job loss.

Even after controlling for economic resources available to households, previous studies have confirmed that the composition of households influences food insecurity. For example, food insecurity rates are higher in the following situations: single-parent households; households with grandchildren present (Ziliak and Gundersen 2016); households with a disabled parent or child (Huang, Guo, and Kim 2010; Burke et al. 2016; Sonik et al. 2016); and households with chaotic living conditions (Fiese et al. 2016).

Understanding what increases household risk of food insecurity is important to this study's analysis. By effectively controlling for these observable drivers of food insecurity, we are able to measure the remaining native/immigrant difference in food insecurity incidence that is associated with immigrant status.

Food Insecurity Incidence among Immigrant Populations in US

In studies that examine the determinants of household food insecurity, demographic variables such as race and immigrant status are typically used as control variables; however, it is not often that race and immigrant status itself acts as the variable of interest. Chilton et al (2009) examines childhood food security among children of poor immigrants, and the relationship of food insecurity with fair or poor health. It is found that among poor immigrants, the risk of fair or poor health and food insecurity is higher among children of recent immigrants than among children of US-born mothers.

Flores- Lagunes et al (2018) gives explicit consideration to overall demographic differences in exposure to food security by examining the incidence and severity of food insecurity across racial, ethnic, and immigrant groups over the great recession in the United States. They find that immigrant populations experience greater incidence of food insecurity than their native counterparts before, during, and after the great recession; however, the immigrant population experiences lower severity of food insecurity before, during, and after the Great Recession. This study uses a broad categorization of immigrant/ non-immigrant and also examines raw group differences. Our study builds upon this nationally- representative picture of food security incidence by examining conditional mean differences across specific immigrant groups.

The four immigrant subgroups examined within this study are immigrants from Mexico, China, India, and West Africa. Numerous case studies have been conducted to examine food insecurity incidence among specific immigrant populations within a confined geographic location. We draw from these studies in order to better predict the type of food insecurity heterogeneity across varying immigrant groups. Rosas et al (2009) examines the dietary associations of household food insecurity among children of Mexican Descent within California and Mexico, ultimately finding that Children of Mexican Descent frequently experience household food insecurity, with higher rates of food insecurity occurring in Mexico. However, food insecurity incidence among the children living in California is associated with a higher consumption of fat, saturated fat, sweets, and fried snacks than of children not experiencing food insecurity. Walsemann et al (2017) assessed food insecurity by immigrant status and ethnicity from 2001 to 2011 among California residents, categorizing Latinos and Asians as US-born, legal permanent residents (LPR) and non-LPR (students, temporary workers, refugees, and undocumented persons). Ultimately, they found that US- born Asians reported similar levels of food insecurity as US-born whites, whereas Asian immigrants and all Latinos report greater food insecurity than US-born whites and non-LPR Latinos report a higher risk of food insecurity than naturalized/LPR Latinos. Moving away from California, Hadley et al (2006) performs structured interviews about a non-probability sample of West African refugees in northeastern USA. The study finds that food insecurity was indicated in approximately half of the households (53%) and the food insecurity rate lowered as time lived in the USA increased. Ultimately, these case studies indicate that food insecurity differs by both immigrant status and ethnic groups, and examining overall incidence across the United States within four different immigrant subgroups will add to the overall understanding of immigrant food insecurity in the United States.

Beyond examining food security incidence among immigrant households, several studies have investigated the differential impact of FI across immigrant/ non-immigrant populations. Huang and King (2018) examine the link between food insecurity and housing hardships in the United States. They find that the negative association of food insecurity is three times larger for immigrants than for non-immigrants and persistently food insecure families have the highest risk of experiencing housing instability compared to families experiencing short-term food insecurity. Additionally, food insecurity incidence may differentially impact immigrant households due to limited access to health insurance (Derose et al 2009) and public assistance (Borjas 2002). The difference in how FI differentially impacts other aspects of material hardship for immigrant vs. non-immigrant households indicates that it is especially important to understand the drivers of food insecurity among immigrant populations.

There has been ample literature that has worked to measure the negative impact of restrictions to public assistance eligibility for immigrants on food security incidence among these populations (Van Hook and Balistreri 2006; Borjas 2002,2004). Borjas (2011) examines program participation among immigrant children with a more acute interest in understanding the differential effect of program participation on native children vs immigrant children. He finds that immigrant children have significantly higher rates of both poverty and program participation than native children, but these rates vary widely among different groups of immigrant children depending in part on place of birth, parents, and national origin. Borjas importantly identifies heterogeneity in immigrant populations regarding poverty and program participation by country of origin. This work calls to better understand in what other ways immigrant groups are experiencing differing levels of economic hardship both from natives and other immigrant

subgroups, and motivated the decision to observe differential food insecurity across immigrant subgroups by country of origin.

Previous research regarding immigrant food security in the US has notably examined FI incidence among aggregated immigrant populations, the relationship between public assistance eligibility and food insecurity incidence, or identified the differential externalities of food insecurity among immigrant populations. This study contributes to this literature by examining the native/immigrant conditional mean difference in food insecurity incidence across various subgroups of the immigrant population divided by both country of origin and household composition, followed by the decomposition of which differential household characteristics and returns to household characteristics that contribute to native/immigrant food security gap.

Immigrant Networks

Previous studies have worked to understand the relationship between immigrant networks on immigrant outcomes. Networks can be viewed as, "communities or patterns of communication." Networks play a role in the decision to migrate, and the types of networks that affect migrants' movements include families, enclaves, neighborhoods, communities, and formal institutions. In addition, networks affect migrant achievement in terms of, "opportunities, employment, education, and mobility", and often act as labor market networks (Bankston 2014). Patel and Vella (2013) examine the relationship between the occupational choice of recently arrived immigrants with those of established immigrants from the same country, finding strong evidence of network effects. Namely, that new arrivals are choosing the same occupations as their compatriots at a regional level, and individuals who choose the most common occupation of their compatriots enjoy a large and positive earnings effect. Thus, it is likely that the existing

immigrant network may serve as either an economic benefit or resistance to newly arrived immigrant households. If the majority of immigrant compatriots are working low wage jobs, it is likely that that is the type of job newly arrived immigrants will accept, thus setting the trajectory for a household's potential economic mobility. The opposite is true for immigrant networks comprised mainly of highly skilled and paid workers.

It is often the case that immigrant networks at a regional level also provide social support for households. There is evidence of social support improving wellbeing, potentially moderating the relationship between income and some health-related outcomes (Heaney and Israel 2002). Garasky et al (2006) assessed two rural Iowa counties and found that individuals with a higher social support were less likely to experience food insecurity. Marco and Thorburn (2008), however, in a study examining Oregon residents, found no evidence of social support offsetting the negative impact of low income on food security. Essentially, the effect of social support in food insecurity across all populations is largely unknown.

Network effects among immigrant populations in the United States likely impact the acculturation of immigrant households through occupational stability as well as social safety nets. These factors may impact an immigrant household's ability to achieve and maintain food security status. In addition, a stronger presence of immigrant networks in a region will likely increase the prevalence of culturally relevant food choices for that immigrant subgroup. Therefore, the impact of food culture and immigrant networks on food insecurity levels among immigrants is intertwined and the separate impact of each is difficult to measure. Highly resourced immigrants may select into neighborhoods possessing an immigrant network that supports their cultural food preferences and favored social structure, thus impacting food security levels. Importantly, immigrant populations may experience differential abilities to select into

supportive networks. With an understanding of the importance of immigrant networks, we aim to control for the impact of immigrant networks on immigrant food security by controlling for spatial variation within our sample. Additionally, understanding how immigrant populations integrate and thrive within their new country of residence informs the discussion surrounding what could be driving differential food insecurity incidence among immigrant populations.

Decomposition Methods and Food Insecurity

Decomposition methods are widely used in social research to quantify the contributions to group differences in average predictions from multivariate models. The OBD method was initially implemented to decompose the gender wage gap (Oaxaca 1973); however, recent studies have utilized this method to identify contributions to demographic differences in food insecurity, such as the gender gap in food security (Broussard 2019), the non-homeowner/ homeowner gap in food security (McIntyre et al 2016), and racial and ethnic disparities in food security among families with infants in the US (Nam et al 2015).

Similarly, Arteaga et al (2017) decomposes household food insecurity for children of US-Born and Foreign- Born Hispanics by examining the changes in food insecurity for Hispanic kindergarteners between 1998 and 2011. They identify that the food insecurity gap between children of US born and foreign-born mothers increased by almost 7 percentage points. The factors- child, family, and state- that contributed to the FI gap differed over time. Across all time periods, lower familial resources among immigrant families and state fixed effects are a large component of this gap. However, a large proportion of this gap is not explained by differential HH characteristics and could be potentially driven by differential effect of the great recession,

growing anti-immigrant sentiment, and/or the relatively large share of unauthorized immigrants on certain time periods.

This study employs an Oaxaca-Blinder decomposition method to understand how differential native/immigrant household characteristics and returns to these characteristics explain the native/immigrant gap in food insecurity incidence. Our work differs from the Arteaga et al (2017) by broadening the scope of our study beyond the Hispanic population, and, rather than examining variation in FI over time, the focus of this study will be to examine variation in FI across immigrant subgroups.

The Impact of Food Culture on Food Behaviors

Power's (2008) developed a concept of "cultural food security" which includes three pillars: food availability, access, and use. Moffat et al (2017) follows up on this framework by conducting interviews with immigrants and refugees living in a medium-sized city in Canada. They found that cultural factors are integral to satisfying each of the three pillars of food security for immigrants and refugees, and it specifically plays itself out in low income and high food prices acting as barriers to accessing desired food. Additionally, immigrant participants had difficulty shopping, identifying, and using new foods, such as canned items.

Atkin (2016) is a pioneer in the economics literature examining the impact of food culture on household food behaviors. Building upon previous studies proving how migrants bring their food preferences with them, and that these food preferences are persistent (Staehle 1934; Logan and Rhode 2010; Bronnenberg, Dube, and Gentzkow 2012), Atkin examines the impact of food culture on the caloric intake of these Indian migrants. Atkin finds that the interstate migrants consume fewer calories per rupee, that these migrants bring their food

preferences with them and, finally, that this gap in caloric intake between locals and migrants depends on the suitability and intensity of the migrants' origin-state food preferences. The impact of food culture on consumption levels in the context of Indian migrants shows that culture can impact household decisions and, in fact, households are willing to sacrifice nutrition in order to maintain cultural relevance within their diets. The findings of this story are not necessarily generalizable to other populations; however, they invite the investigation of whether or not other migrant populations are experiencing nutritional impacts due to persisting food preferences that serve as an obstacle to adjusting to a new place of residence. Atkin's work informs an important piece of motivation for this study, particularly regarding the role of differences in food culture on the likelihood of US immigrants experiencing higher incidences of food insecurity than their native counterparts. In this way, food culture may play a role in explaining a native/immigrant gap in food security incidence.

In another study investigating the role of food preferences on food behaviors, Dubois et al (2013) measure the proportion of international differences in food purchases attributable to international differences in food prices and attributes. The results suggest that although differences in prices and characteristics are important, a true explanation of the differences in food purchases lies in an interaction between the economic environment and differences in food preferences. This paper indicates that re-locating to a new set of food prices and attributes will not entirely alter your food purchasing decisions, rather, your food preferences play a role in your food purchasing decisions. Likewise, Wang and Lo (2007) in a study examining the grocery shopping behaviors of suburban middle-class Chinese immigrants in Toronto, find that ethnic affinity has a stronger affect than economic rationality on immigrants' choice of shopping venue. On the basis thereof, immigrant households re-locating to the United States likely have different

food purchasing behaviors than natives, and these habits may be difficult to maintain in a new food environment with a new set of food prices.

The impact of food culture on a household's food behaviors is likely heterogeneous across immigrant households based on both country of origin and household composition. Atkin (2016) found among Indian migrants that the 'caloric tax' attributable to differential food preferences is larger when the favored foods of a households' origin state are expensive compares to local alternatives, and also when both the husband and wife within a household are migrants, as opposed to just one. Given this logic, the relative price difference between local food options and culturally appropriate preferred foods will likely vary across immigrant subgroups, having differential impacts on a household's ability to achieve food security. Additionally, the link between culture and food may be stronger within certain cultural contexts, causing the impact of food preferences on food purchasing behaviors to vary across immigrant subgroups based on country of origin. Hadley et al (2009) found that the among a subgroup of West-African refugees living in the northeastern USA, culturally related barriers such as difficulty in the shopping environment and language barriers were associated with the occurrence and severity of food insecurity. Cervellon and Dubé (2005) examine the cultural influences in the origins of food likes and dislikes by comparing cross-cultural differences between the French and Chinese. They ultimately find that both affective and cognitive factors contribute to the formation of the Chinese attitude towards food, in contrast to the affect dominance in the French attitude towards food. Additionally, Chinese are proven to adhere rigidly to their traditional food habits and experience little change to their basis for liking upon relocation to Western Culture. Among Hispanic immigrants, Variyam and Aldrich (2000) find that as time living in the US increases, American eating patterns tend to erode away at traditional diets, ultimately causing a

decrease in overall diet quality. Similarly, Greder et al (2012) examined Latina immigrant mothers within a rural area of a Mid-western state, ultimately finding that these mothers retained their cultural identity; however, they varied in their ability to negotiate their new food environments to maintain cultural food practices and promote healthy child eating patterns. Ultimately, cultures role in influencing the strength and persistence of food preferences is shown to vary across the ethnicity, and we anticipate that the impact of food culture on food insecurity will be largely heterogeneous across immigrants from China, Mexico, India, and West Africa.

On a similar thread, household composition likely plays a role in the impact of food preferences on food behaviors. Married households will have two individuals with a certain set of food preferences rather than one, potentially making the switch to local foods more difficult.

Self- Selection Effects among Immigrant Populations

Immigrant populations are not randomly selected from the general population, making it difficult to disentangle the effects of immigrating on certain outcomes. Mckenzie et al (2010) exploits a lottery based quota system of Togan migrants into New Zealand, finding evidence of migrants being positively selected in terms of both observed and unobserved skills. These unmeasured attributes may behave as a key determinant of the ability for immigrant households to assimilate into a new country, and ultimately to attain food security.

Due to the heterogeneity of different immigrant populations, there is likely variance in the type of self-selection that is present across these groups, effecting how quickly and successfully certain immigrant households may be able to assimilate. Primarily, immigrant households may be less likely to be food secure than their native counterparts due to a negative immigrant self-selection effect that would make it more difficult for immigrants to produce

adequate food from the same resources (Haberfeld and Lundh 2014). Alternatively, positive immigrant self-selection could result in healthy, wealthy, and highly motivated people as the ones who make the decision to immigrate, thus leading to a scenario where immigrant households are more likely to be food secure than their native counterparts due to these certain endogenous characteristics (Kennedy et al 2006). Positive or negative selectivity depends on the relative returns to skills in the countries of origin and destination (Borjas 1987; 1990). Due to the differences in the relative returns to skills across immigrants from differing countries of origin, it is increasingly important to examine these subgroups separately. Further, motivation for immigration to the US need to be assessed in light of complex social context and factors such as divergent immigration paths and a range of associated circumstances (Chen et al 2009).

Additionally, the type of self-selection occurring within each immigrant subgroup will likely affect the types of households that choose to immigrate to the United States from each country, their immigrant pathways, the types of jobs they take upon arrival, and how resourced and able they are to select into residing within beneficial immigrant networks. Ultimately, immigrant self-selection will affect not only what households immigrate, but also the ability for these households to assimilate comfortably into the United States, and to achieve household food security.

Heterogeneity of Immigrant Populations across Country of Origin and Time Spent in the United States

Beyond heterogeneity in the type of immigrant self-selection, this study examines immigrant subgroups separately primarily due to heterogeneity of observable characteristics. This study examines four immigrant subgroups separately based on country of origin:

immigrants from Mexico, China, West Africa, and India. Differences in observable characteristics are accompanied by differences in the reason, or pathway, of immigration. In fact, 29% of immigrants from China, 43% of immigrants from India, 5% of immigrants from Sub-Sahara Africa, and 3% of immigrants from Mexico immigrated due to employment based preferences. The other highest pathway for immigration is due to being an immediate relative of U.S. citizens, which was the reason for immigration for 37% of immigrants from China, 32% of immigrants from India, 45% of immigrants from sub-Sahara Africa, and 67% of immigrants from Mexico (Echeverria- Estrada and Batalova 2020; Zong and Batalova 2014; 2017; 2018). Of immigrants who are working in the US on an H1-B visa, 73.9% originate from India, with immigrants from China taking up the second largest share (Gogol 2020). These immigrants have theoretical or technical expertise in specific fields such as financing, IT, engineering, medicine, etc. As displayed through immigrant pathways such as the H1-B visa, the heterogeneity in immigration pathways is also reflective of the types of jobs immigrants take upon arriving in the United States, how resourced these populations are upon arrival, and the ability for households to select into living in a region of the United States which will provide high levels of economic and social support. As reflected in occupation types, the majority, 29%, of Mexican immigrants work in service occupations, the majority, 54% for Chinese immigrants, 73% for Indian immigrants, and 36% for sub-Sahara African immigrants work in the management, business, science, and arts occupations (Echeverria- Estrada and Batalova 2020; Zong and Batalova 2014, 2017, 2018). These differential trends among immigrant populations in the United States informed the decision to examine food insecurity among subgroups of the immigrant population, separated by country of origin.

It is likely that the direction and magnitude of the relationship between immigrant status and food security will be dynamic with the amount of time an immigrant household has resided in the United States. The way that immigrants spend their time is different than natives, and changes as their length of residence grows (Hamermesh and Trejo 2010). Additionally, food insecurity incidence among certain populations of immigrants has been found to decrease with time spend in the United States, due to positive acculturation effects (Hadley et al 2007). Similarly, immigrant's food preference's influence on grocery purchases is found to be more persistent in the short run, and less persistent over time (Hut 2019). Therefore, the association between immigrant status and food security can be thought of as a dynamic relationship that likely varies across time. We control for immigrant households time spent in the United States in our initial analysis, and also perform additional analysis excluding highly acculturated immigrants in order to further investigate the relationship between immigrant food insecurity and time spent in the United States.

