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Neighborhood Context and Migrant Selectivity: An Empirical Analysis of the Nativity Advantage in Black Birth Outcomes, California 2007 - 2010

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Neighborhood Context and Migrant Selectivity: An Empirical Analysis of the Nativity Advantage in Black Birth Outcomes, California 2007 - 2010

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Public Health

by

Bridgette E. Blebu

Dissertation Committee:
Assistant Professor Annie Ro, Chair
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ABSTRACT OF THE DISSERTATION

Neighborhood Context and Migrant Selectivity: An Empirical Analysis of the Nativity Advantage in Black Birth Outcomes, California 2007 - 2010

By

Bridgette E. Blebu

Doctor of Philosophy in Public Health

University of California, Irvine, 2019

Assistant Professor Annie Ro, Chair

Background: Non-Hispanic black women remain at high risk for adverse birth outcomes including preterm birth and low birth weight. However, black immigrant women do not exhibit the same disparities compared to their US-born counterparts. This dissertation examines whether two theoretical explanations for immigrant health advantages: protective immigrant neighborhoods and migrant selection, contribute to the immigrant advantage in black birth outcomes. *Methods*: In chapter two, I examine the spatial distribution of three neighborhood attributes: black immigrant co-ethnic density, black racial concentration, and neighborhood deprivation, and then conduct an ecological analysis using OLS regression to examine whether these neighborhood attributes are associated with the proportion of black immigrant preterm births. In chapter three, I use logistic regression with robust standard errors to assess whether nativity differences in preterm birth risk persist after adjusting for each neighborhood attribute and maternal characteristics. In chapter four, I use OLS regression to assess whether migrant selection contributes to nativity differences in infant birth weight. The migrant selection hypothesis argues that immigrants are selected on characteristics that make more likely to migrate compared to those left behind in the country of origin, and that these characteristics contribute to their above average post-migration health. To test this, I compute three measures of migrant selection: BMI selectivity, height selectivity and migration likelihood, leveraging the Nigerian Demographic Health Survey data and a subset of California births to Nigerian immigrant women. *Results*: I find that tract-level immigrant co-ethnic density, black racial concentration, and neighborhood deprivation are not associated with black immigrant preterm birth, nor do they explain differences in preterm birth risk between US- and foreign-born black women. However, migration likelihood explains a significant portion of the nativity advantage in infant birth weight after adjusting for maternal characteristics. *Conclusion*: My findings indicate that there is little association between tract-level neighborhood context and black immigrant birth outcomes in California, a distinct finding compared to existing research in the Northeast. Further migrant selection, when measured as migration likelihood, may be a more robust predictor of the nativity differential in infant birth weight among Nigerian immigrant and US-born black women in California.

CHAPTER 1
Introduction: Nativity Status and Birth Outcomes of Black Women

Despite advancements in maternal and perinatal health care, significant disparities in non-Hispanic black birth outcomes remain. In 2015, 13% of infants born to non-Hispanic black women were preterm (< 37 weeks of gestation) compared to approximately 9% of infants born to non-Hispanic white women (Martin, Hamilton, M. J. K. Osterman, et al. 2017). Differences in low birth weight were larger, with 13% of non-Hispanic black infants, compared to 7% of non-Hispanic white infants weighing less than 2,500g at birth (Martin, Hamilton, M. J. K. Osterman, et al. 2017). Yet compared to US-born black women, black immigrant women are at lower risk for adverse birth outcomes and exhibit a smaller racial disparity when compared to infants of non-Hispanic white women (David and Collins 1997; Elo, Vang, and Culhane 2014; Oliver et al. 2018; Pallotto, Collins, and David 2000; Singh and Stella 1996; Wartko, Wong, and Enquobahrie 2017). In 2008, 9% of black immigrant births were preterm compared to 12% of US-born black births (Elo et al. 2014). This nativity advantage also varies by maternal birthplace, where African-born women have better birth outcomes compared to Caribbean-born women, who then have better outcomes than US-born black women (Elo et al. 2014; Hamilton and Hummer 2011; Howard et al. 2006; Stein et al. 2009).

To date, there is little consensus on the origins of the nativity advantage in black birth outcomes. Differences in maternal sociodemographic characteristics and health behaviors fail to account for them entirely, indicating that nativity advantages stem from the interplay of social, environmental and biological factors related to health disparities and health advantages in the US (Alio et al. 2010).