Policy Implications for Research addressing Food Related Hardship among Immigrants

In working to understand immigrant/native differences in food security incidence as well as the characteristics and components that explain these gaps, it is important to understand what public assistance programs are currently in effect to alleviate food related hardships, and the specific ways that this research can contribute.

There are a few key policies that have been proven to reduce the incidence of food insecurity. Primarily, and widely known, is SNAP, the supplemental nutritional assistance program. When thinking about SNAP policy reform, two angles of approach include SNAP eligibility requirements and SNAP participation rates. Increasing eligibility to a larger proportion

of immigrant populations could have significant, positive benefits to immigrant food insecurity incidences (Borjas 2002;2004) and overall health and wellbeing (Bartfeld et al 2015). Differential SNAP eligibility among immigrant populations provides motivation to understand how to best alleviate immigrant food insecurity, and previous studies have called for the SNAP reconstruction in order to more effectively alleviate food insecurity in the US (Gundersen et al 2018).

Non-participation in SNAP reflects three main factors: transaction costs, a small benefit level, or a negative stigma. Transaction costs make up the cost of transportation in the form of the cost of transportation as well as time and childcare costs to get to the SNAP office (Ponza et al. 1999). In addition, benefit levels may be as small as $16 a month, potentially not seeming worth the transaction cost of receiving the benefits. There may be differential transaction costs between populations leading to heightened barriers for SNAP participation. Certain immigrant subgroups may experience weak social networks and limited access to transportation, thus acutely impacting their likelihood in participating in SNAP.

Beyond eligibility and participation, SNAP benefits may have differential effectiveness in combatting food insecurity among immigrant populations. Namely, the amount of SNAP benefits allocated to each household is anchored to the Thrifty Food Plan, or the TFP. One of the TFP's primary shortcomings is that it assumes households effectively have unlimited time to prepare food at home in the most economical way, effectively ignoring and underestimating the price of time in food at home production (Ziliak 2016). There are time requirements associated with the process of assimilating to a new country (Hamermesh and Trejo 2013), thus indicating that immigrant populations may experience higher time constraints than natives. Increased time

constraints among immigrant populations could decrease the effectiveness of SNAP benefits for combatting household food insecurity.

The second public assistance program most notably associated with alleviation from food related hardships are the national school lunch program and the school breakfast program, or the NSLP or SBP. Although school lunch programs are not exclusionary, a high proportion of eligible children do not participate in NSLP or SBP, and food preferences are proven to be a major determinant of consumption, particularly among school-aged children (Cashman et al 2010). If cultural food preferences are an obstacle for immigrant household participation in school meal programs, then it may be important for child nutrition professionals to prioritize not only the nutritional value, but also the cultural acceptability of food available to school-aged immigrant children.

In essence, when considering policies and programs addressing immigrant food insecurity, immigrant populations experience differential access to public assistance, benefits from public assistance, and barriers to participating in public assistance. After identifying which immigrant populations experience heightened risk for food insecurity, a possible next step is to identify how to aid these populations via policies and programs with either increase public assistance eligibility or decrease barriers to utilizing available public assistance.

Outline of this Study's Contribution to the Existing Literature

As previously stated, the primary focus of this research is to estimate the association between immigrant status and food security levels across various immigrant populations and household compositions in the United States. The native/immigrant conditional mean difference in food security captures the gap in food security levels between immigrant populations and their

native counterparts attributable to characteristics, obstacles, or attributes specific to being an immigrant. This study contributes to the literature by examining immigrant food insecurity across four different immigrant subgroups: immigrants from China, Mexico, India, and West Africa. Within these immigrant subgroups, we disaggregate based on if the household is married/single and male/female. In this way, this study also contributes to understanding heterogeneity of food insecurity across varying household compositions. Additionally, this study employs OBD methodology to decompose what household characteristics and returns to these characteristics contribute to the native/immigrant gap in food security. The decomposition methodology helps to better explain what is driving differential incidence in food security between natives and various immigrant subgroups, which is topic area that is largely not understand.

This research draws from studies addressing the impact of food culture on food security, immigrant self- selection effects, and immigrant networks to form possible hypotheses that explain native/immigrant conditional mean differences in food security incidence. Further research is needed to quantify the direct contribution of these factors on immigrant food security levels across varying immigrant subgroups. If certain immigrant households are more vulnerable to food insecurity than their native counterparts, then there may be implications for policy makers regarding increasing immigrant access to public assistance, or rather decreasing immigrant barriers to participating in public assistance programs, such as SNAP, NSLP, or SBP. Alternatively, it may be important to support programs that help immigrants not eligible for SNAP assimilate into the US.

Chapter 3- Data

3.1- Data Source and Key variables

The Bureau of Labor Statistics' Current Population Survey's is a monthly survey of households conducted by the Census Bureau. We use a subsample of the CPS data, the food security supplement (FSS), which includes a 12-month food security variable that defines households as either food secure, low food secure, or very low food secure. The food security supplement is a repeated cross-section and we use data spanning from 1998-2017. In order to maximize available observations by including all available years within our analysis, we match native and immigrant households on the year that the survey was taken, and further include year fixed effects within our model. This will control for time invariance across factors that affect a household's ability to achieve and maintain food security. The survey is available in both Spanish and English and is administered by Census Bureau field representatives across the country through both personal and telephone interviews. About 60,000 households are selected for the CPS each month; however, participation in the survey is not required, thus introducing the possibility of response bias. However, the CPS has one of the highest response rates among government household surveys, averaging around 90 percent after excluding unoccupied or ineligible households (US Census Bureau). Thus, we assume that any response bias is minimal and does not affect the validity of this study.

The current population survey works towards choosing a nationally representative sample, and then further creates weights to increase accuracy in the sample's representation of the nation at large, ultimately mitigating sample selection bias. We do not make use of these weights, but rather implement coarsened exact matching weights, which balance immigrant and

native households on a set of pre-specified characteristics. In this way, out sample behaves as a convenience sample, namely being comprised only of immigrant households that have an adequate native household match according to our specifications. Pew Research Center reports annual facts on various demographic characteristics of US immigrants. To investigate the how accurately our sample of immigrants represents the entire US immigrant population, we compare some key demographic variables our sample of the year 2017, with the 2017 Pew Research Center Report. The demographic composition of our immigrant sample is very comparable to the national immigrant population in terms of income, gender, marital status, and medium age. When compared to the Pew Research report, however, 3.75% less of our sample is from Mexico, 9.45% more of our sample are citizens, 8.73% more of our sample have a bachelor's degree, and 8.63% less of our sample have a high school degree or less. Thus, our sample is slightly higher educated than the national average, and more likely to have attained citizenship status. Ultimately, in spite of these marginal differences, we assert that the sample used for this study does an adequate job representing the Foreign Born population as a whole, and the implementation of CEM weights is still an optimal decision to minimize estimation bias in measuring the impact of immigrant status on food security. The table displaying these comparisons is located in the appendix.

Importantly, the CPS data identifies immigrants to the US, their country of origin, and their year of arrival. Using this information, we can examine different immigrant populations, separated by birthplace, controlling for time spent in the United States. We define immigrants as anyone whose birthplace is not the United States. We examine several groups including aggregated immigrant populations, and then disaggregated subgroups of immigrants who originated from China, Mexico, India, and West Africa. This distinction is made based on

birthplace. West Africa is comprised of 10 countries: Ghana, Nigeria, Cameroon, Cape Verde, Liberia, Senegal, Sierra Leone, Guinea, Ivory Coast, and Togo. The selection of these particular regions of origin was an effort to have representation from varying continents of origin, varying food cultures, as well as to select countries with a large number of immigrant observations. Due to the fact that the CEM method drops observations to form a newly pruned dataset, it was necessary for this study to only examine immigrant populations that are largely represented in the United States.

Other key variables included used in our analysis are household characteristics that act as determinants to a households' probability of experiencing food security. These variables include age, gender, year the survey was taken, county and state of residence, family income, family size, occupation type, education level, SNAP and WIC benefit receipt, and food expenditures.

A possible critique of the data is that the questions which comprise the food security metric are all self-reported. In this way, if there are systematic differences in the way that certain subgroups of the population answer these questions, than this would introduce bias into the estimation. However, the food security status variable is calculated based on the way households answer a set of 18 questions. In this way, the odds of consistent systematic differences across 18 questions are relatively low.

Two additional shortcomings of this dataset include no variables that account for language proficiency and asset ownership. Fluency in English may benefit a household's ability to assimilate into life in the United States; therefore, we would ideally like to control for this. In addition, if a household owns assets such as a car or a house, this wealth in the form of assets may offset potential food insecurity, even in spite of inadequate income.

Each immigrant subgroup is divided into smaller subgroups based on household composition. Previous research indicates that there are differences in food expenditures depending on family structure, gender, and parental employment status (Ziol-Guest, DeLeire, and Kalal 2006). In addition, intra-household food production is likely different between married and single households due to the presence of intra-household bargaining dynamics within married households that will influence food production behaviors. Specifically, married households are able to specialize and divide up household responsibilities, which will likely impact the way married households allocate food related tasks.

We first examine the food insecurity differences between immigrant subgroups and their native counterparts with all household compositions aggregated, followed by married households, single females, and single males. Within aggregated household compositions, to avoid repeated observations for the same household, we drop members of the household who do not self-identify as the head/household and also either the Census-defined subfamily unit reference person or not a family member. Thus, each observation represents a unique household. Within married households, we merge on household id to combine each household head with their respective spouses. Within single households, we only include observations from the household head dataset whose marital status is never married/single and whose family size is also equal to one. This insures that there is no intra-household exchange of food within single households. Additionally, we analyze single males and single females separately due to gender differences in dietary behavior (Turrell 1997). In this way, we aim to measure the relationship between immigrant status and food security across five different immigrant subgroups (including aggregated immigrant populations) and four different household compositions within each

grouping. Due to limitations in observations, we are only able to examine single households for aggregated immigrant populations.

For this analysis, we excluded any households that did not answer the food security supplement, since their food security status is unknown. We also dropped households with unknown family incomes, food expenditures, birthplace, educational attainment, and occupation type. These variables are all important controls within our regression; therefore, it is necessary to drop households who chose not to answer these questions. In addition, we excluded households where the adults in the household are comprised of one native and one immigrant. Due to the importance of culture as a mechanism driving the relationship between immigrant status and food security, intra- household heterogeneity of immigrant status makes the interpretation of this relationship unclear. We also excluded households if the birthplace or the year of immigration was unknown. Not having information on the birthplace of individuals makes it impossible to identify households as immigrants or natives. Additionally, information regarding the year of immigration is required to control for the impact of assimilation on food security among immigrant households. Finally, we dropped households with more than one family unit living within the home. The Current Population Survey is filled out once per household; therefore, for households with more than one family within, it is unclear what intra-household transferring of resources is occurring between families. To maintain greater integrity of results, it was necessary to drop these observations.

3.2 – Summary Statistics

The data used for analysis is pruned from the original dataset via the coarsened exact matching method, and the reported summary statistics reference the cleaned and pruned subsets

of the population. Table 1 reports mean comparison values of food security prevalence between natives and each immigrant subgroup for each household composition.

Table 1- Mean Comparisons- Food Security Status

	Aggregated Household Compositions				
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**W. African Immigrants**
% Natives Food Secure	88.75%	88.75%	88.75%	88.75%	88.75%
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
% Immigrants Food Secure	83.35%	94.94%	71.25%	96.50%	76.40%
	(0.0017)	(0.0052)	(0.0043)	(0.0042)	(0.0193)
Difference	5.40%	-6.19%	17.50%	-7.75%	12.35%
	(0.0018)	(0.0052)	(0.0043)	(0.0043)	(0.0193)
	Married Households				
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**W. African Immigrants**
% Natives Food Secure	93.74%	93.74%	93.74%	93.74%	93.74%
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
% Immigrants Food Secure	83.91%	95.51%	71.34%	97.04%	76.76%
	(0.0024)	(0.0063)	(0.0057)	(0.0044)	(0.031)
Difference	9.83%	-1.78%	22.40%	-3.30%	16.98%
	(0.0025)	(0.0064)	(0.0058)	(0.0045)	(0.0311)
	Single Households				
	Females	**Males**			
% Natives Food Secure	86.20%	93.88%			
	(0.0029)	(0.0023)			
% Immigrants Food Secure	88.05%	93.52%			
	(0.0081)	(0.0066)			
Difference	-1.85%	0.36%			
	(0.0086)	(0.0069)			

Source: CPS data, 1998-2017
*Standard Deviations in Parentheses

Table 1 displays native/immigrant food security prevalence comparisons among three differing household compositions: aggregated household composition, married households, and single households. The first line shows the food security prevalence among native households for comparison and remains constant, the second line shows the food security prevalence among each immigrant subgroup, and the third line displays the percentage difference between the two. As demonstrated in table 1, across both aggregated household compositions and married

households, aggregated immigrants experience lower levels of mean food security prevalence. When examining specific immigrant subgroups, immigrants from China and India experience higher levels of mean food security prevalence than natives, and immigrants from Mexico and West Africa experience lower levels of mean food security prevalence than natives. Any positive difference in food security prevalence between immigrants and natives is larger for married households, whereas negative differences shrink among married households. Among single populations, female immigrants have higher mean food security prevalence than natives, whereas male immigrants have lower mean food security prevalence. There are notable differences in food security prevalence between natives and immigrants, but this difference changes in magnitude and direction across country of origin and household composition.

The population subgroups of interest vary greatly not only in food security prevalence, but also general demographic indicators. Table 2 shows differences in age, income, family size, and educational attainment between subgroups. Income has been adjusted with the CPI and is reported in 1999 dollars. Each matched native population subgroup will vary across each respective immigrant subgroup; however, for the remaining tables, the native population represented is the subset of natives that have been matched on aggregated immigrants.

Table 2- Summary Statistics- Demographic Variables

	Aggregated Household Compositions					
		Immigrant Populations				
Variable	**Natives**	**Aggregated**	**Chinese**	**Mexican**	**Indian**	**W. African**
Age	49.3	47.06	49.5	42.4	42.04	44.9
Avg Fam Inc in 1999 Dollars	$ 23,505	$ 19,727	$ 20,223	$ 16,852	$ 38,702	$ 19,597
Family Size	2.6	3.05	2.7	3.9	3.1	2.7
Educational Attainment						
No HS Diploma	8.41%	25.47%	18.50%	59.90%	1.90%	6.90%
HS Diploma	46.32%	34.26%	27.80%	31.91%	12.49%	34.60%
College Degree	31.86%	26.51%	28.10%	7.20%	37.60%	37.60%
Advanced Degree	13.39%	13.75%	25.60%	0.99%	48.01%	20.90%
# of Observations	86,267	48,429	1,439	9,917	1,435	359

	Married Households					
		Immigrant Populations				
Variable	**Natives**	**Aggregated**	**Chinese**	**Mexican**	**Indian**	**W. African**
Age	48.5	46.6	49.6	41.8	42.1	47.1
Avg Fam Inc in 1999 Dollars	$ 39,391	$ 22,120	$ 25,452	$ 18,539	$ 39,015	$ 32,279
Family Size	3.39	3.78	3.27	4.48	3.42	3.96
Educational Attainment						
No HS Diploma	5.73%	27.92%	16.39%	58.94%	0.81%	0.00%
HS Diploma	44.08%	26.51%	26.51%	32.79%	7.85%	25.93%
College Degree	34.83%	25.97%	24.59%	7.14%	37.17%	35.80%
Advanced Degree	15.36%	14.41%	32.51%	1.13%	54.18%	38.27%
# of Observations	27,066	22,676	732	2,747	982	81

	Single Households			
	Single Natives		Single Immigrants	
Variable	**Females**	**Males**	**Females**	**Males**
Age	41.9	40.6	41.2	37.8
Avg Fam Inc in 1999 Dollars	$ 18,527	$ 34,070	$ 16,825	$ 34,536
Educational Attainment				
No HS Diploma	5.13%	2.62%	12.19%	7.63%
HS Diploma	32.89%	34.85%	25.88%	24.05%
College Degree	40.68%	45.04%	36.04%	38.08%
Advanced Degree	21.29%	17.47%	25.88%	30.24%
# of Observations	13,409	11,230	1,615	1,389

Source: CPS data, 1998-2017

For aggregated household compositions, the range of mean annual family income for each subgroup lies tightly within a $20,000- $25,000 range; however, for the Indian immigrant

subgroups, average family income lies at $49,000. Among married households, the average family income increases for each subgroup, but remains below $30,000 for aggregated immigrants and immigrants from Mexico. The average family size is larger for immigrants than natives across all subgroups, but especially large for immigrants from Mexico and India. Immigrants from Mexico and India are also, on average, younger than natives and other immigrant subgroups. Among single households, the mean age and income are similar across immigrants and natives.

As demonstrated in table 2, the composition of educational attainment varies widely across subgroups. Among aggregated household compositions, 48% of Indian immigrants have an advanced degree, whereas 15.36% of natives have an advanced degree and less than 1% of Mexican immigrants having an advanced degree. In fact, 59.90% of Mexican immigrants have no high school diploma. Similar ratios are consistent within married households. Among single households, native females are more likely to have a HS diploma or a college degree, whereas immigrant females are more likely to have no HS diploma or an advanced degree. The same dynamic is true among males.

Tables 3-5 displays variation in occupation type across natives and immigrant subgroups based on country of origin and household composition. Documentation concerning the specific occupations that belong to each occupational category is located in the appendix.

Table 3- Occupation Type Categories – Aggregated Household Composition

		Immigrant Populations				
Occupation Type	**Natives**	**Aggregated**	**Chinese**	**Mexican**	**Indian**	**W. African**
Professional Occupations	20.75%	17.67%	31.26%	4.26%	52.09%	31.88%
Farming Occupations	0.22%	0.09%	0.06%	0.20%	0.10%	0%
Managerial Occupations	22.50%	17.51%	13.57%	10.84%	22.65%	14.49%
Sales Occupations	4.39%	3.19%	2.73%	2.12%	1.94%	3.31%
Craft Occupations	5.90%	7.12%	2.61%	11.27%	1.99%	2.07%
Operative Occupations	4.58%	7.87%	3.11%	13.43%	2.67%	7.87%
Service Occupations	7.57%	13.64%	11.79%	17.84%	2.30%	22.56%
Labor Occupations	1.73%	4.40%	0.61%	12.39%	0.62%	0.62%
Not Employed	32.35%	28.51%	34.26%	27.65%	15.63%	17.18%
# of Observations	86,267	48,429	1,439	9,917	1,435	359

Source: CPS Data, 1998 - 2017

There is large variation in occupation type across natives and immigrant subgroups. Among immigrants, immigrants from India and China are most likely to work professional and managerial jobs; however, a much larger proportion of Chinese immigrants work in the service industry than Indian immigrants. Additionally, it is far more common for Chinese immigrants to be unemployed. Mexican immigrants are most likely to work in the service industry, and much less likely to work a professional occupation. Otherwise, the spread of occupation types among Mexican immigrants is primarily split between managerial, craft, operative, and labor occupations. Immigrants from West Africa are most likely to work in professional, managerial, or service occupations.

For married households, due to the representation of two adults per household, our model controls for both the “primary occupation” as well as the “secondary occupation”. The primary worker is defined as the adult in the household who comparatively works more hours per week.

Table 4- Occupation Type Categories – Married Households

		Immigrant Populations				
Occupation Type	**Natives**	**Aggregated**	**Chinese**	**Mexican**	**Indian**	**W. African**
Primary Occupation						
Professional Occupations	24.94%	9.94%	33.33%	4.30%	54.58%	48.15%
Farming Occupations	0.11%	0.07%	0.00%	0.33%	0.00%	0.00%
Managerial Occupations	24.17%	9.75%	15.03%	11.07%	25.66%	19.75%
Sales Occupations	4.83%	1.50%	3.42%	2.04%	1.53%	6.17%
Craft Occupations	6.33%	4.07%	3.01%	15.18%	2.34%	3.70%
Operative Occupations	3.65%	4.26%	3.69%	15.84%	2.04%	6.17%
Service Occupations	6.19%	6.99%	13.93%	16.89%	1.53%	9.88%
Labor Occupations	1.58%	1.94%	0.96%	12.20%	0.31%	0.00%
Not Employed	28.19%	26.76%	26.64%	22.17%	12.02%	6.17%
Secondary Occupation						
Professional Occupations	24.73%	16.96%	30.59%	3.39%	44.38%	41.03%
Farming Occupations	0.09%	0.14%	0.00%	0.15%	0.00%	0.00%
Managerial Occupations	25.74%	16.64%	14.81%	9.14%	16.97%	21.79%
Sales Occupations	4.42%	2.79%	2.61%	1.86%	2.04%	1.28%
Craft Occupations	4.61%	9.04%	1.51%	10.64%	0.41%	1.28%
Operative Occupations	3.44%	9.54%	5.08%	14.35%	1.74%	2.56%
Service Occupations	6.11%	12.46%	13.31%	17.89%	1.23%	17.95%
Labor Occupations	1.36%	5.73%	0.69%	8.45%	0.31%	2.56%
Not Employed	29.50%	26.77%	31.41%	34.13%	32.92%	11.54%
# of Observations	27,066	22,676	732	2,747	982	81

Source: CPS Data, 1998 - 2017

The same occupation type trends across natives and respective immigrant subgroups are consistent among married households, with the household's secondary occupation falling into similar categories as the primary occupation. A notable distinction, however, is that among immigrants from Mexico and India, the 'secondary worker' in the household is more likely to be not employed than other subgroups. Among these households, there will likely be increased specializing in intra- household responsibilities pertaining to food preparation.

Table 5- Occupation Type Categories- Single Households

	Single Natives		Single Immigrants	
Occupation Type	**Females**	**Males**	**Females**	**Males**
Professional Occupations	40.90%	70.06%	34.61%	42.33%
Farming Occupations	0.00%	0.00%	0.00%	0.00%
Managerial Occupations	22.95%	19.91%	20.86%	20.37%
Sales Occupations	0.26%	0.62%	3.59%	3.67%
Craft Occupations	0.00%	2.47%	1.11%	8.14%
Operative Occupations	0.17%	0.62%	1.79%	6.77%
Service Occupations	5.44%	3.09%	14.55%	7.99%
Labor Occupations	0.00%	0.15%	0.49%	3.17%
Not Employed	30.28%	3.09%	22.97%	7.56%
# of Observations	13,409	11,230	1,615	1,389

Source: CPS Data, 1998 - 2017

Among single households, native females are more likely to not be employed than immigrant females, and immigrant females are more likely to work service occupations. Native males are more likely to work professional occupations, and immigrant males have higher representation in sales, craft, operative, service, and labor occupations.

Not only is there heterogeneity in food security prevalence between natives and immigrant subgroups, but also these populations differ largely in terms of income, educational attainment, and occupation type. Understanding demographic trends within these population subgroups will help inform the discussion surrounding what attributes and obstacles specific to immigrant households are contributing to the native/immigrant difference in food security prevalence across each immigrant subgroup and household composition. Additionally, the heterogeneity in characteristics across subgroups further motivates the decision to examine these populations separately.

Control variables such as educational attainment and occupational type possess intuitive categorical separations. However, food expenditure brackets are less intuitive. Table 6 details the

8 respective food expenditure ranges captured by the 8 food expenditure dummy variables, as well as summary statistics for each population subgroup.

Table 6 – Food Expenditure Groups

			Immigrant Populations			
Food Expenditure Groups	**Natives**	**Aggregated**	**Chinese**	**Mexican**	**Indian**	**W. African**
$1-$54 per week	22.34%	19.21%	21.13%	16.31%	19.35%	22.36%
$55-$104 per week	33.98%	32.73%	30.98%	34.41%	32.37%	32.29%
$105-$154 per week	20.89%	21.96%	20.91%	24.99%	22.33%	21.33%
$155-$204 per week	12.15%	13.44%	12.68%	14.21%	12.50%	13.25%
$205-$284 per week	6.07%	6.65%	6.06%	5.88%	7.89%	6.21%
$285-$364 per week	2.92%	3.71%	5.34%	2.82%	3.24%	3.52%
$365-$494 per week	1.18%	1.59%	2.34%	1.09%	1.36%	0.83%
> $495 per week	0.46%	0.69%	0.56%	0.30%	0.94%	0.21%
# of Observations	86,267	48,429	1,439	9,917	1,435	359

Source: CPS Data, 1998 - 2017

For the most part, the variation in food expenditure category composition across natives and immigrant populations is slight. Each subgroup of the population is most likely to spend between $55-$104 per week on food. This distribution indicates the relative inelasticity of household food expenditures in spite of differential income across groups.

Chapter 4- Methodology

4.1- Theoretical Motivation

Food security status is a binary variable that indicates whether a household has the ability to acquire the food needed by its members to be food secure (Pinstrup- Anderson 2009).

Following Pininstrup- Anderson (2009), we propose that a households' food security status is a function of two things: their standard of food security and their ability to produce food. A household's standard of food security captures both the type and amount of food required for that household to feel food secure, and it is a function of not only household dietary requirements, but also cultural preferences for certain types of food. The ability to produce food is a function of the amount/type of food produced within a household, which is a function of knowledge, cultural influence, and input availability. These factors can largely be proxied for via observable characteristics.

Our theoretical model is so that food security will be equal to one (classified as food secure) if a household's food security standard is less than or equal to the actual amount of food being produced. Food security will equal zero (classified as food insecure) if a household's food security standard is greater than the amount of food being produced.

The difference between a household's 'standard of food security' as well as the amount/type of food produced will determine that household's food security status.
For both natives and immigrants, we expect food insecurity to be driven by various demographic factors such as low household income, low levels of education, high food prices, unemployment, and unstable household compositions (Smith et al 2017; Ziliak and Gundersen 2016). In the case of immigrants, however, there is an additional cultural component that differentially impacts a

household's ability to achieve and maintain food security. Atkin (2016) finds that in the case of interstate migrants in India, these migrants bring their food preferences with them and consume fewer calories per rupee than non-migrant populations. Consequently, a household's standard of food security is influenced by cultural preferences for food, and this will differentially impact immigrant household's ability to achieve and maintain food security.

Conceptually, if we were to take a native household and compare it to an immigrant household that is similar in observable and unobservable characteristics, any probability of being more or less food insecure could be attributable to the fact that one household is an immigrant and the other is not. The association between immigrant status and a household's probability of achieving food security will likely vary in sign and magnitude across immigrant subgroups. The variance in the association between immigrant status and food security across immigrant subgroups may be attributable to differences in how specific cultural influences act as attributes or obstacles to attaining food security. The relative price difference between local food options and culturally appropriate preferred foods as well as the strength and persistence of cultural food preference will vary across immigrant subgroups (Atkin 2016). Ultimately, the impact of a new culture on a household's ability to achieve food security hinges largely on the comparative returns to efforts towards food security between the United States and immigrants' respective country of origin. This will define household's relative difficulty or ease in finding and preparing sufficient and culturally relevant food within a new context.

Additionally, immigrant populations are non-randomly selected from the general population, and there is evidence of immigrants being selected on both observable and unobservable skills (McKenzie et al 2010). Not only do self-selection effects impact what type of households choose to relocate from their country of origin, but also may behave as a key

determinant of the ability for immigrant households to assimilate into a new country, and ultimately to attain food security. Due to the heterogeneity of different immigrant populations, there is likely variance in the type of self-selection that is present across these groups, effecting how quickly and successfully certain immigrant households may be able to assimilate. Positive or negative selectivity depends on the relative returns to skills in the countries of origin and destination (Borjas 1985; 1990). We implement a coarsened exact matching (CEM) method to match immigrant households with comparable native counterparts on various observable characteristics. By matching immigrant households with native counterparts on demographic variables and location, we attempt to also control for various unobservable characteristics, such as personality traits, attitudes, and expectations. This will minimize bias when estimating the relationship between immigrant status and household food security. Characteristics specific to immigrant households that influenced the household's decision to immigrate, however, are not controlled for because comparable native households have not made the decision to immigrate, but rather to remain in the US. These specific characteristics capturing differential household motivation to immigrate are heterogeneous by country of origin and will contribute to the relationship between immigrant status and food security.

Likewise, we do not know the food security status of immigrant households prior to immigrating, thus the association between immigrant status and food security cannot be completely attributed to the act of immigrating itself, but rather this relationship may partially reflect the preexisting conditions of these households within their respective countries of origin.

As previously explained, we assume a household to be food insecure if they are unable to produce sufficient foods to meet their food security standard.

Specifically, we have:

$$FS = \{0 \; if \; \hat{f}(I,Z) > f_i \; (K,X,Z,I \ldots)\}$$

$$FS = \{1 \; if \; \hat{f}(I,Z) \leq f_i \; (K,X,Z,I \ldots)\}$$

$$FS = g(K,X,Z,I)$$

where FS is a binary variable that equals 1 if a household is food secure and 0 otherwise. $\hat{f}$ is the standard of amount and type of food required for a household to feel food secure. f_i is the amount/type of food produced in the household. I is equal to one if the household is headed by immigrants. More importantly, this variable is intended to capture the effect of various social and cultural elements that might effect a households 'standard of food security' after controlling for other household characteristics and abilities. Z captures various household demographic variables such as income, education level, occupation type, family size, food expenditures, gender. These variables are included to control for observable determinants of food insecurity. K captures household knowledge as an input to the food production function, specifically how-to shop for and prepare culturally appropriate food. We implement household educational attainment as a proxy for knowledge. X represents the availability of 'food inputs'. This captures the physical availability of the built food environment, local food prices, as well as the availability of culturally relevant food inputs.

In essence, controlling for the known determinants of food insecurity captured by *Z*, *K*, and *X* will allow us to empirically tease out what the role of immigrant status is on household food security in the United States.

4.2- Empirical Methods

Coarsened Exact Matching

To compare FI between native and immigrant households we first match households with similar observable characteristics using Coarsened Exact Matching (CEM). This method matches households on pre-determined observable indicators of food security *Z*, *K*, and *X*, and then treats immigrant status, *I*, as a treatment variable. Matching in this way improves the balance of data by forcing the distribution of observed explanatory variables between the treated and control groups to be similar. As a result, the distribution of unobservable characteristics that are captured by these observable characteristics will also be forced into similar distributions between groups. In practice, the implementation of CEM makes it so that this study can compare an immigrant household to a native household that is a statistical twin, matched according to specified observable characteristics. By using CEM, we aim to minimize bias in the estimation of the treatment effect, in this case, immigrant status (Stuart 2010).

After matching households on specified observable characteristics, the CEM method creates weights from the matched strata. All immigrant households, or treatment members, will receive a weight value of 1, and all unmatched non- immigrant households will receive a weight of 0 and are excluded from the dataset. The remaining non-immigrant households, or control members, receive a weight between 0 and less 1 that will normalize the variance in the distribution of the various combinations of characteristics across these households. Hence resulting in one immigrant household observation per several weighted non-immigrant households.

In the case of this study, we apply CEM weights to a linear probability model, with immigrant status acting as the variable of interest. CEM weights are implemented into our model as an importance weight, which is different than other traditionally seen weights including frequency weights, analytic weights, and sampling weights. Importance weights, unlike the other

three types, have no formal statistical definition and rather reflect the importance of the observations. This type of weight will be treated differently based on the command that is being implemented. Importance weights are a suitable way to apply CEM weights to our data (Blackwell et al 2010).

CEM has superior qualities for the purpose of this study when compared to other widely used matching methods, such as propensity score matching and nearest neighbor matching. Propensity score matching chooses a fixed number of observations ex ante at the loss of imbalance reduction. CEM, however, is a caliber-based approach that chooses a fixed level of imbalance reduction ex ante at the loss of observations (Iacus et al 2012). In this way, although CEM requires a larger sample size, the method does not compromise the balance of the covariate and more rigorously matches HH on specified characteristics, thus minimizing bias in the estimation. Although matching methods rely on the conditional independence assumption, they require fewer functional form assumptions due to their semi-parametric nature. In addition, CEM, unlike nearest-neighbor matching, is able to improve the balance of one covariate without compromising the balance of the other covariates between treatment and control groups. In the case of limited observations for the treatment group, one can choose to coarsen the continuous covariates to broader intervals. This reduces unnecessary noise in the results and also allows for greater observance of heterogeneity across the distribution of the continuous variable. CEM exploits this natural way of broadening the categories and, ultimately, the data from individuals that cannot be perfectly matched, or matched within the specified coarsened intervals, will be excluded from the sample.

We match natives and immigrants using a number of explanatory variables including: county of residence, education level, household income, family size, as well as the year and

month that the survey was administered. CEM allows you to match on characteristics using more or less relaxed parameters. For instance, we required an exact household match on county of residence, the year and month the survey was administered, as well as the category of education completed. We use a more coarsened match on family size and family income, with family size intervals at 0, 1.5, 2.5, and 16.5. For annual family income, we match at intervals of $0, $29,000, $49,999, $60,000, $75,000, and $150,000 and above. These intervals were determined to create a fairly even distribution of observations within each category.

Matching on county of residence and time of survey is intended to control for differences in local food environments that might effect FI including prices, access to different store types, and seasonality. In this way, comparable immigrant and native households reside within the same county-level built food environment. The county level food environment will be differentially beneficial to immigrant and native households. Spatial attributes such as immigrant networks and culturally specific food retail outlets will only benefit immigrant populations. Spatial fixed effects must be implemented to control for the differential benefits of space across households. Additionally, we would ideally match households based on a more well-defined measure of food access to capture the heterogeneity of the food environment within any given county; however, we are limited by the number of observations at such a refined scale. Further, it is not clear that more precise data of the immediate food environment would provide better information than broader scale measures. Particularly as the effect of food access on food insecurity and dietary quality is still not well- established (Ver Ploeg and Wilde 2018). Controlling for variance at a smaller spatial scale is an opportunity for future studies to improve upon the robustness of our results.

We match households on income because low household income is a key determinant of household food insecurity (Smith et al 2017). Additionally, this study matches on the number of family members per household because as household size increases, the same income will become less effective towards providing food security. This is true despite economies of scale in producing food causing larger households to spend less per capita on food (Vernon 2004). Finally, this study matches on education level. Education influences household job prospects and ultimately acts as a factor that empowers individuals to appropriately access nutritionally adequate and safe food (Riley and Mock 1995). In addition, knowledge is an important component of a household's ability to achieve and maintain food security. This knowledge component captures a household's ability to prepare food in a way that is cost effective, time efficient, and nutritious. Nutrition education that educates low-income families on food selection and resource management skills are shown to effectively decrease the risk of food insecurity (Dollahite et al 2003). In this way, general education level can act as a proxy for knowledge, thus motivating the intuition for households to be matched on this variable of interest.

Linear Probability Model

After calculating CEM weights, we use these weights to estimate a linear probability model across four different immigrant subgroups and four different household compositions, with food security status acting as the dependent variable and immigrant status as the variable of interest. The implementation of CEM weights motivates the decision to estimate a separate linear probability model within each immigrant subgroup and household composition rather than estimating an aggregate model which interacts immigrant status with the respective country of origin. This way, we are able to match within each subgroup of immigrants and household

composition to create appropriate weights that match that set of immigrants with their respectively appropriate native counterparts. This will minimize bias in the estimation for each respective subgroup.

We estimate a linear probability model because this model has advantages in the context of this study when compared to the traditional Logit or Probit models, which are commonly used with binary dependent variables. The Logit and Probit models generally require a large sample size, which was restricting in the case of our study and also omitted the possibility of estimating meaningful coefficients for certain categorical variables of interest. In fact, Caudill (1988) states that in the Logit and Probit, group membership dummy variables that include members where everyone who makes the same binary decision cannot be estimated. We in fact have several dummy variable groups that include households that are all food secure or all food insecure. Given the additional associated assumptions and requirements of Probit/Logit estimations, and due to the fact that we are not out of sample predicting, a linear probability model proved itself to be a more parsimonious option.

Additionally, we further decompose our models to better understand what household characteristics contribute to a native/immigrant gap in food security incidence. Although there are nonlinear decomposition methods available (Powers et al 2011), linear decomposition methods including the Oaxaca- Blinder decomposition allow the implementation of importance weights, including our matching weights, whereas the non-linear decomposition methods have not yet been adapted for such. Due to our desire to include CEM weights on the decomposition to minimize estimation bias, it was further beneficial to utilize a linear model.