Theoretical Explanations of the Immigrant Health Advantage

Immigrants in the United States experience lower rates of mortality and morbidity despite having a lower socioeconomic position compared to the US-born population (Argeseanu Cunningham, Ruben, and Venkat Narayan 2008). Explanations for this immigrant health advantage typically follow two theoretical frames: 1) health-promoting cultural norms and social networks or 2) migrant selection. Scholars that draw on the former posit that immigrants are more likely to maintain a cultural orientation that promotes better health behaviors including lower substance use and healthier dietary patterns (Logan et al. 2002). For example, black immigrant women are less likely to use tobacco, alcohol, or marijuana before and during pregnancy compared to US-born black women (Elo and Culhane 2010; Perreira and Cortes 2006; Ramadhani et al. 2011). Black immigrant women are also less likely to be obese before pregnancy, and one study found that black immigrant women had better pre-pregnancy dietary behaviors compared to US-born black women (Cabral et al. 1990; Ramadhani et al. 2011). However, these behavioral characteristics do not fully explain the nativity advantage in black birth outcomes, leading some scholars to consider the neighborhood context.

Examinations of the immigrant neighborhood context have emerged as an extension of cultural orientation theories, given that protective immigrant social networks stem in part from immigrants' settlement in neighborhoods with higher co-ethnic concentrations upon arrival (Portes and Rumbaut 2014). The ethnic density hypothesis suggests that cultural norms are maintained and improve health when immigrants reside in enclaves with co-ethnic peers and greater access to culturally specific resources (Becares et al. 2012; Osypuk et al. 2009; Pickett and Wilkinson 2008). However, it is also important to note that immigrant neighborhoods are not exclusively defined by voluntary settlement among co-ethnics and that nativity advantages may also stem from differential exposure to adverse or health-promoting neighborhood conditions. Segmented assimilation theory offers a guide to understanding how immigrant neighborhood context is shaped by racial and socioeconomic stratification that leads to different neighborhood-level exposures among immigrants. Portes and Zhou (1993) posit that immigrants follow one of three paths to integration in the United States. Immigrants will either experience upward (or classic) assimilation into the American middle-class, downward assimilation to the most disadvantaged social classes, or selective assimilation while maintaining an ethnic orientation through co-ethnic communities. Although immigrant assimilation patterns are beyond the scope of this study, it follows that exposure to adverse neighborhood conditions will vary depending on these assimilation patterns (Portes and Rumbaut 2014; Waters 1999). In addition to immigrant co-ethnic density, exploration of other neighborhood attributes like racial residential segregation and neighborhood deprivation, are critical for a more comprehensive understanding of the nativity advantage as racial segregation and neighborhood deprivation are closely tied with social stratification in the US.

In contrast, migrant selection theories focus on processes that begin in the countries of origin. Migrant selection follows that immigrants are not a representative sample of non-migrants in the country of origin, but rather a group selected on health status and characteristics associated with a higher likelihood of migration (Akresh and Frank 2008). The health selection hypothesis posits that selective migration of individuals with better health patterns may contribute to immigrant health advantages after migration (Riosmena, Kuhn, and Jochem 2017). For instance, studies using binational comparisons find that migrants are less likely to smoke and have lower obesity rates compared to non-migrants in sending countries (Bostean 2013; Fleischer, Ro, and Bostean 2017; Riosmena, Wong, and Palloni 2013).

While health indicators capture differences in the distribution of health and illness of migrants relative to non-migrants, sociodemographic indicators such as age and educational attainment, are also important because they capture differences in human and social capital that are necessary during migration. At its core, the decision to migrate depends on whether the economic benefits of migration outweigh the costs of leaving one's home country (Jasso et al. 2004). Sociological research has shown that those who decide to migrate tend to be younger and more educated compared to non-migrants, as they are better equipped to maximize the employment opportunities and overall financial benefits in the receiving country (Jasso et al. 2004). These characteristics (age and education) are also associated with health, where younger individuals are healthier and those with higher levels of education are better equipped to access to health-promoting resources. Thus, immigrant advantages may stem from characteristics related to migration likelihood.

Migration likelihood is especially salient for migrants coming from sending countries where the cost of migration is high—as is the case for African immigrants (Hamilton 2014). In countries where overall education levels are low, levels of income inequality are high, and distance from the US is large, migration becomes increasingly difficult and the degree of selectivity increases among immigrants (Feliciano 2005; Jasso et al. 2004). Thus, examining migration likelihood in across various countries with different contexts also illuminates variations in the degree of selectivity (and subsequent nativity advantages) between immigrant groups. The country of origin differences in the nativity advantage of black immigrants may be reflecting differences in migrant selection, where nativity advantages are larger among African-born because they have a higher degree of selectivity relative to Caribbean-born women.