As a robustness check, we estimated this model using a maximum likelihood method, the Probit model. Within the Probit model, we encountered various estimation issues. Primarily, the

Probit model was unable to converge within certain subgroups of the population due to insufficient observations within dummy variable categories, such as state and year fixed effects. This required the removal of these variables in some of the subgroups, making the interpretation of differences immigrant status significance across subgroups convoluted. In addition, we were unable to estimate the marginal effects of certain variables and their relationship to food security, namely food expenditure brackets. To calculate marginal effects require the application of partial derivatives, and is sensitive to insufficient observations. Within the context of a linear probability model, however, we were able to estimate meaningful coefficients for each independent variable of interest within each subgroup of interest. After calculating our model using both a linear and non-linear estimation, the sign and significance of immigrant status for each subgroup did not vary, and the magnitude varied minimally. Therefore, since a linear probability model has superior qualities in the context of this study, we estimate our final model in linear form. The Probit model results are available in the appendix.

We estimate the linear probability model equation specification as:

(1) $FS = \beta_0 + \beta_I I + \beta_Z Z + \beta_K K + \beta_X X + \lambda_s + \lambda_t,$

where food security status (*FS*) acts as the binary dependent variable, with *FS* equal to 1 if a household is food secure and is 0 otherwise. Each independent variable estimates the impact of that variable on a household's probability of achieving food security, with β_I being the parameter of interest.

The remaining control variables include demographic variables, *Z*, which is comprised of SNAP participation, WIC participation, gender, age, age squared, time that has passed since year of immigration, type of occupation, education level, food expenditure level, and state and year

fixed effects. Within married households, we control for the occupation of the 'primary worker', who is the adult in the household that works more hours per week, as well as the occupation of the 'secondary worker', who is the adult in the household that works less hours per week.

We control for food expenditures instead of income in our linear probability model because different households may choose to allocate a greater proportion of their income to food, whereas other households with the same income may have unobserved expenses that require their food expenditures to take up a smaller proportion of their income.

SNAP and WIC participation are often associated with higher levels of food security incidence due to a certain level of selection bias; however, within food insecure households, participation in these programs is shown to alleviate food insecurity (Gunderson et al 2017). Therefore, the interpretation of the coefficients on these variables is not clear, however, it is still important to control for participation in these programs when measuring the likelihood of food security incidence. There is variation in public assistance eligibility across immigrants and natives, which, if left unaddressed, could result in estimation bias. SNAP eligibility for immigrant populations is contingent on either citizenship status, or the length of time an individual has been a green card holder (>5 years). Thus, by controlling for both immigrant citizenship status and the amount of time an immigrant has been in the United States, we aim to account for differences in public assistance eligibility.

The variable that captures the time that has passed since arrival into the United States for immigrants is an important proxy for acculturation. We anticipate that the longer an immigrant remains in the United States, the more acculturated they become in regards to their food habits (Hut et al 2019); therefore, a households ability to attain food security may increase as time spent in the US increases.

As previously detailed, educational attainment acts as a proxy for the 'knowledge' component of our theoretical model. Controlling for occupation type is an effort to capture the physical fatigue associated with specific job types, time scarcity outside of work, as well as the likelihood of receiving benefits with your employment compensation. Occupation type may also be associated with various unobservable characteristics that are important to managing household food security.

The remaining control variables include family size, age, and gender. Being a female, older age, and large family size paired with insufficient income are all found to be determinants of food insecurity (Broussard 2019, Smith et al 2017). Finally, the inclusion of state and year fixed effects is a way to control for space and time invariance across the sample that may influence a household's ability to maintain food security, such as state economic conditions and unemployment rates. In this way, including state level fixed effects controls for variation in economic conditions across states, and year fixed effects controls for variation in economic conditions over time. Additionally, we aim to control for changes in immigration law and immigrant eligibility for public assistance across time and space, which may impact immigrant food security. Due to insufficient observations we are unable to include county-level fixed effects to control for spatial variation in the county-level food environment within every subgroup is interest. However, we cluster the standard errors on a county-level, which will correct for county level correlation between the error terms. Therefore, we account for county-level conditions that affect the outcome variables, but differ between regions. County-level differences that may impact household food security include not only immigrant networks, but also the built food environment, and other general county-level characteristics such as rural/urban and metro/non-metro. As a robustness test, we include county level fixed effects for

subgroups of sufficient observations and the results change minimally. These results are available in the appendix.

Oaxaca-Blinder style decomposition

The final component of the study is to decompose the effects of our previously specified linear probability model. Specifically, we employ an Oaxaca-Blinder Decomposition (OBD) while applying our calculated CEM weights to control for selection bias. This technique is attributed to Blinder (1973) and Oaxaca (1973), and has been implemented extensively in years since. Decomposing how household characteristics and returns to these characteristics contribute to differences in food security incidence between natives and immigrants helps to further disentangle native/immigrant differences in food security incidence.

Under the classic OBD, the model is assumed to be linear and the primary model separable into three components such that:

$$FS^{natives} - FS^{immigrants} = \underbrace{\Delta x \beta^{immigrants}}_{E} + \underbrace{\Delta \beta x^{immigrants}}_{C} + \underbrace{\Delta x \Delta \beta}_{I}$$

$$= E + C + I$$

The gap in mean outcomes between natives and immigrants is then decomposed into endowments (*E*), coefficients (*C*), and the interaction of endowments and coefficients (*I*) (O'Donnell et al 2008).

The first component (*E*) is the portion of the gap in food security that is due to endowment differences in the group characteristics. For example, if Chinese immigrant populations have, on average, higher education levels than their native counterparts, and this difference in education directly affects the difference in food security incidence, then that component will be quantified within the decomposition. The second component (*C*) is the

portion of the gap in food security incidence that is attributable to coefficient differences, or rather a difference in the rate of returns to certain characteristics. For example, the payoff to education in terms of how it affects food security levels may differ between immigrants and natives. The value of performing a decomposition method is that it enables us to quantify how differences in food security would change if there were a reduction in the differences between characteristics, or a reduction in the differences between coefficients. The third component is an interaction term (*I*), which accounts for the fact that the differences in endowments and coefficients exist simultaneously between the two groups.

A weakness of OBD is that the choice of the reference group, also known as the counterfactual, could introduce bias. Specifically the composition of the reference group will affect the ratio of explained to unexplained portions within the gap, known as the index number problem (Oaxaca 1973). The simple counterfactuals may act as an inappropriate reference group, depending on the economic question of interest. In the case of this study, it is quite possible that native household's likelihood of achieving food security may not be an accurate representation of the counterfactual for immigrant household's likelihood of achieving food security with the same endowment of characteristics. In the case of providing an alternative counterfactual, typical propositions have used a weighted average expression (Fortin et al 2011). In our case, we employ OBD within subgroups of the population that have been matched using the CEM method, which excludes unmatched strata and generates appropriate weights. Implementing these weights into the OBD is a way to intentionally determine the choice of reference coefficients. In this way, the comparison is drawn between immigrant coefficients and the weighted estimates of the coefficients for natives, instead of the usual un-weighted estimate. This ensures that the gap represents a true underlying difference in the populations rather than a

misspecification error.

A key assumption of least squares methods is that the error term has a conditional mean of zero. For the Oaxaca-Blinder decomposition method, however, the zero conditional means assumption is replaced by an ignorability assumption. Under ignorability, unobservables do not need to be independent (or mean independent) as long as their conditional distribution given X is the same in both groups (Fortin et al 2010). In essence, selection bias is allowed as long as this bias is the same for both groups. For example, if access to credit affects food security levels, yet we do not have a variable to control for this characteristic, it will not affect the robustness of our decomposition results so long as access to credit is neither controlled for in the immigrant or native group.

Another key assumption of OBD is that the composition factors contributing to household food security are linear additively separable functions in the households' observable and unobservable characteristics. Under this assumption, it is possible to perform a detailed decomposition that describes the contribution of specific household attributes to the native/immigrant food security gap. Some difficulties of interpreting detailed decompositions arise concerning categorical explanatory variables. These difficulties are rooted in two factors. Primarily, categorical variables do not have a natural zero, thus forcing the reference point to be chosen by omitting a reference group. In many cases, decomposition output may be sensitive to the choice of the omitted category. Second, it is difficult to disentangle the fraction attributable to group membership itself vs. the differences in the coefficient of the omitted reference group (Fortin et al 2011). There is no agreed upon best practice regarding how to handle selecting an appropriate omitted reference category. In the case of our study, we attempt to minimize interpretation error by aggregating components of the detailed decomposition together (Firpo et

al 2018), such as total education effects and occupation effects, in an effort to deduce not the impact of membership to a particular category on the total difference, but rather the proportion of the total native/immigrant food security gap that can be attributed to a certain grouping of variables.

Chapter 5 – Empirical Results and Discussion

5.1- Linear Probability Models

Table 7 – Linear Probability Model- Aggregated Household Compositions

	All Households				
VARIABLES	**Aggregated Immigrants**	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Immigrant Status	-0.0134***	0.0598***	-0.0353***	0.0251***	-0.0759*
	(0.0050)	(0.0149)	(0.0106)	(0.0089)	(0.0452)
Immigrant time in US	0.000167	0.00119**	0.000936**	-0.000286	-0.000215
	(0.0002)	(0.0005)	(0.0004)	(0.0005)	(0.0025)
Food Exp 1	-0.0935***	-0.0447*	-0.105	-0.0697***	-0.0283
	(0.0201)	(0.0232)	(0.1070)	(0.0254)	(0.0834)
Food Exp 2	-0.0545***	-0.0128	-0.0688	-0.0363*	0.0106
	(0.0206)	(0.0235)	(0.1080)	(0.0218)	(0.0852)
Food Exp 3	-0.0364	0.0134	-0.049	-0.0337	0.00477
	(0.0228)	(0.0258)	(0.1100)	(0.0252)	(0.0848)
Food Exp 4	-0.0173	0.0313	-0.0216	-0.0133	0.00517
	(0.0216)	(0.0232)	(0.1050)	(0.0219)	(0.0814)
Food Exp 5	-0.013	0.0182	-0.0101	-0.0131	0.0117
	(0.0249)	(0.0286)	(0.1110)	(0.0221)	(0.0817)
Food Exp 6	-0.0177	-0.0105	-0.0622	-0.0167	0.0213
	(0.0239)	(0.0171)	(0.1110)	(0.0282)	(0.0920)
Food Exp 7	-0.0112	-0.0253	-0.0108	-0.0481	0.0242
	(0.0263)	(0.0317)	(0.1110)	(0.0337)	(0.0946)
Citizen Immigrant	0.0289***	-0.0157	0.0328***	0.00475	0.0664
	(0.0043)	(0.0134)	(0.0106)	(0.0115)	(0.0477)
SNAP	-0.308***	-0.313***	-0.268***	-0.397***	-0.306***
	(0.0098)	(0.0197)	(0.0138)	(0.0555)	(0.0438)
WIC	-0.0507***	-0.0612	-0.0394***	-0.105	-0.127*
	(0.0096)	(0.0393)	(0.0119)	(0.0842)	(0.0751)
Female	-0.0341***	-0.0147*	-0.0450***	-0.0200***	-0.00531
	(0.0034)	(0.0083)	(0.0065)	(0.0059)	(0.0173)
Age	-0.00688***	-0.00538***	-0.0106***	0.00196	-0.00296
	(0.0007)	(0.0019)	(0.0011)	(0.0022)	(0.0040)
Age Squared	8.79e-05***	6.67e-05***	0.000130***	-1.48E-05	4.96E-05
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Family Size	-0.00440***	0.00790*	-0.00607**	-0.00549*	-0.000971
	(0.0015)	(0.0042)	(0.0029)	(0.0029)	(0.0074)
No HS diploma	-0.0571***	-0.0618***	-0.0432***	0.0296	-0.0488
	(0.0083)	(0.0225)	(0.0124)	(0.0378)	(0.0317)
College Degree	0.0676***	0.0606***	0.0593***	0.0643***	0.0909**
	(0.0041)	(0.0130)	(0.0117)	(0.0182)	(0.0380)
Advanced Degree	0.0970***	0.105***	0.129***	0.0847***	0.102***
	(0.0044)	(0.0112)	(0.0179)	(0.0159)	(0.0295)
Professional Occ	0.0436***	0.0138	0.0384**	-0.000476	0.026
	(0.0053)	(0.0099)	(0.0163)	(0.0076)	(0.0326)

Table 7 Cont- Linear Probability Model- Aggregated Household Compositions

Farming Occ	0.0959***	-0.208	0.193***	-0.124	0.157***
	(0.0246)	(0.3010)	(0.0426)	(0.1090)	(0.0336)
Mangerial Occ	0.0346***	0.0211	0.0403***	-0.00301	-0.00143
	(0.0066)	(0.0148)	(0.0117)	(0.0107)	(0.0276)
Sales Occ	0.0348***	0.00464	0.0701***	-0.018	0.0707
	(0.0100)	(0.0232)	(0.0207)	(0.0283)	(0.0454)
Craft Occ	0.0252***	0.0617***	0.0286*	-0.0511	0.0355
	(0.0072)	(0.0209)	(0.0158)	(0.0326)	(0.0656)
Operations Occ	-0.00619	-0.0508	0.00578	-0.0641	-0.0447
	(0.0105)	(0.0429)	(0.0141)	(0.0497)	(0.0609)
Service Occ	0.000769	-0.0248	0.00639	-0.012	-0.0823*
	(0.0075)	(0.0209)	(0.0140)	(0.0236)	(0.0488)
Labor Occ	-0.0191*	0.0169	-0.00874	-0.0223	-0.0642
	(0.0101)	(0.0272)	(0.0147)	(0.0342)	(0.0693)
Constant	1.017***	0.958***	1.147***	0.728***	0.898***
	(0.0381)	(0.0530)	(0.1150)	(0.1410)	(0.1520)
Observations	126,237	10,272	34,793	9,279	3,437
R-squared	0.166	0.184	0.117	0.207	0.235

* State and Year FE Excluded for Brevity

* County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

After calculating CEM weights, we use these weights to estimate a linear probability model across four different immigrant subgroups and four different household compositions. Table 1 details a linear probability model including all household compositions. For our linear probability model, food security status (FS) acts as the binary dependent variable, with FS equal to 1 if a household is food secure and is 0 otherwise. Each independent variable estimates the impact of that variable on the household's probability of achieving food security, with immigrant status acting as the variable of interest. When examining aggregated immigrant populations, the immigrant status variable is statistically significant and negative, indicating that, when examining all immigrant populations aggregately, immigrant status lowers a households probability of being food secure, all else equal. Overall, immigrant status is associated with a 1.34% decrease in the likelihood of achieving household food security (significant at $p<0.01$). This is consistent with previous literature that finds higher incidence of food insecurity among aggregated immigrant populations when compared to natives (Flores-Lagunes et al 2018).

Due to the heterogeneity across immigrant groups, examining all immigrant groups aggregately will likely convolute the true impact of immigrant status. It can be noted that the results for the aggregated immigrant population most closely emulate the results for immigrants from Mexico. Immigrants from Mexico have the largest number of observations within our sample and likely dominate trends when observing immigrants aggregately. However, observing immigrant groups separately provides a better understanding of the true impact of immigrant status on food security incidence among these specific populations. Future studies examining immigrant populations should be cautious when aggregating immigrant groups.

Immigrant status remains statistically significant and negative within the subgroups of immigrants from Mexico and from West Africa. This indicates that immigrants from Mexico and West Africa have a lower probability of achieving food security than their native counterparts, after controlling for all observable characteristics. Specifically, Mexican immigrant status is associated with a 3.53% decrease in the likelihood of achieving household food security (significant at $p< 0.01$) and West African immigrant status is associated with a 7.59% decrease in the likelihood of achieving household food security (significant at $p<0.1$). This negative, significant association of immigrant status on food insecurity captures characteristics specific to these populations that make it harder for immigrants from these two countries of origin to achieve and maintain food security than for comparable native households. The variance in food security incidence across different immigrant populations may largely be explained by differences in observable characteristics such as occupation, income, and education level. However, our results suggest the presence of cultural attributes or obstacles specific to immigrants, and the immigrant status variable captures the impact of these characteristics on food security.

Two possible explanations for what characteristics comprise the association between immigrant status and food security is the impact of food culture on food security and a negative self- selection effect. Primarily, it is possible that immigrants from Mexico and West Africa have a negative self-selection effect based on the relative returns to skills in their respective countries of origin and the United States. The type of selection present among immigrants from Mexico to the United States is not largely understood within the literate. Borjas (1987) argues that the less skilled are those most likely to migrate from countries with high skill premia/earnings inequality to countries with low skill premia/earnings inequality, this theory indicates that for immigrants relocating from developing country to a developed country, i.e. from Mexico to the United States, there will be a negative-selection effect. Chiquiar and Hanson (2005) use the 1990 and 2000 Mexican and US population censuses to test Borjas's negative-selection hypothesis, finding that Mexican immigrants in the United States are more educated than non-migrants in Mexico, and these results are inconsistent with the negative-selection hypothesis. More recently, Kauestner and Malamud (2014) implement novel data with rich pre-migration characteristics, finding that Male Mexican migrants are negatively selected on earnings, and this result is largely explained by differential returns to labor market skill between the US and Mexico. Although the type of selection largely present among Mexican immigrants as a whole not entirely understood, this relationship will ultimately determine the type of Mexican household's that choose to immigrate to the US, the motivation for immigrating and the immigrant pathway, the job that immigrants accept when entering the United States, and how quickly they are able to assimilate. Difficultly assimilating to a new culture may directly impact how well households are able to find and prepare culturally relevant food within their new context.

Conversely, immigrant status is statistically significant and positive for immigrants from China and India. Specifically, Chinese immigrant status is associated with a 5.98% increase in the likelihood of achieving household food security (significant at $p<0.01$) and Indian immigrant status is associated with a 2.51% increase in the likelihood of achieving household food security (significant at $p<0.01$). This indicates that these immigrant populations have a higher probability of achieving food security than their native counterparts, after controlling for all observable characteristics.

With these two groups, the positive impact of immigrant status on food insecurity indicates that these immigrant households are able to achieve and maintain food security than at a greater rate than comparable native households. Immigrants originating from India and China may have a positive self-selection effect where highly motivated and resourced households make the decision to immigrate, and are equipped to make a smooth transition into a new culture. In past studies examining the course of acculturation within Asian Indian immigrant communities in the US, there is evidence of "judicious biculturalism", which is an expression of active involvement on the immigrants' part to control the course of their own acculturation (Dasgupta 1998). This theory predicts that borrowing values and behaviors from both home and destination countries, and then applying them judiciously, may be more beneficial than indiscriminately subscribing to one culture. This can particularly benefit mental health outcomes (Figueiredo 2013). Additionally, these populations may have the resources and job mobility to select into an area of residence that has positive immigrant networks effects. These immigrant networks will make it easier for households to maintain culturally relevant food habits and to also experience positive social network effects on food security. Further research needs to be done to disentangle what causal mechanisms play into immigrant status' direct impact on food security incidence.

Moving beyond immigrant status, there are multiple variables of interest that contribute to a household's probability of achieving food security. Compared to the highest food expenditure category, lower levels of food expenditures are associated with a lower likelihood of achieving food security across all immigrant subgroups. This is consistent with our expectations because a smaller food budget is likely reflective of a smaller household income, and as the food budget shrinks so does the probability of a household having the ability to purchase adequate food to feel food secure. Relative to having a high school diploma, higher education levels are associated with a higher probability of achieving food security across all immigrant subgroups. This is also consistent with our expectations because a higher educational attainment not only affects job prospects, but also promotes knowledge concerning how to adequately and efficiently produce sufficient, nutritious food (Riley and Mock 1995). Working in a professional, managerial, sales, or craft occupation is associated with a higher probability of achieving food security for the aggregated immigrant population and Mexican immigrant populations, and labor occupations have a negative association with food security among aggregated immigrants. Two explanations for the differential impacts of varying occupation type on food security is the difference in associated benefits of certain occupations or the difference in physical requirements across certain occupations. Professional, managerial, and sales occupations, typically thought of as 'white collar' professions, are more likely to provide a salary rather than hourly compensation. Moving away from hourly compensation may increase income stability and increase household food security. Likewise, these same jobs typically require less physical requirements, potentially enabling individuals to allocate more energy towards food preparation at the end of the day. Among immigrants from China, India, and West Africa, however, occupation effects are less significant. This indicates that among these populations, other factors such as income and

education more directly contribute to a household's probability of being food secure than does occupation type.

Among immigrants, citizenship status among aggregated immigrants and Mexican immigrants is significantly associated with an increase in the likelihood of experiencing food security. An increase in the time that has passed since the year of immigration is positively associated with food security among immigrants from China and Mexico, but not for immigrants from India and West Africa. This indicates that the impact of time on a households' ability to achieve food security is less impactful for immigrant subgroups originating from these countries. These results are surprising because we would expect for acculturation to significantly impact a household's probability of achieving food security across all immigrant subgroups. These findings indicate heterogeneity in acculturation timeline across immigrant groups that may be caused by differences in cultural habit persistence across these immigrant groups.

Ideally, this study would control for the presence and strength of immigrant networks on food insecurity. Immigrant networks, in this case, capture the density of other neighborhood residents with the same nationality. These networks may impact immigrant household's social networks and access to culturally relevant food sources. Although we matched immigrant and native households on the county of residence, this only controls for common resources accessible by both natives and immigrants. Importantly, immigrant networks may only be accessible to immigrants. Alternatively, county-level fixed effects are an accepted way to control for neighborhood effects on certain outcomes. Although, ideally, one could capture more granular data by controlling for neighborhood effects using narrower geographies, county- level controls capture the a sufficient amount of neighborhood-level impacts (Chetty and Hendren 2018). Due to limitations on the available number of observations within each immigrant subgroup and

household composition, we are unable to include county-level fixed effects for every subgroup. However, we include county level fixed effects for the aggregate household composition across each immigrant subgroup. We found that the immigrant status variable does not vary in sign or significance, and there is minimal change in magnitude. Among immigrant groups from Mexico, India, and Africa, there is no change in the immigrant status coefficient, for aggregated immigrants and Chinese immigrants, the coefficient changes by .0004 and .0034 respectively. This suggests that the exclusion of county-level fixed effects does not significantly alter the results for the impact of immigrant status on a households probability of being food secure. We are able to assume that the change would also be minimal across specified household compositions. Linear probability model results including county-level fixed effects can be found in the appendix. Due to our inability to include county level fixed effects, however, we cluster the standard errors on a county-level, which will correct for county level correlation between the error terms. Therefore, county-level conditions that affect the outcome variables, but differ between regions, can be accounted for. County-level differences that may impact household food security include not only immigrant networks, but also the built food environment, and other general county-level characteristics such as rural/urban and metro/non-metro.

Table 8- Linear Probability Models- Married Households

	Married Households				
VARIABLES	**Aggregated Immigrants**	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Immigrant Status	-0.0249***	0.0245	-0.0526***	0.0525***	-0.198*
	(0.0082)	(0.0229)	(0.0182)	(0.0125)	(0.1140)
Immigrant time in US	0.000668	0.00187**	0.00171*	-0.00133**	0.00561
	(0.0004)	(0.0009)	(0.0009)	(0.0005)	(0.0036)
Food Exp 1	-0.0810***	-0.0602*	-0.0414	-0.0694*	-0.0659
	(0.0221)	(0.0324)	(0.0936)	(0.0392)	(0.0897)
Food Exp 2	-0.0504**	-0.0245	-0.00448	-0.0709*	0.0483
	(0.0215)	(0.0256)	(0.0942)	(0.0360)	(0.0428)
Food Exp 3	-0.0212	0.00786	0.044	-0.0504	0.0267
	(0.0247)	(0.0240)	(0.0933)	(0.0359)	(0.0354)
Food Exp 4	-0.0129	0.00456	0.0445	-0.028	0.0419
	(0.0218)	(0.0286)	(0.0880)	(0.0345)	(0.0416)
Food Exp 5	-0.0147	0.000619	0.0439	-0.0355	0.0216
	(0.0242)	(0.0257)	(0.0939)	(0.0335)	(0.0536)
Food Exp 6	-0.00538	0.0126	0.0342	-0.036	0.0831
	(0.0220)	(0.0208)	(0.0853)	(0.0389)	(0.0741)
Food Exp 7	-0.00289	0.0175	0.0273	-0.0332	0.00702
	(0.0300)	(0.0337)	(0.1180)	(0.0365)	(0.0835)
Food Exp 8	0.0289***	-0.0113	0.0339*	0.00763	0.0902
	(0.0069)	(0.0147)	(0.0184)	(0.0107)	(0.0900)
SNAP	-0.265***	-0.391***	-0.239***	-0.302***	-0.198
	(0.0171)	(0.0513)	(0.0227)	(0.0828)	(0.1240)
WIC	-0.0833***	-0.0864	-0.0585***	-0.251**	-0.360***
	(0.0106)	(0.0582)	(0.0155)	(0.1120)	(0.1130)
Age	-0.00327**	0.000536	-0.00455	0.00539**	0.0139
	(0.0015)	(0.0021)	(0.0038)	(0.0021)	(0.0091)
Age Squared	4.02e-05***	-2.29E-05	6.31e-05*	-6.06e-05***	-0.000119
	0.0000	0.0000	0.0000	0.0000	(0.0001)
Spouse Age	0.000437	0.00164	-0.000207	0.00164	-0.00215
	(0.0005)	(0.0014)	(0.0010)	(0.0012)	(0.0031)
Family Size	-0.0145***	-0.00883*	-0.0145***	-0.0156***	-0.0446***
	(0.0022)	(0.0050)	(0.0034)	(0.0057)	(0.0136)
No HS Diploma	-0.0622***	-0.105***	-0.0425***	0.0445	0.0226
	(0.0100)	(0.0334)	(0.0151)	(0.0588)	(0.0893)
College Degree	0.0646***	0.0116	0.0403***	0.0763***	0.0297
	(0.0064)	(0.0139)	(0.0146)	(0.0229)	(0.0577)
Advanced Degree	0.0895***	0.0624***	0.134***	0.0967***	0.0805*
	(0.0058)	(0.0154)	(0.0292)	(0.0206)	(0.0447)
Primary Occupation					
Professional Occ	0.0326***	-0.00152	0.0639	0.0233**	0.00344
	(0.0105)	(0.0135)	(0.0497)	(0.0107)	(0.0541)
Farming Occ	0.0273	0.342	0.0268	-0.0438	
	(0.0836)	(0.3330)	(0.0596)	(0.0337)	
Mangerial Occ	0.0507***	0.00963	0.0994***	-0.00975	-0.0399
	(0.0124)	(0.0164)	(0.0228)	(0.0100)	(0.0418)
Sales Occ	0.0467**	0.00857	0.197***	-0.0582	-0.0502
	(0.0213)	(0.0672)	(0.0536)	(0.0418)	(0.0812)
Operations Occ	0.0746***	-0.117	0.0806***	0.184*	0.147
	(0.0154)	(0.0867)	(0.0255)	(0.1040)	(0.3560)
Service Occ	0.0694***	0.0401	0.0936***	-0.0256	-0.148
	(0.0162)	(0.0375)	(0.0283)	(0.0314)	(0.1230)
Labor Occ	0.0423	0.0731	-0.00199	0.184	0.4
	(0.0356)	(0.0705)	(0.0432)	(0.1740)	(0.2550)
No Occ	-0.121	-0.0599	-0.294	0.0171	0.471*
	(0.1150)	(0.0414)	(0.2780)	(0.0159)	(0.2500)

Table 8 Cont- Linear Probability Models- Married Households

Secondary Occupation					
Professional Occ	-0.0124	-0.0494	-0.193	-0.0121	0.431*
	(0.1120)	(0.0327)	(0.2620)	(0.0212)	(0.2560)
Farming Occ	0.0702	-0.297	0.0396		
	(0.1120)	(0.3300)	(0.2760)		
Mangerial Occ	-0.02	-0.0409	-0.205	0.017	0.504**
	(0.1120)	(0.0310)	(0.2670)	(0.0191)	(0.2130)
Sales Occ	-0.0109	-0.0446	-0.22	0.0345*	0.519**
	(0.1200)	(0.0479)	(0.2850)	(0.0203)	(0.2540)
Craft Occ	-0.00366	-0.0313	-0.178	-0.0291	0.552*
	(0.1110)	(0.0471)	(0.2670)	(0.0363)	(0.2810)
Operations Occ	-0.078	-0.0113	-0.233	-0.151	0.123
	(0.1120)	(0.0427)	(0.2630)	(0.0984)	(0.3790)
Service Occ	-0.0621	-0.0551	-0.246	0.0156	0.530**
	(0.1110)	(0.0384)	(0.2670)	(0.0419)	(0.2480)
Labor Occ	-0.0501	0.0133	-0.217	-0.2	
	(0.1120)	(0.0792)	(0.2650)	(0.1520)	
No Occupation	0.102***	0.0525	0.0878**		
	(0.0226)	(0.0349)	(0.0346)		
Constant	1.066***	0.974***	1.278***	0.765***	0.456
	(0.1310)	(0.0672)	(0.3290)	(0.0648)	(0.3420)
Observations	43,024	3,629	11,695	5,118	478
R-squared	0.157	0.218	0.107	0.216	0.5

*State and Year Fixed Effects Excluded for Brevity

* County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

After estimating linear probability models for every immigrant subgroup at the aggregated household composition level, we then examine married households separately. We analyze married households separately because intra-household food production is likely different between married and single households due to the presence of intra-household bargaining which enables married households to specialize in food-related household responsibilities between the two partners. We matched married immigrant households with their respective native households and applied these CEM weights to each linear probability model. Within the linear probability models examining married households (Table 2), the direction of association between immigrant status and food security remains consistent across subgroups; however, the relative magnitude of the association increases every subgroup besides immigrants from China. Specifically, among combined immigrant groups, immigrant status is associated

with a 2.49% decrease in the likelihood of achieving household food security (significant at $p<0.01$). When examining Mexican married households, immigrant status is associated with a 5.26% decrease in the likelihood of achieving household food security (significant at $p<0.01$) and West African immigrant status is associated with a 19.8% decrease in the likelihood of achieving household food security (significant at $p<0.1$). Indian immigrant status is associated with a 5.25% increase in the likelihood of achieving household food security (significant at $p<0.01$).

Differential magnitude in the association between immigrant status and food security between married households and aggregated household compositions could be attributable to a few factors. Primarily, married households may face stronger cultural persistence than single households due to the process of forming a family unit within their country of origin and the cultural customs and traditions that accompany this process. The strength of cultural persistence manifested in food preferences may make it harder for married immigrant households from Mexico and West Africa to achieve food security within their new context. Alternatively, among immigrants from India, the strength of cultural persistence among married households may require better resources and promise of opportunity to justify the removal of the household from their country of origin. This may result in a stronger positive immigrant self-selection effect among married households, resulting in married households from India achieving higher food security levels than among aggregated household compositions.

In the case of married Chinese households, however, immigrant status is not significant, indicating that married Chinese household's probability of being food secure is no different than for comparable natives. Thus, the positive relationship between immigrant status and food security that is captured among aggregated household compositions does not exist among

married Chinese immigrant households. A possible explanation for the difference among married Chinese immigrant households is variation in the type of self-selection based on household composition that could impacts immigrant pathways and the ability to quickly and effectively assimilate into a new culture. Unlike married Indian households, any positive self-selection effect may be weaker for married households and immigrant pathways may vary across household compositions, with more highly resourced, single Chinese households immigrating for education or occupation opportunities.

Consistent with the literature, lower food expenditures, larger family size, less education, and older age is associated with lower probability of obtaining food security across the majority of subgroups. Food expenditure and educational attainment impact West African immigrants food security status less than other immigrant subgroups. Age and gender more significantly impact aggregated immigrants and immigrants from India. West Africans, a professional primary occupation has a positive relationship with food security. Among the aggregated married immigrant population and immigrants from Mexico, primary occupations in management, sales, service, and operations has a positive, significant relationship with food security. Within these same two subgroups, the secondary occupation being none also has a positive impact on food security status. This indicates that for these married households, a second partner in the household not working has a positive impact on the likelihood of the household achieving food security. This could potentially be attributable to the negative impact of time poverty on food security (Beatty et al 2014), which would be negated by the presence of an un-employed adult within the household. Among immigrants from West Africa, the secondary occupation in the household does not significantly impact food security status.

Among married immigrants, citizenship status among aggregated immigrants and Mexican immigrants is significantly associated with an increase in the likelihood of experiencing food security. An increase in the time that has passed since the year of immigration is positively associated with food security among immigrants from China and Mexico, but negatively associated with food security among immigrants from India. The negative relationship between acculturation and food security among married immigrant households from India is not expected and could be explained by differences in acculturation attitude among this population; however, we are unable to disentangle this relationship within the scope of this study.

Table 9- Linear Probability Models- Single Households

	Single Households	
VARIABLES	Aggregated Immigrants- Female	Aggregated Immigrants- Male
Immigrant Status	0.0414**	0.0194
	(0.0192)	(0.0228)
Time since Year of Immigration	-0.00333***	-0.000985
	(0.0012)	(0.0016)
Constant	0.975***	0.846***
	(0.0861)	(0.0878)
Observations	1,725	1,003
R-squared	0.257	0.127

*Remaining explanatory variables excluded for Brevity
* County-level clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For single households, due to insufficient observations within immigrant subgroups, we only examined single households for aggregated immigrant subgroups. Immigrant status is statistically significant and positive for single female immigrants (Table 9). Specifically, immigrant status is associated with a 4.14 % higher probability of achieving household food security (significant at $p<0.05$). Due to the prevalence of gender based cultural barriers that make

it more unusual for single females to immigrate individually, there are likely strong positive self-selection effects among the female immigrants that do. In the case of single male immigrant households, immigrant status is not significant, indicating that single male immigrant's probability of being food secure is no different than for comparable natives.

Overall, the model better explains food security status for single females than for single men. Among single females, higher education level, working a professional or managerial occupation, or being a citizen immigrant has a positive impact on the probability of achieving food security. Unexpectedly, likewise to married immigrant populations from India, the impact of time spent in the United States since immigrating has a significant, negative impact on food security. This relationship is difficult to disentangle in the scope of this study; however, single-self identity differentially impacts females and also may fluctuate with the passage of time (Simpson 2015). This relationship could potentially increase the barriers to achieving food security for single immigrant women as time passes.

The complete linear probability including all explanatory variables can be seen in the appendix.

5.2- Decomposition of Native/Immigrant Household Food Insecurity Gap

We use the Oaxaca-Blinder decomposition (OBD) technique to explain the gap in food security incidence between immigrant and native populations. The OBD approach primarily calculates an unconditional mean difference in food security incidence between immigrant and native households, as opposed to the conditional mean difference captured by the immigrant status variable in our previously estimated linear probability models. Although the conditional mean difference is effective at measuring the true association between immigrant status and food security incidence, the decomposition contributes to our understanding of this relationship by

quantifying what percentage of the unconditional mean difference in food security incidence may be attributed to various characteristics.