THE PRESENT STUDY

In this dissertation, I first argue that beyond the protective cultural orientation that neighborhood immigrant co-ethnic density confers, nativity advantages may also stem from differential exposure to adverse neighborhood conditions such as racial residential segregation and neighborhood deprivation. Neighborhoods play a critical role in shaping the risk profiles of black women in the US and could explain the nativity advantage in birth outcomes if black immigrant women are less likely to reside in neighborhoods with adverse conditions compared to US-born black women. Black immigrants may have lower levels of exposure to adverse neighborhood conditions, given that they do not share the same lifelong minority status as US-born blacks and often emigrate from countries with a majority-black racial context which some research attributes to their nativity advantages in the US (Hamilton 2014; Read and Emerson 2005). I add to the literature by exploring the extent that immigrant co-ethnic density, black racial concentration, and neighborhood deprivation explain nativity differences in black birth outcomes.

African immigrants are much more likely to enter through diversity and employment visas compared to other immigrant groups (Kent 2007), which indicates that they are selected on important characteristics related to health such as educational attainment. I argue that migrant selection is an important source of the nativity advantage in black birth outcomes, particularly among African immigrants who are selected on important sociodemographic characteristics and face the highest costs of migration (e.g. distance from the US) relative to Caribbean immigrants (Dodoo 1997; Gambino, Trevelyan, and Fitzwater 2014). While most studies of migrant selection examine the extent that migrants are selected on health outcomes compared to non-migrants, I also examine the extent that measures of early life conditions and migration likelihood explain the nativity difference in black birth outcomes.

This dissertation also has important contributions to the study of black immigrants because of its focus on the state of California. Currently, the small body of research on black immigrants is geographically limited to regions in the Northeast, specifically New York City, and while some research has considered the Midwest, very few studies consider black immigrants living in the West. Although the US black population is largest in the Northeast and home to a considerable number of black immigrants in the US, the foreign-born black population is increasingly settling in destinations outside of the Northeast (Tetty-Fio 2016). For instance, African immigrants, who accounted for the majority of recent arrivals among foreign-born blacks by 2005, are much more dispersed with 34% residing in a state that is not a major settlement area[1], compared to only 9% of Caribbean immigrants (Kent 2007).

However, more importantly, settlement regions in the Northeast are uniquely entrenched in a history of black-white residential segregation that is distinct from other regions in the US. While black immigrants may be afforded benefits from their foreign-born status, these benefits may be overshadowed by the concentration of social disadvantage that stems from the residence in residentially segregated regions. In California, however, the total black population is significantly smaller and racial segregation is less pervasive. For instance, in 2017 US-born blacks accounted for 14% of the total population in New York compared to 7% in California (Iceland, David H. Weinberg, and Steinmetz 2002; Migration Policy Institute 2018). In this context, neighborhood conditions of black immigrants and US-born blacks are more likely to vary.

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[1] The top settlement states of foreign-born blacks include: New York, Maryland, Pennsylvania, Massachusetts, New Jersey, Virginia, Minnesota, Florida, Georgia, Texas, and California (Kent 2007).

CONCEPTUAL FRAMEWORK

The purpose of this dissertation is to explore the nativity advantage in the birth outcomes of black women living in California, by examining the contributions of neighborhood context and migrant selection. This conceptual framework situates nativity status as a central predictor of perinatal health and describes how neighborhood context and migrant selection mediate its influence on the perinatal health of black women (Figure 1.1). In this section, I begin with a review of literature on neighborhood context and black birth outcomes broadly, then present an argument for how neighborhood context mediates nativity differences in black birth outcomes. Lastly, I review the literature on migrant selection and discuss how it contributes to the nativity advantage in black birth outcomes.

Neighborhoods and Black Birth Outcomes

Racial residential segregation and neighborhood deprivation are two neighborhood attributes that receive the most attention in neighborhood literature, because of their contribution to social inequality in the US. As a form of institutional racism, residential segregation shapes access to education and employment opportunities, as well as the social and physical conditions of neighborhoods (Landrine and Corral 2009; Williams and Collins 2001). Residential segregation is independently associated with several adverse birth outcomes among black women and is also associated with poor neighborhood conditions (Anthopolos et al. 2011; Debbink and Bader 2011; Mason et al. 2009a; Mendez, Hogan, and Culhane 2014; Osypuk and Acevedo-Garcia 2008). A significant body of literature indicates that neighborhood deprivation is negatively associated with birth weight and positively associated with preterm birth (Janevic et al. 2010; Messer et al. 2008; O'Campo et al. 2008; Phillips et al. 2013; Vinikoor-Imler et al. 2011).