Table 10- OBD - Aggregated Household Compositions

	All Households				
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Food Security Prevalence among Natives	0.830***	0.875***	0.733***	0.947***	0.852***
	(0.0063)	0.0113	0.0068	(0.0057)	(0.0149)
Food Security Prevalence among Immigrants	0.830***	0.950***	0.708***	0.975***	0.801***
	(0.0071)	0.0100	0.0084	(0.0042)	(0.0197)
Native/Immigrant Difference	-0.000218	-0.0755***	0.0250***	-0.0281***	0.0509**
	(0.0034)	0.0116	0.0064	(0.0061)	(0.0218)
Decomposition- Aggregated Variables					
Endowments	0.0116***	-0.00705	0.0265***	-0.00984***	0.0186
	(0.0020)	(0.0074)	(0.0067)	(0.0036)	(0.0189)
Coefficients	-0.00276	-0.0732***	0.00894	-0.0242***	0.0408*
	(0.0034)	(0.0104)	(0.0095)	(0.0066)	(0.0230)
Interaction	-0.00911***	0.00473	-0.0105	0.00587	-0.00847
	(0.0019)	(0.0096)	(0.0075)	(0.0056)	(0.0216)
Socio-Demographic Variables					
Endowments	0.00325***	-0.000759	0.00753**	-0.00374	0.0139
	(0.0007)	(0.0013)	(0.0031)	(0.0026)	(0.0144)
Coefficients	-0.047	-0.244***	-0.152***	0.00687	0.341
	(0.0328)	(0.0763)	(0.0564)	(0.0669)	(0.2860)
Interaction	0.000477	-0.00109	0.00661*	0.00295	-0.00136
	(0.0007)	(0.0016)	(0.0037)	(0.0033)	(0.0152)
Welfare Variables					
Endowments	-0.00698***	-0.0143***	-0.00962***	-0.00820***	-0.00571
	(0.0010)	(0.0049)	(0.0024)	(0.0028)	(0.0069)
Coefficeients	0.00114	-0.00422	0.0029	-4.63E-06	-0.000792
	(0.0024)	(0.0047)	(0.0061)	(0.0018)	(0.0103)
Interaction	-0.00274***	0.000406	-0.00740***	-0.000651	-0.00347
	(0.0006)	(0.0052)	(0.0018)	(0.0025)	(0.0045)
Occupation Variables					
Endowments	0.00534***	0.00189	0.00996***	0.00301	0.00964
	(0.0007)	(0.0024)	(0.0031)	(0.0021)	(0.0116)
Coefficients	-0.0575**	0.156	-0.152***	0.0912	-0.0122
	(0.0272)	(0.3010)	(0.0381)	(0.1140)	(0.1790)
Interaction	-0.00616***	-0.00148	-0.0195***	-0.00411	-0.00171
	(0.0015)	(0.0049)	(0.0047)	(0.0028)	(0.0121)

Table 10 Cont- OBD - Aggregated Household Compositions

Education Variables					
Endowments	0.00920***	0.00277	0.0164***	-0.000107	0.000371
	(0.0013)	(0.0028)	(0.0044)	(0.0001)	(0.0024)
Coefficients	0.0103**	0.0303**	-0.00104	0.0274	0.0881**
	(0.0043)	(0.0142)	(0.0123)	(0.0253)	(0.0392)
Interaction	-0.00172	0.00476	0.00146	7.58E-05	-0.00143
	(0.0018)	(0.0044)	(0.0081)	(0.0003)	(0.0027)
Food Expenditure Variables					
Endowments	3.15E-05	0.00226**	-0.00130**	-0.000682	0.000403
	(0.0002)	(0.0010)	(0.0006)	(0.0015)	(0.0054)
Coefficients	-0.0239*	0.0165	-0.036	-0.0233	-0.262
	(0.0123)	(0.0432)	(0.1330)	(0.0312)	(0.1880)
Interaction	-5.02E-05	0.00037	7.94E-06	0.00706***	-0.00112
	(0.0001)	(0.0011)	(0.0007)	(0.0025)	(0.0058)
Observations	126,237	10,272	34,793	9,279	3,437

* State and year FE excluded for brevity

* County- level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the OBD, native households serve as the reference group. The endowment component measures the expected change in food security levels among immigrant populations if the average endowments of the immigrant populations were equal to the average endowments of the native populations in our sample. The coefficient component, often called the impact effect, measures the expected adjustment to the change in food security levels for immigrant populations if the immigrant population had the same returns to characteristics as the native population. The third component is the interaction term that measures the interaction across group differences among the endowments and coefficients simultaneously. The simultaneous effect of group differences in both endowments and coefficients may have a differential impact than when one of these effects is held constant.

When decomposing differences in food security incidence between natives and the aggregated immigrant populations, there is no significance difference in the unconditional mean prevalence of food security (Table 4, column 1). This result further displays how examining

immigrants aggregately missed key differences between subgroups. Natives and aggregated immigrants have significantly different endowments that contribute to a gap in food security via education, occupation and socioeconomic variables. However, immigrant populations have beneficial comparative public assistance endowments and returns to food expenditures and occupation type. Additionally, the interaction effect of occupation and public assistance endowments and coefficients are protective. Ultimately, these factors work in opposite directions ultimately resulting in an insignificant unconditional mean difference in food security between aggregated immigrant and native households.

The unconditional mean probability of being food secure is 7.6 % higher for Chinese than natives (Table 4, column 2). Differential coefficients significantly explain the majority of the difference in food security incidence between Chinese immigrants and comparable natives. To that point, if Chinese immigrants had the same returns to characteristics as their native counterparts, the percentage of Chinese immigrants within our sample defined as food secure would drop from 95% to 87.68%. The specific coefficients that significantly contribute to the overall impact effect are socio-demographic variables and educational attainment; however, they behave in opposite directions. The impacts of socio-demographic variables contribute to the difference in food security, and the impacts of education protect against the gap in food security incidence. Socio-demographic variables associated with decreasing food security levels, specifically being a female and old age, have a smaller impact on Chinese immigrants food security than it does for natives. Educational attainment, however, has a smaller impact on Chinese immigrant food security levels than it does for natives. Education captures knowledge as well as some measure of technical capability. A possible explanation for the smaller returns to education among Chinese immigrants is that the knowledge gained through education that acts as

an input to efficient and nutritious food production would be less helpful in the context of a new culture. Cultural food preferences and habit persistence may affect intra-household food production behaviors so that education is a less effective input to food security for Chinese immigrant populations. This indicates that if Chinese immigrants had the same returns to educations as natives, the gap in food security between these two populations would increase.

Although the aggregated endowment effect is not significant for Chinese immigrants, endowment differences in public assistance receipt significantly contributes to the differential incidence of food security. Public assistance receipt captures the aggregate effect of whether a household is receiving either SNAP or WIC public assistance. The impact of this variable on food security is difficult to interpret because food insecure households are more likely to select into participating in these forms of public assistance. Group differences in food expenditure, however, protects against the gap in food security. Therefore, if Chinese immigrants had the same food expenditure endowments as natives, the gap in food security would also increase.

Among Mexican immigrants, there is a 2.5% difference in the conditional mean level of food security between immigrants and native counterparts, with 2.5% less Mexican immigrants being defined as food secure than natives. Differential endowments significantly explain the majority of the difference in food security incidence, with aggregated impact and interaction effects not being significant. If Mexican immigrants had the same endowments as their native counterparts, the percentage of Mexican immigrants within our sample defined as food secure would increase from 70.8% to 73.45%. Differential endowments of socio-demographic variables, education, and occupation all significantly contribute to the gap in food security, with food expenditure and public assistance endowments acting as significant protective factors. This indicates that addressing educational attainment and opportunity for certain types of employment

would directly impact food security among Mexican immigrants. To illustrate, negating the difference in educational attainment endowments alone between Mexican immigrants and natives would negate the gap in food security by 1.6%. The impacts of socio-demographic and occupation variables as well as the interaction effects of occupation and public assistance reduce the gap in food security between Mexican immigrants and their native counterparts. This indicates that, similar to Chinese immigrants, socio-demographic variables associated with decreased food security levels, specifically being a female and old age, have less of an impact on Mexican Immigrants' food security than it does for natives. In addition, in spite of the differences in occupational endowments, Mexican immigrants have higher returns to occupation towards food security. Over half of foreign- born workers from Central America work as operators, fabricators, laborers or in service occupations, compared to 25% of native employed workers. Overall, immigrant workers from Central America show a different pattern of industrial participation, with only 9% working in professional and related industries. These differences in occupational participation indicate that Mexican immigrants are more likely than natives to participate in hourly-wage jobs that are physically demanding (MPI 2004). It is possible that Mexican immigrants have, over time, developed compensation techniques to better leverage their specific occupations to support household food security. Thus, if Mexican immigrant households had the same returns to occupation as natives, the gap in food security would significantly increase.

There is a 2.8 % difference in the unconditional mean level of food security between Indian immigrants and their native counterparts, with 2.8% more Indian immigrants being defined as food secure than natives. Nearly 35 % of the difference in food security incidence is explained by the differential endowments, and 86% of the gap is attributable to differential

impacts effect. The interaction effect, which accounts for simultaneous differences in endowments and coefficients between groups, is protective against the gap in food security. If Indian immigrants had the same endowments as natives within our sample, their food security incidence would drop from 97.5% to 96.5%, whereas if Indian immigrants had the same returns to endowments as natives within our sample, their food security incidence would drop from 97.5% to 95.1%. Among the disaggregated effects, differential public assistance endowments contribute to the gap, and the interaction between the endowments and coefficients of food expenditure are protective against this gap in food security.

Among West African immigrants, there is an 8.9% mean difference in food security incidence between immigrants and comparable natives, with immigrants from West Africa experiencing lower levels of food security. The significant majority of this gap in food security is attributable to differences in coefficients, or the rates of returns to certain endowments. If West African immigrants had the same returns to endowments as natives within our sample, their food security incidence would increase from 84.8% to 88.88%. Mainly, the difference in the rate of returns to education explains the majority of the aggregated differential impacts. Similarly to Chinese immigrants, a possible explanation for the smaller returns to education among West African immigrants is that knowledge gained through education as an input to efficient and nutritious food production may be less helpful in the context of a new culture. Cultural food preferences and habit persistence may affect intra-household food production behaviors so that education is a less effective input to food security for West African immigrant populations. Ultimately, if West African immigrants had the same returns to education as natives, the gap in food security between the two populations would decrease.

Table 11- OBD- Married Households

	Married Households				
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Food Security Prevalence among Natives	0.863***	0.916***	0.766***	0.960***	0.938***
	(0.0074)	(0.0120)	(0.0094)	(0.0064)	(0.0196)
Food Security Prevalence among Immigrants	0.845***	0.960***	0.717***	0.987***	0.848***
	(0.0099)	(0.0119)	(0.0101)	(0.0038)	(0.0364)
Native/Immigrant Difference	0.0181***	-0.0439***	0.0487***	-0.0278***	0.0899**
	(0.0051)	(0.0117)	(0.0099)	(0.0065)	(0.0419)
Decomposition- Aggregated Variables					
Endowments	0.0256***	-0.000759	0.0479***	-0.00265	0.100*
	(0.0038)	(0.0076)	(0.0079)	(0.0041)	(0.0576)
Coefficients	0.000776	-0.0547***	0.0126	-0.0382***	0.0624
	(0.0049)	(0.0161)	(0.0139)	(0.0089)	(0.0466)
Interaction	-0.00831**	0.0115	-0.0118	0.0130*	-0.0727
	(0.0034)	(0.0144)	(0.0112)	(0.0077)	(0.0592)
Socio-Demographic Variables					
Endowments	0.00624***	-0.00400**	0.0160**	0.00624	0.0224
	(0.0018)	(0.0018)	(0.0068)	(0.0086)	(0.0348)
Coefficients	-0.0477	-0.195	-0.084	-0.0679	-0.992
	(0.0548)	(0.1710)	(0.1110)	(0.1050)	(0.6170)
Interaction	-0.000558	0.00174	0.00253	-0.0114	-0.0122
	(0.0020)	(0.0026)	(0.0080)	(0.0106)	(0.0352)
Public Assistance Variables					
Endowments	0.000973	-0.00363	0.000806	-0.003	0.0610**
	(0.0014)	(0.0034)	(0.0033)	(0.0020)	(0.0289)
Coefficeients	0.00347	-0.00762*	0.00774	-0.00167	0.0128
	(0.0046)	(0.0045)	(0.0113)	(0.0017)	(0.0257)
Interaction	-0.00336***	-0.0041	-0.00835***	-0.00151	-0.0254
	(0.0012)	(0.0046)	(0.0029)	(0.0019)	(0.0228)
Primary Occupation Variables					
Endowments	-0.000381	-0.0057	0.0220***	-0.00365	-0.0723
	(0.0022)	(0.0055)	(0.0047)	(0.0035)	(0.0453)
Coefficients	-0.0674	0.0662	-0.177**	0.000957	-0.173*
	(0.0498)	(0.0903)	(0.0895)	(0.0065)	(0.0918)
Interaction	-0.0258*	0.0205	-0.0741**	0.00151	0.119**
	(0.0155)	(0.0236)	(0.0318)	(0.0038)	(0.0563)
Secondary Occupation Variables					
Endowments	0.00981***	0.00799	0.00599	0.00645**	0.0455
	(0.0024)	(0.0093)	(0.0073)	(0.0028)	(0.0435)
Coefficients	-0.0832	0.258	-0.219	0.0337	0.579**
	(0.1180)	(0.2500)	(0.1710)	(0.0261)	(0.2360)
Interaction	0.0155	-0.0214	0.0357*	-0.00118	-0.0959
	(0.0112)	(0.0300)	(0.0212)	(0.0038)	(0.0617)
Total Occupation Variables					
Endowments	0.00942***	0.00229	0.0280***	0.0028	-0.0268
	(0.0014)	(0.0051)	(0.0064)	(0.0032)	(0.0298)
Coefficients	-0.151	0.324	-0.395	0.0346	0.406*
	(0.1630)	(0.3370)	(0.2530)	(0.0260)	(0.2450)
Interaction	-0.0104**	-0.000917	-0.0384**	0.000331	0.0234
	(0.0051)	(0.0094)	(0.0163)	(0.0040)	(0.0344)

Table 11 Cont- OBD- Married Households

Education Variables					
Endowments	0.00959***	0.0023	0.0121**	-9.70E-05	0.0114
	(0.0019)	(0.0027)	(0.0053)	(0.0002)	(0.0140)
Coefficients	0.00531	-0.00414	-0.0196	0.0577*	0.0241
	(0.0063)	(0.0205)	(0.0154)	(0.0308)	(0.0610)
Interaction	0.0016	0.0105	0.0151	2.76E-05	-0.012
	(0.0032)	(0.0073)	(0.0104)	(0.0004)	(0.0140)
Food Expenditure Variables					
Endowments	0.000803**	0.00169	-0.00157	0.000147	0.0168
	(0.0003)	(0.0015)	(0.0010)	(0.0024)	(0.0213)
Coefficients	0.0258	-0.031	0.105*	-0.0534	-0.208*
	(0.0260)	(0.0395)	(0.0607)	(0.0376)	(0.1180)
Interaction	0.000146	0.00217	0.000103	0.00800*	-0.0176
	(0.0003)	(0.0022)	(0.0010)	(0.0045)	(0.0222)
Observations	43,024	3,629	11,695	5,118	478

* State and year FE excluded for brevity

* County- level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Overall, the unconditional mean gap in immigrant/native food security levels is larger for Mexican and West African immigrant subgroups and smaller for Chinese and Indian immigrant households. This is consistent with the linear regression model estimates. Across immigrant and native households, married households have higher food security incidences than when including all household compositions. The positive difference in food security based on marital status, however, is significantly larger for native households than immigrant households. This indicates that any protective impact of marriage on food security may differentially impact native and immigrant populations.

The married aggregated immigrant population is 1.8 % less food secure than their native counterparts. The majority of this effect is explained by differential endowments between these populations, which reflects the adjustment at the mean to the change in food security levels among the married immigrant population that we might expect if the mean characteristics of the immigrant populations were the same as the mean characteristics of native populations within

our sample. In this case, if married immigrant populations had the same endowments as native populations, food security incidence would increase by 2.56%, from 84.5% to 87.1%. Differential returns to endowments between groups do not significantly contribute to a gap in food security. The interaction between endowments and coefficients serve as a protective factor against the gap in food security incidence. Thus, the simultaneous effect of group differences in both endowments and coefficients decreases the native/immigrant gap in food security, whereas endowment and coefficient effects assume the other is held constant.

When examining the specific coefficients that comprise the endowment, coefficient, and interaction components of the gap in food security levels between immigrants and natives, socio-demographic, education, and occupation significantly contribute to the endowment gap in food security, whereas the impacts of occupation as well as the interaction between the endowments and effects of occupation reduce the gap in food security incidence. This indicates that increasing education and occupation opportunity among married immigrant households would directly increase food security levels by 0.94% and 0.95% respectively. Married immigrants may have developed compensating techniques so that their returns to certain occupation types better supports household food security than for natives.

The married Chinese immigrant subgroup has a 4.39% higher unconditional mean level of food security than comparable natives, which is a 3.11% decrease from the immigrant/native food security gap present among Chinese immigrant households aggregately. These are similar to the linear regression model estimates, where married Chinese immigrant households are more similar to natives than aggregated Chinese immigrant households. Similarly to aggregate household compositions, the significant majority of the native/immigrant gap in food security is attributable to differential rates of returns to characteristics. If married Chinese immigrant

households had the same rate of returns to characteristics as native households, the native/immigrant gap in food security levels would decrease by 5.47%

Among married Mexican immigrant households, the unconditional mean difference in food security incidence between this population and their native counterparts is 2.37% larger than for aggregated household compositions. Similarly to aggregate households, the majority of the native/immigrant gap in food security incidence is explained by differential endowments. If married Mexican immigrant households had the same characteristics as their native counterparts, mean food security levels would increase from 71.7% to 76.49%. The significant disaggregated characteristics that contribute to the immigrant/native gap in food security among married households are largely the same as for aggregated household compositions; however, the magnitudes are larger. The impact of occupation endowments on food security is 1.8% larger among married Mexican immigrant households than aggregated household compositions. Among married households, the impact of food expenditure is protective against the gap in food security incidence, signaling that married Mexican immigrant households can produce more food security with less financial resources for food expenditure when compared to native households. If married Mexican immigrant households had the same returns to food expenditures as natives, all else being held constant, the gap in food security would increase by 10.5%.

Married Indian immigrant households have 2.78% higher food security levels than comparable natives, which is a marginal decrease of .03% in the native/immigrant food security gap when compared to aggregate household compositions. This is opposite of the trend observed in the linear regression models, indicating that the conditional mean difference in food security between household compositions captures an unobserved effect of marital status on food security among Indian immigrants that the unconditional mean cannot. Among married Indian immigrant

households, differential returns to characteristics significantly explains the majority of the immigrant/native gap, whereas for aggregated household compositions, the immigrant/native gap is explained by both differential endowments and impacts. Much of the impact effect for this population is attributable to the differential returns to socio-demographic characteristics such as advanced age and being a female on food security between married Indian immigrants and married native households.