Residential segregation also has important implications for neighborhood racial/ethnic composition. While the two are related, residential segregation is most often studied as a regional attribute (e.g., metropolitan area) that captures broader patterns of racial exclusion in institutions like the housing market (Osypuk 2013; Osypuk and Acevedo-Garcia 2008). On the other hand, racial/ethnic composition describes the local neighborhood racial context. While neighborhood racial composition can capture the association between protective group density and health, for black neighborhoods, black racial composition is often used as a partial representation of racial residential segregation given the magnitude of segregation in predominantly black neighborhoods (White and Borrell 2011). As such, the findings on black racial concentration and black birth outcomes are mixed. Some studies find black racial concentration to increase adverse birth outcomes, while others show no association between black racial concentration and black birth outcomes (Masi et al. 2007a; Reichman, Teitler, and Hamilton 2009). Further, one study found that black racial concentration is associated with a lower risk of adverse birth outcomes (Vinikoor et al. 2008). Together these studies indicate that the role of black racial concentration in black neighborhoods is complex: in some instances, it may reflect voluntarily settlement patterns to seek insulation from experiences of discrimination (i.e., protective group density), and in others it may reflect broader trends of racial isolation among black women (Acevedo-Garcia et al. 2003; Collins James W. et al. 1998).

Mechanistically, residence in segregated and disadvantaged neighborhoods can result in chronic exposures to stress over the life course and during pregnancy (Cheng et al. 2013; Hogue and Bremner 2005; Holland, Kitzman, and Veazie 2009; Mendez et al. 2014). Direct influences may occur through biological mechanisms where mothers with exposure to environmental stressors are at increased risk for inadequate weight gain, chronic hypertension or pre-pregnancy related hypertension which are associated with adverse birth outcomes (Giurgescu and Misra 2018; Grady and Ramirez 2008). Indirect pathways related to health behaviors suggest black women may be more likely to adopt coping behaviors associated with increased risk such as smoking, substance use, and delayed prenatal care (Harville et al. 2010; Vinikoor-Imler et al. 2011). Neighborhood residential segregation and deprivation may also erode the neighborhood social cohesion and social capital[2] in black neighborhoods that afford black women social support systems which buffer against harmful exposures. Studies show that social support is related to birth outcomes among black women and mediates the relationship between neighborhoods and perinatal health (Nkansah-Amankra et al. 2010; Schempf, Strobino, and O'Campo 2009).

Neighborhood immigrant co-ethnic density is said to reflect the degree of social support available to immigrants and is thus relevant to differences in the residential context of US-born and black immigrants. The proportion of foreign-born residents in a neighborhood is hypothesized to be associated with improved birth outcomes for some groups, but studies of black immigrant co-ethnic density report increases in risk of adverse birth outcomes for African immigrants (Finch et al. 2007; Logan et al. 2002; Mason et al. 2010; Osypuk et al. 2009).

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[2] I adopt Bourdieu's definition of social cohesion and social capital which describes social cohesion as the values and connectedness that are reflected in social networks within a neighborhood, and social capital as the actual or potential resources within neighborhood networks that is afforded to its members (Carpiano 2006).

Nativity Differences in Neighborhood Context

In the following section, I review literature that examines differential exposure and vulnerability to neighborhood context between US- and foreign-born black women. I explore the extent that US-born blacks and black immigrants are differentially exposed to three relevant neighborhood attributes: racial residential segregation (and black racial concentration), neighborhood deprivation and immigrant co-ethnic density.