Married immigrant households from West Africa are 8.99% less Food Secure than comparable married natives. This is a 3.9% increase in the native/immigrant food security gap when examining household compositions aggregately. In addition, the significant majority of the native/immigrant gap for married West African households is explained by differential endowments, in contrast to the significant majority of the native/immigrant gap among the aggregated household compositions being explained by differential coefficients. In fact, if married West African immigrant households had the same characteristics as their native counterparts, their food security incidence would increase from 84.8% to 94.8%. This indicates that married West African immigrant households are significantly less endowed than the population as a whole, and this drives the difference in food security levels. This indicates that among certain immigrant subgroups, household composition may act as a signal for immigrant pathways and the likelihood that a household will be sufficiently resourced to achieve and maintain food security within their new country of residence.

Among single households, there is no significant aggregate immigrant/native gap in the unconditional mean of food security incidence for both males and females. This indicates that without controlling for the impact of observable characteristics, the immigrant/native gap in food security no longer exists. The OBD results for single households can be seen in the appendix.

5.3 - Robustness Checks

Excluding Highly Acculturated Immigrant Households

Within our decomposition methodology, it is an important component of the method that control variables only relevant to the treatment group cannot be included. Therefore, the control variable capturing the time that has passed since the year of immigration cannot be included within the decomposition because the variable does not apply to natives. Thus, our decomposition does not have a control for the effect of acculturation on food security incidence among immigrants. To investigate the impact of acculturation on decomposition, we calculate a second decomposition that excludes all immigrants who have been in the United States for greater than 10 years. The results for this decomposition are shown in Table 12. The assumption is that the excluded immigrants are highly acculturated and will behave more like natives when compared to immigrants who have been in the United States for less than 10 years. Additionally, we assume that as immigrant households become more acculturated, their probability of being food secure will increase. Thus, we anticipate that among immigrant subgroups who experience lower levels of food security than natives, the native/immigrant gap in food security incidence will increase after excluding immigrants who had been in the United States for longer than 10 years.

Among immigrant subgroups who experience higher levels of food security than comparable natives, if highly acculturated immigrants behave more like native, thus have lower probabilities of being food secure than recently arrived immigrants, the gap in food security incidence will also increase when excluding highly acculturated immigrants. Alternatively, if highly acculturated immigrants, rather, are more likely to be food secure compared to recently arrived immigrants, than the gap in food security will decrease. Specifically, we find a 2.65%

native/immigrant food security gap increase for aggregated immigrants, a 1.27% gap decrease for Chinese immigrants, a 5.39% increase for Mexican immigrants, .13% increase for Indian immigrants, and a 5.11% increase for West African immigrants. The change in the difference between immigrant and native food security incidence when excluding highly acculturated immigrants is largest for immigrants from Mexico and West Africa, which indicates that these populations experience the greatest gains to food security as time spend in the Unites States increases. For Chinese immigrants, the native/immigrant food security gap when excluding highly acculturated Chinese immigrants decreases. Since the gap in food insecurity is so that Chinese households are more food secure than comparable native households, this indicates that Chinese immigrant households grow more likely to achieve food security as time spend in the United States increases, so excluding highly acculturates households will cause a decrease in this gap. For Indian immigrants, the change in the native/immigrant food security gap is minimal, but is still an increase. This indicates that as time spent in the United States increases, Indian immigrants may have a harder time achieving food security. This is consistent with the unexpected negative, significant effect of time spent in the United States on food security in our linear probability model for Married Indian Immigrants. This further confirms that Indian immigrants may have a differential acculturation experience than other immigrant subgroups. Further research needs to be done to disentangle this nuance.

Table 12- OBD- Excluding immigrant HHs with >10 yrs residence in the US

	All Households				
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Food Security Prevalence among Natives	0.830***	0.875***	0.733***	0.947***	0.852***
	(0.0063)	(0.0113)	(0.0068)	(0.0061)	(0.0064)
Food Security Prevalence among Immigrants	0.804***	0.938***	0.654***	0.976***	0.750***
	(0.0085)	(0.0161)	(0.0148)	(0.0068)	(0.0479)
Native/Immigrant Difference	0.0263***	-0.0628***	0.0789***	-0.0294***	0.102**
	(0.0056)	(0.0171)	(0.0148)	(0.0082)	(0.0483)
Observations	94,849	9,288	27,007	8,436	3,184

* County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Citizenship Status

Within our decomposition, we were unable to include the citizenship status of immigrants because that variable only applies to the treatment group and not the control group. Thus, to further investigate the impact of immigrant status on food security, we performed a decomposition analysis for immigrants who have achieved citizenship status within the United States and for immigrants who have not achieved citizenship status within the United States. Citizenship status acts as a measure of formal acculturation to the United States and the separation of immigrants into these two groups provides interesting commentary on the differential impact of citizenship across groups. For the aggregated immigrant population and for immigrants from Mexico, non- citizen immigrants experience lower levels of food security than comparable natives, whereas citizen immigrants experience higher levels of food security than comparable natives. This shows that for these populations citizenship status is a powerful indicator of acculturation and has strong ties to a household's ability to achieve and maintain food security. For immigrants from West Africa, both non-citizen immigrants and citizen immigrants have lower levels of food security than comparable natives, the difference between

the two groups is very large, at 10%. For immigrants from India and China, both non-citizen immigrants and citizen immigrants are still more likely to achieve food security than native populations and the difference in food security incidence between citizen and non-citizen immigrants is less than 2%. This indicates that citizenship status does a weaker job of representing acculturation for these subgroups. It is likely that immigrants from India and China are able to quickly assimilate and achieve food security status regardless of citizenship status.

Table 13 – OBD- citizen immigrants vs. non- citizen immigrants

			Non- Citizens		
	Aggregated Immigrants	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**W. African Immigrants**
Food Security Prevelance- Natives	0.830***	0.875***	0.733***	0.947***	0.852***
	(0.0063)	(0.0113)	(0.0068)	(0.0057)	(0.0149)
Food Security Prevelance- Immigrants	0.775***	0.948***	0.672***	0.979***	0.743***
	(0.0096)	(0.0122)	(0.0089)	(0.0055)	(0.0336)
Native/Immigrant Difference	0.0550***	-0.0734***	0.0610***	-0.0320***	0.109***
	(0.0056)	(0.0138)	(0.0085)	(0.0069)	(0.0363)
Observations	104,231	9,439	31,488	8,599	3,228
			Citizens		
	Aggregated Immigrants	**Chinese Immigrants**	**Chinese Immigrants**	**Indian Immigrants**	**W. African Immigrants**
Food Security Prevelance- Natives	0.830***	0.875***	0.875***	0.947***	0.852***
	(0.0063)	(0.0113)	(0.0113)	(0.0057)	(0.0149)
Food Security Prevelance- Immigrants	0.876***	0.952***	0.952***	0.971***	0.842***
	(0.0052)	(0.0104)	(0.0104)	(0.0065)	(0.0244)
Native/Immigrant Difference	-0.0460***	-0.0770***	-0.0770***	-0.0239***	0.00989
	(0.0046)	(0.0114)	(0.0114)	(0.0079)	(0.0250)
Observations	107,979	9,671	9,671	8,530	3,289

* County-level clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Food Insecurity Severity

Flores-Lagunes et al (2018) finds that immigrants not only experience differential incidence of food security, but also differential severity of food security. The current population

survey's food security supplement reports a Rasch food security score, and the food security status variable is constructed based on cut offs from this gradual score. Due to the use of a linear probability model, we were unable to account for food security severity by implementing an ordered Probit that accounts for various levels of food insecurity: high food secure, marginal food secure, low food secure, and very low food secure. However, in order to further investigate this relationship, we ran an OLS regression with the Rasch food security score, a continuous variable ranging from 1 to 13, serving as the dependent variable of interest. Rasch scores are not assigned to households with zero reported food insecure conditions or to households that are screened out of the food security section of the supplement, thus we are effectively examining the variance in food insecurity severity among native and immigrant households that experience some level of food insecurity.

Table 14- Food Security Severity – Aggregated Household Compositions

			All Households		
VARIABLES	**Aggregated Immigrants**	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**W. African Immigrants**
Immigrant Status	-0.0521	-0.599**	0.167*	0.406	0.954
	(0.0450)	(0.2490)	(0.0968)	(0.3220)	(0.6040)
Time since Immigration	-0.00268*	0.0165	-0.0153***	-0.0304*	-0.0344
	(0.0016)	(0.0115)	(0.0034)	(0.0166)	(0.0268)
Observations	38,524	2,943	14,595	1,271	898
R-squared	0.321	0.433	0.204	0.625	0.284

** State and Year Fixed Effects Excluded for Brevity

** County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The results indicate that being a Chinese immigrant is associated with a .599 decrease in household Rasch food security score. Thus, among native and immigrant households that are

experiencing some level of food insecurity, Chinese immigrants experience a lower severity of food insecurity than comparable natives. Additionally, being a Mexican immigrant is associated with a .167 increase in household Rasch food security score. Thus, among native and immigrant households that are experiencing some level of food insecurity, Mexican immigrants experience a higher severity of food insecurity than comparable natives. For immigrants from Mexico, immigrant status is associated with both a higher incidence and higher severity of food insecurity. It is important to understand not only what populations are experiencing differential food insecurity incidence, but also differential food insecurity severity, and then to work towards creating policies and programs to alleviate food insecurity for these particularly affected populations.

The immigrant status variable is not significant for aggregated immigrant populations, or for immigrants from Mexico, India, or West Africa. This indicates that even if immigrant status is a significant indicator of household food security status, it does not directly explain any native/immigrant differential severity of food insecurity.

Chapter 6- Conclusion

The primary focus of this research is to estimate the relationship of immigrant status on food security levels across specific, diverse immigrant populations in the United States. This impact captures obstacles and characteristics specific to immigrant populations that make these households more or less likely to achieve and maintain household food security than comparable natives. This study finds that the determinants of food insecurity among immigrants are complex and that immigrant subgroups vary greatly depending on the country of origin, and even after controlling for heterogeneity across observable characteristics, immigrants still experience differing levels of food security than of natives and of other immigrant groups. Overall, we find that immigrant status is a significant indicator of food security status for every immigrant subgroup. For immigrants from Mexico and West Africa, immigrant status is associated with a 3.53% and 7.59% decrease in the likelihood of achieving household food security respectively. Conversely, for immigrants from India and China, immigrant status increases the likelihood of being food secure, at 5.98% and 2.51% respectively. These relationships vary in strength but are consistent in sign when examining married households, apart from married Chinese immigrants, who experience the same probability of being food secure as comparable married natives. Among single households, female immigrants are more likely to achieve food security than comparable natives, and male immigrants experience the same probability of being food secure as comparable natives.

A key takeaway of this study is that immigrant groups are extremely heterogeneous and their food security incidence varies across both country of origin and household composition. Researchers should practice caution when examining immigrants aggregately. Two hypotheses

to explain the variation in food security across immigrant groups based on country of origin include the impact of food culture on food security and the variation in the type of self-selection across different immigrant subgroups. The persistence of cultural food preferences as well as the ability to maintain a culturally appropriate diet will vary across immigrant subgroups. Additionally, the circumstances and characteristics specific to households that make the decision to immigrate will vary based on the relative returns to skills in the countries of origin and destination. This relationship will impact the type households that choose to immigrate from their respective countries of origin, the types of jobs that immigrants accept when arriving in the United States, how quickly they are able to assimilate, and how resourced households are to select into locations in the United States that support their cultural preferences through the form of immigrant networks and culturally relevant food options. Further research needs to be done to disentangle the causal mechanism driving the relationship between immigrant status and a differential ability to achieve and maintain food security across immigrant groups.

In an effort to better understand what is driving native/immigrant differences in food security incidence, this study employs an Oaxaca-Blinder decomposition to decompose what household characteristics and returns to those characteristics are contributing to the gap in food insecurity incidence between immigrant populations and their native counterparts. . The characteristics of interest include food expenditures, educational attainment, occupation, employment status, and other socio-demographic indicators such as age and gender. We find that not only do immigrant populations vary greatly in food security incidence, but also the drivers of differential food security levels vary between groups. Among married aggregate immigrants and immigrants from Mexico, the majority of the native/immigrant difference in food security is attributable to differences in endowments, specifically socio-demographic indicators, educational

attainment, and occupation type. This indicates that increasing education opportunities and occupational training will directly increase food security levels for married immigrant and Mexican immigrant populations. Among immigrant populations from West Africa, the main driver of the native/immigrant difference in food security comes from differential rates of returns to education. It is likely that culturally specific food preferences and habit persistence may affect intra-household food production behaviors so that education is a less effective input to producing food security among West African immigrant populations. This causal mechanism, however, is not clearly identified within the scope of our study. For Indian immigrants, the native/immigrant food security gap is attributable to significant differences in endowments as well as differences in the rate of returns to these endowments. For Chinese immigrants, this difference is primarily attributable to differential rates of returns to endowments, specifically socio-demographic variables such as old age and being a female. However, the returns to education are lower for Chinese immigrants than for comparable natives, ultimately shrinking the gap in food security incidence.

Identifying which populations are the most vulnerable to food insecurity is important for policy makers when considering legislation that impacts access to public assistance addressing food related hardships. In addition, the drivers of food security incidence vary across populations, and programs that target food related hardships among immigrants ought to tailor their approach to address the specific obstacles these populations are facing. Beyond increasing public assistance eligibility for immigrant populations, it may be important to consider barriers that inhibit immigrant population participation in available public assistance. Among immigrant populations from Mexico, policies increasing education opportunities and occupational training can directly increase food security levels. Among immigrant populations from West Africa, the

main driver of the gap in food security between immigrants and natives is attributable to differential rates of returns to education. The policy implications of differential impact effects are not well defined in the literature; however, further research and interest from policy makers needs to be done in order to address this type of inequality.

Due to the increase in immigrant populations in the United States (Office of Immigration Statistics, MPI) and the differential risk factors associated with food insecurity among immigrants in the United States (Borjas 2002; Derose et al 2009), it is particularly important to understand food insecurity among these populations. Increased food security has notable positive externalities, including a more productive work force, an increase in economic activity, better learning capabilities, and overall social and economic development (Gregory and Coleman-Jensen 2017; Gunderson and Kreider 2009; Hamelin, Habicht, Beaudry 1999). Increasing immigrant food security levels will improve the overall health, wellbeing, and productivity of these populations and, ultimately, society as a whole.

Shortcomings and Opportunities for Further Research

As mentioned within the data description, this study has shortcomings attributable to data limitations. Primarily, the data is missing information on language fluency and asset ownership, which may impact households' ability to achieve food security. In addition, we do not have information on if immigrants are lawfully residing in the United States. Furthermore, households that are not lawfully residing in the United States may have a differential likelihood of completing the survey. Therefore, it is possible that this study is not capturing the entire immigrant population in the United States. Additionally, there are not ample observations to include county or neighborhood level fixed effects across all subgroups, capturing the impact of

community networks on food security incidence. Although we cluster standard errors at the county-level, and our results with the aggregate household composition data indicates that the impact of immigrant network effects on food security is minimal, it may be beneficial to more rigorously control for spatial variance.

Opportunities for future research primarily include disentangling and quantifying what causal mechanisms are driving the difference in conditional mean food security levels between native and immigrant populations. Understanding the specific nuances that contribute to immigrant populations' ability to assimilate and thrive within their set of cultural food preferences and immigrant networks may require a qualitative study. This type of study would provide the opportunity to examine immigrant households' food behaviors within their new context, and identify specific native/immigrant differential assets and obstacles to obtaining food security.

Additionally, further research needs to be done to understand what types of households choose to immigrate from their respective countries of origin, and how that may be different across populations. Namely, we are unable to observe the previous food security status of households prior to immigrating. Thus, it is possible that we are capturing the average pre-existing conditions of households, and that immigrating did not directly impact food security incidence, but rather the type of household that immigrates varies largely across countries. In order to disentangle this relationship, it is necessary to observe households within each respective country, and tease out specific differences between the households that choose to immigrate to the United States verses the households that opt to remain within their country of origin.

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Appendix

Table 15- Linear Probability Models w/ County Fixed Effects

			All Households		
VARIABLES	**Aggregated Immigrants**	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Immigrant Status	-0.0138***	0.0564***	-0.0364***	0.0262***	-0.0939**
	(0.0050)	(0.0153)	(0.0105)	(0.0091)	(0.0437)
Food Exp 1	-0.0956***	-0.0519*	-0.114	-0.0646***	-0.0536
	(0.0202)	(0.0283)	(0.1090)	(0.0246)	(0.0858)
Food Exp 2	-0.0561***	-0.0184	-0.0772	-0.0348	-0.00703
	(0.0207)	(0.0283)	(0.1090)	(0.0218)	(0.0874)
Food Exp 3	-0.0384*	0.00856	-0.0567	-0.0328	-0.0224
	(0.0230)	(0.0306)	(0.1110)	(0.0251)	(0.0841)
Food Exp 4	-0.02	0.0251	-0.0311	-0.0122	-0.0265
	(0.0216)	(0.0261)	(0.1060)	(0.0219)	(0.0831)
Food Exp 5	-0.0153	0.0154	-0.0176	-0.0135	-0.0301
	(0.0250)	(0.0324)	(0.1120)	(0.0222)	(0.0854)
Food Exp 6	-0.0201	-0.0164	-0.0671	-0.0149	-0.0155
	(0.0241)	(0.0227)	(0.1110)	(0.0279)	(0.0927)
Food Exp 7	-0.0128	-0.0341	-0.0159	-0.0376	0.00195
	(0.0266)	(0.0348)	(0.1120)	(0.0319)	(0.0924)
Citizen Immigrant	0.0278***	-0.0124	0.0339***	0.00837	0.0685
	(0.0042)	(0.0138)	(0.0104)	(0.0125)	(0.0456)
SNAP	-0.304***	-0.305***	-0.263***	-0.395***	-0.302***
	(0.0097)	(0.0182)	(0.0132)	(0.0565)	(0.0451)
WIC	-0.0477***	-0.0609	-0.0391***	-0.117	-0.11
	(0.0098)	(0.0371)	(0.0120)	(0.0852)	(0.0766)
Female	-0.0342***	-0.0153*	-0.0447***	-0.0175***	-0.00477
	(0.0033)	(0.0081)	(0.0067)	(0.0053)	(0.0176)
Age	-0.00691***	-0.00604***	-0.0107***	0.00171	-0.00271
	(0.0007)	(0.0019)	(0.0011)	(0.0022)	(0.0041)
Age Squared	8.75e-05***	7.17e-05***	0.000130***	-1.32E-05	4.60E-05
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Time since Year of Immigration	0.000204	0.00128**	0.000989***	-0.000491	0.000672
	(0.0002)	(0.0006)	(0.0004)	(0.0005)	(0.0024)
Family Size	-0.00512***	0.00652	-0.00741***	-0.00565*	-0.00189
	(0.0016)	(0.0047)	(0.0028)	(0.0030)	(0.0093)
No HS diploma	-0.0555***	-0.0632***	-0.0437***	0.0246	-0.0311
	(0.0083)	(0.0225)	(0.0121)	(0.0381)	(0.0303)
College Degree	0.0647***	0.0569***	0.0550***	0.0706***	0.0591
	(0.0040)	(0.0146)	(0.0118)	(0.0197)	(0.0436)
Advanced Degree	0.0941***	0.104***	0.126***	0.0913***	0.0834**
	(0.0043)	(0.0129)	(0.0184)	(0.0169)	(0.0344)
Professional Occ	0.0431***	0.00974	0.0390**	-0.00183	0.0342
	(0.0054)	(0.0105)	(0.0162)	(0.0071)	(0.0358)
Farming Occ	0.0938***	-0.215	0.186***	-0.0352	0.162***
	(0.0231)	(0.3280)	(0.0428)	(0.1220)	(0.0366)
Mangerial Occ	0.0346***	0.0184	0.0402***	-0.00485	0.00985
	(0.0067)	(0.0147)	(0.0119)	(0.0107)	(0.0289)
Sales Occ	0.0345***	0.00499	0.0685***	-0.025	0.0605
	(0.0101)	(0.0238)	(0.0209)	(0.0278)	(0.0462)
Craft Occ	0.0248***	0.0589***	0.0300*	-0.0508	0.0165
	(0.0070)	(0.0202)	(0.0157)	(0.0322)	(0.0681)
Operations Occ	-0.00299	-0.0507	0.0111	-0.076	-0.0113
	(0.0103)	(0.0435)	(0.0137)	(0.0512)	(0.0578)
Service Occ	0.000899	-0.0156	0.00577	-0.0193	-0.0756
	(0.0074)	(0.0192)	(0.0140)	(0.0242)	(0.0491)
Labor Occ	-0.0181*	0.00787	-0.00709	-0.0297	-0.0626
	(0.0097)	(0.0263)	(0.0146)	(0.0318)	(0.0714)
Constant	0.893***	1.074***	1.268***	0.912***	0.982***
	(0.0239)	(0.0636)	(0.1230)	(0.0660)	(0.1570)
Observations	126,237	10,272	34,793	9,279	3,437
R-squared	0.172	0.215	0.131	0.249	0.287

* State, Year, and County Fixed Effects Excluded for Brevity
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 16- Probit Model- Aggregated Household Composition

	All Households				
VARIABLES	**Aggregated Immigrants**	**Chinese Immigrants**	**Mexican Immigrants**	**Indian Immigrants**	**West African Immigrants**
Immigrant Status	-0.0115**	0.0359***	-0.0327***	0.0123***	-0.0770*
	(0.0047)	(0.0127)	(0.0109)	(0.0044)	(0.0457)
SNAP	-0.256***	-0.213***	-0.261***	-0.213***	-0.257***
	(0.0108)	(0.0189)	(0.0143)	(0.0492)	(0.0464)
WIC	-0.0312***	-0.0324*	-0.0379***	-0.0167	-0.08
	(0.0066)	(0.0191)	(0.0112)	(0.0201)	(0.0582)
Female	-0.0385***	-0.0151**	-0.0496***	-0.0164***	-0.00732
	(0.0028)	(0.0068)	(0.0071)	(0.0035)	(0.0173)
Age	-0.00709***	-0.00356***	-0.0130***	0.000594	-0.00468
	(0.0006)	(0.0012)	(0.0012)	(0.0009)	(0.0034)
Age Squared	9.13e-05***	4.55e-05***	0.000161***	-3.32E-06	6.74e-05**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Time since Year of Immigration	0.000809***	0.00172***	0.00140***	-7.61E-05	0.00111
	(0.0002)	(0.0007)	(0.0004)	(0.0003)	(0.0019)
Family Size	-0.00372***	0.00611*	-0.00634**	-0.00241*	-0.00143
	(0.0014)	(0.0032)	(0.0030)	(0.0013)	(0.0072)
No HS diploma	-0.0475***	-0.0409**	-0.0475***	0.0067	-0.0444
	(0.0071)	(0.0162)	(0.0129)	(0.0056)	(0.0284)
College Degree	0.0697***	0.0403***	0.0754***	0.0182***	0.0812***
	(0.0039)	(0.0084)	(0.0130)	(0.0045)	(0.0283)
Advanced Degree	0.120***	0.0947***	0.196***	0.0447***	0.0959***
	(0.0037)	(0.0078)	(0.0221)	(0.0063)	(0.0180)
Professional Occ	0.0440***	0.011	0.0406**	0.00171	0.0332
	(0.0047)	(0.0090)	(0.0170)	(0.0040)	(0.0335)
Farming Occ	0.0836***	-0.181	0.190***	-0.191	
	(0.0161)	(0.3050)	(0.0360)	(0.1550)	
Mangerial Occ	0.0314***	0.0112	0.0425***	1.73E-05	0.00172
	(0.0054)	(0.0094)	(0.0113)	(0.0052)	(0.0246)
Sales Occ	0.0315***	-3.82E-07	0.0725***	-0.0106	0.0630**
	(0.0091)	(0.0187)	(0.0202)	(0.0154)	(0.0303)
Craft Occ	0.0156***	0.0372***	0.0262*	-0.0424*	0.0267
	(0.0058)	(0.0111)	(0.0156)	(0.0235)	(0.0539)
Operations Occ	-0.00804	-0.0446	0.00438	-0.0466	-0.0355
	(0.0083)	(0.0293)	(0.0139)	(0.0326)	(0.0555)
Service Occ	0.00275	-0.0186	0.00701	-0.00315	-0.0593
	(0.0059)	(0.0121)	(0.0138)	(0.0089)	(0.0406)
Labor Occ	-0.0185**	0.0097	-0.012	-0.0126	-0.0482
	(0.0082)	(0.0155)	(0.0147)	(0.0163)	(0.0693)
Observations	126,225	10,146	34,764	9,111	3,360

** State and Year fixed effects excluded for brevity

* County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17- Complete Linear Probability Model- Single Households

VARIABLES	Single Households Aggregated Immigrants- Female	Aggregated Immigrants- Male
Immigrant Status	0.0414**	0.0194
	(0.0192)	(0.0228)
Time since Year of Immigration	-0.00333***	-0.0009
	(0.0012)	(0.0016)
Food Exp 1	-0.191***	-0.0546
	(0.0706)	(0.0686)
Food Exp 2	-0.160**	-0.0189
	(0.0732)	(0.0592)
Food Exp 3	-0.135*	-0.0255
	(0.0738)	(0.0615)
Food Exp 4	-0.128*	-0.0342
	(0.0705)	(0.0576)
Food Exp 5	-0.240*	-0.00158
	(0.1360)	(0.0625)
Food Exp 6	-0.335**	-0.0321
	(0.1490)	(0.0875)
Food Exp 7	-0.233***	-0.000611
	(0.0848)	(0.0358)
Citizen Immigrant	0.0631*	-0.0324
	(0.0345)	(0.0337)
SNAP	-0.358***	
	(0.0592)	
WIC	-0.297**	
	(0.1160)	
Age	-0.00154	-0.00158
	(0.0035)	(0.0034)
Age Squared	4.53E-05	2.32E-05
	(0.0000)	(0.0000)
No HS diploma	-0.0286	-0.053
	(0.0428)	(0.1400)
College Degree	0.104***	0.0892**
	(0.0354)	(0.0357)
Advanced Degree	0.0873**	0.102**
	(0.0340)	(0.0384)
Professional Occ	0.0981***	0.0424
	(0.0246)	(0.0376)
Farming Occ		
Mangerial Occ	0.0740*	0.0188
	(0.0373)	(0.0307)
Sales Occ	0.0351	0.0355
	(0.0467)	(0.0415)
Craft Occ		-0.127
		(0.1090)
Operations Occ	-0.0285	0.117
	(0.1000)	(0.0709)
Service Occ	0.0114	0.0668
	(0.0362)	(0.0877)
Labor Occ		0.0433
		(0.0486)
Constant	0.975***	0.846***
	-0.0861	-0.0878
Observations	1,725	1,003
R-squared	0.257	0.127

*State and Year Fixed Effects Excluded for Brevity
* County-level clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 18- OBD - Single Households

	Single Households	
	Aggregated Immigrants-Female	Aggregated Immigrants-Male
Food Security Prevalaence among Natives	0.854***	0.958
	(0.0256)	0.0000
Food Security Prevalence among Immigrants	0.875***	0.944
	(0.0226)	0.0000
Native/Immigrant Difference	-0.0211	0.0143
	(0.0141)	0.0000
Decomposition- Aggregated Variables		
Endowments	-0.0015	-0.0025
	(0.0081)	(0.0000)
Coefficients	-0.0129	0.0103
	(0.0143)	(0.0000)
Interaction	-0.0067	0.0065
	(0.0086)	(0.0000)
Socio-Demographic Variables		
Endowments	0.0012	-0.0029
	(0.0026)	(0.0000)
Coefficients	-0.0633	-0.0216
	(0.2420)	(0.0000)
Interaction	0.0007	0.0047
	(0.0039)	(0.0000)
Public Assistance Variables		
Endowments	-0.01	0
	(0.0062)	(0.0000)
Coefficeients	-0.0088	0
	(0.0079)	(0.0000)
Interaction	-0.0011	0
	(0.0050)	(0.0000)
Occupation Variables		
Endowments	1.02E-05	0
	(0.0002)	(0.0000)
Coefficients	0.260**	0.0471
	(0.1050)	(0.0000)
Interaction	-1.34E-06	0
	(0.0000)	(0.0000)
Education Variables		
Endowments	0.0052	-0.0013
	(0.0047)	(0.0000)
Coefficients	0.0553	-0.165
	(0.0474)	(0.0000)
Interaction	-0.0034	0.0043
	(0.0062)	(0.0000)
Food Expenditure Variables		
Endowments	0.0018	0.0017
	(0.0014)	(0.0000)
Coefficients	-0.213**	0.0122
	(0.0931)	(0.0000)
Interaction	-0.0027	-0.0025
	(0.0024)	(0.0000)
Observations	1,725	1,003

* State and Year fixed effects excluded for brevity

* County-level clustered standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 19 – Occupational Categories

Professional Occupations: Accountants and auditors, Actors and actresses, Airplane pilots and navigators, Architects, Artists and art teachers, Athletes, Authors, Chemists, Chiropractors, Clergymen, College presidents and deans, Professors and instructors, Dancers and dancing teachers, Dentists, Designers, Dieticians and nutritionists, Draftsmen, Editors and reporters, Engineers, Entertainers, Farm and home management advisors, Foresters and conservationists, Funeral directors and embalmers, Lawyers and judges, Librarians, Musicians and music teachers, Nurses, Agricultural scientists, Biological scientists, Geologists and geophysicists, Mathematicians, Physicists, Miscellaneous natural scientists, Optometrists, Osteopaths, Personnel and labor relations workers, Pharmacists, Photographers, Physicians and surgeons, Radio operators, Recreation and group workers, Religious workers, Social and welfare workers, Economists, Psychologists, Statisticians and actuaries, Miscellaneous social scientists, Sports instructors and officials, Surveyors, Teachers, Technicians, Therapists, Veterinarians, professional, technical and kindred workers.
Farming Occupations: Farmers (owners and tenants), Farm Managers
Managerial Occupations: Buyers and department heads (store), Buyers and shippers (farm products), Conductors, Credit men, Floormen and floor managers, Store Inspectors, public administration, Managers and superintendents, building Officers, pilots, pursers and engineers, ship Officials and administrators, public administration, Postmasters, Purchasing agents and buyers, Managers, officials, and proprietors (n.e.c.), Clerical and Kindred (n.e.c.), Attendants and assistants, Baggagemen, Bank tellers, Bookkeepers, Cashiers, Collectors (bill and account), Dispatchers and starters, vehicle, Express messengers and railway mail clerks, Mail carriers, Messengers and office boys, Office machine operators, Shipping and receiving clerks, Stenographers, typists, and secretaries, Telegraph messengers, Telegraph operators, Telephone operators, Ticket, station, and express agents
Sales Occupations: Advertising Agents and Salesman, Auctioneers, Demonstrators, Hucksters and Peddlers, Insurance agents and brokers, newsboys, real estate agents and brokers, stock and bond salesmen, salesmen and sales clerks (n.e.c.)
Craft Occupations: Bakers, Blacksmiths, Bookbinders, Boilermakers, Brickmasons, stonemasons, and tile setters, Cabinetmakers, Carpenters, Cement and concrete finishers, Compositors and typesetters, Cranemen, derrickmen, and hoistmen, Decorators and window dressers, Electricians, Electrotypers and stereotypers, Engravers, Excavating, grading, and road machinery operators, Foremen (n.e.c.), Forgemen and hammermen, Furriers, Glaziers, Heat treaters, annealers, temperers, Inspectors, scalers, and graders, log and lumber, Inspectors (n.e.c.), Jewelers, watchmakers, goldsmiths, and silversmiths, Job setters, metal, Linemen and servicemen, telegraph, telephone, and power, Locomotive engineers, Locomotive firemen, Loom fixers, Machinists, Mechanics and repairmen, airplane, Mechanics and repairmen, automobile Mechanics and repairmen, office machine

Mechanics and repairmen, radio and television Mechanics and repairmen, railroad and car shop Mechanics and repairmen (n.e.c.), Millers, grain, flour, feed, etc., Millwrights, Molders, metal, Motion picture projectionists, Opticians and lens grinders and polishers, Painters, construction and maintenance, Paperhangers, Pattern and model makers, Photoengravers and lithographers, Piano and organ tuners and repairmen, Plasterers, Plumbers and pipe fitters, Pressmen and plate printers, printing, Rollers and roll hands, metal Roofers and slaters, Shoemakers and repairers, Stationary engineers, Stone cutters and stone carvers, Structural metal workers, Tailors and tailoresses, Tinsmiths, coppersmiths, and sheet metal workers, Tool makers, and die makers and setters, Upholsterers, Craftsmen and kindred workers (n.e.c.), Members of the armed services
Operative Occupations: Apprentice auto mechanics, Apprentice bricklayers and masons, Apprentice carpenters, Apprentice electricians, Apprentice machinists and toolmakers, Apprentice mechanics, except auto Apprentice plumbers and pipe fitters Apprentices, building trades (n.e.c.), Apprentices, metalworking trades (n.e.c.) Apprentices, printing trades, Apprentices, other specified trades Apprentices, trade not specified, Asbestos and insulation workers, Attendants, auto service and parking, Blasters and powdermen, Boatmen, canal men, and lock keepers, Brakemen, railroad Bus drivers, Chainmen, rodmen, and axmen, surveying Conductors, bus and street railway, Deliverymen and routemen, Dressmakers and seamstresses, Dyers, Filers, grinders, and polishers, metal Fruit, nut, and vegetable graders, and packers, except factory, Furnacemen, smeltermen and pourers, Heaters, metal Laundry and dry cleaning operatives, Meat cutters, except slaughter and packing house, Milliners, Mine operatives and laborers, Motormen, mine, factory, logging camp, etc., Motormen, street, subway, and elevated railway Oilers and greaser, Painters, except construction or maintenance, Photographic process workers, Power station operators, Sailors and deck hands, Sawyers, Spinners, textile, Stationary firemen, Switchmen, railroad, Taxicab drivers and chauffers, Truck and tractor drivers, Weavers, textile, Welders and flame cutters, Operative and kindred workers (n.e.c.)
Service Occupations: Housekeepers, Laundressses, Private household workers (n.e.c.), hospital and other institution attendants, professional and personal service attendants, recreation and amusement attendants, Barbers, beauticians, and manicurists, Bartenders, Bootblacks, Boarding and lodging house keepers, Charwomen and cleaners, Cooks, Counter and fountain workers, Elevator operators, Firemen, fire protection Guards, watchmen and doorkeepers, Housekeepers and stewards, Janitors and sextons, Marshals and constables, Midwives, Policemen and detectives, Porters, Practical nurses, Sheriffs and bailiffs, Ushers (recreation and amusement), Waiters and waitresses, Watchmen (crossing) and bridge tenders, Service workers (except private households n.e.c.)
Labor Occupations: Farm foreman, farm laborers (wage workers), farm laborers (unpaid family workers), farm service laborers (self-employed), fisherman and oystermen, garbage laborers, car washers, greaser, gardeners, longshoreman, stevedores, lumbermen, raftsmen, woodchoppers, teamsters, laborers (n.e.c.)
Not Employed: No Occupation

Table 20- Pew Research Center Data and Sample Data- 2017 Comparisons

Demographic Characteristics- 2017	National Population	Sample
Nativity of US Immigrants		
Foreign Born population in total	44,406,371	2,311
% born in Mexico	25.30%	21.55%
Percent who are citizens	49.40%	58.85%
Age and Gender of US Immigrants		
Median Age (in years)	44	47
Percent of foreign born who are female	51.70%	50.76%
Marital Status of US immigrants		
Percent who are Married (ages 18 and older)	60.90%	60.42%
Education of US Immigrants		
High School or less	50%	41.37%
Two-year degree/some college	18.80%	18.69%
Bachelor's Degree or More	31.20%	39.93%
Income of US immigrants		
Median annual HH income (in 2017 dollars)	$56,000	$50,000-$59,999

Source: Pew Research Center, CPS 1998-2017