Differential exposure to adverse neighborhood conditions. Due to the pervasiveness of racial stratification in the US, differences in neighborhood context between US-born blacks and black immigrants are modest. Much like US-born blacks, black immigrants experience high levels of residential segregation from whites (Scopilliti and Iceland 2008). Nonetheless, even though black immigrant neighborhoods are located in residentially segregated areas, sociological research on the spatial assimilation of black immigrants has shown that they maintain reasonable spatial distances from US-born blacks and in some locales, this translates to improved neighborhood conditions (Freeman 2002). For instance, in New York City, Crowder (1999) found that while black-white segregation was high among black immigrants, they also reside in neighborhoods with lower levels of deprivation. Also, one study found that while African immigrants in Boston reside in segregated neighborhoods, they maintain a moderate degree of separation from US-born blacks (Vang 2012). Thus, it appears that even though black immigrants do not achieve spatial assimilation with whites, they tend to reside in less deprived neighborhoods, which has implications for their health outcomes. In states like California, differential exposure to neighborhoods with high black racial concentration and deprivation may be more pronounced because residential segregation is low and allows for greater residential mobility of black immigrants.

Residence in neighborhoods with high immigrant co-ethnic density may also contribute to the nativity advantage, but black immigrant co-ethnic density appears to be an exception: two studies report increased preterm birth risk as immigrant co-ethnic density increases (Bloch 2011; Mason et al. 2010). However, it is important to note that the neighborhoods included in these studies were in New York City and Philadelphia—cities where racial residential segregation is high. It may hold that in less segregated neighborhoods, black immigrant co-ethnic density reduces risk of adverse birth outcomes among black immigrants.

Differential vulnerability to adverse neighborhood conditions. The nativity advantage may also stem from nativity differences in the association between adverse neighborhood conditions and birth outcomes. The small body of literature on nativity differences in the association between neighborhoods and birth outcomes is mixed; while some associations do vary by nativity status, others appear to be robust to nativity status. For instance, in New York City, two studies found that in neighborhoods with poor socioeconomic conditions, infants of black immigrant women are at lower risk of low birth weight compared to infants of US-born black women (Fang, Madhavan, and Alderman 1999; Grady and McLafferty 2007). Studies find that residential segregation associations are more consistent across nativity status. Grady and McLafferty found that tract-level racial isolation and low birth weight risk are positively associated for both US- and foreign-born black women and another study found that preterm birth risk increases with residential segregation for both US- and foreign-born black women (Grady and McLafferty 2007; Margerison-Zilko et al. 2017). However, in Minnesota, Baker and Hellerstedt (2006) showed that tract-level black racial concentration is positively associated with preterm birth among US-born black women, but not among foreign-born black women. These findings indicate that black immigrants are subject to similar patterns of structural racism in the

US. However, at the local level and in a region where residential segregation is not as pervasive such as Minnesota, the association between black racial concentration and birth outcomes varies.

Migrant Selection

According to the health selection hypothesis, migrants are positively selected on health and that this above average health status contributes to their post-migration health outcomes. More specifically, health selection argues that the health status of migrants is better than that of non-migrants who remain in the sending country (Jasso, 2004). Because of this overall health advantage, immigrants display better health status compared to US-born. While many studies examine migrant selection by comparing foreign-born to US-born populations, appropriate measures of migrant selection require comparisons between migrants and non-migrants in sending countries. Binational comparisons of migrant and non-migrant health show that immigrants are selected on several outcomes including height (a proxy measure of early life conditions), hypertension, obesity, disability/activity limitation, smoking status and infant mortality (Barquera et al. 2008; Bostean 2013; Crimmins et al. 2005; Fleischer et al. 2017; Landale, Gorman, and Oropesa 2006; Mehta and Elo 2012; Riosmena et al. 2013).

Many of these dimensions of migrant selection are also associated with increased risk of adverse birth outcomes (Goldenberg et al. 2009). For instance, black immigrant women who are selected on height may have favorable early life conditions in their home country that relate to lower stress accumulation and thus lower risk of having a low birth weight infant. As it relates to nutritional status, black immigrant women who are selected on obesity risk may be at lower risk for comorbidities that increase risk of adverse pregnancy outcomes, such as hypertension (Albrecht et al. 2013; Wartko et al. 2017). Sociologists also find that migrants are selected on sociodemographic characteristics like educational attainment—a vital determinant of post-migration health and socioeconomic status. Feliciano (2006) found that educational attainment in children of immigrants increases as the educational selectivity of their immigrant parents' increases. Sociodemographic characteristics can also determine differences in migration likelihood between migrants and non-migrants as a measure migrant selection (Van Hook et al. 2012).

Most migrant selection studies have been conducted among immigrants from Hispanic countries (primarily Mexico), but black immigrants from sub-Saharan African countries have received relatively little attention. This is a considerable gap because health selection varies by country of origin characteristics (Akresh and Frank 2008; Hamilton 2014). For instance, Fleischer and colleagues (2017) found that smoking selectivity is sensitive to smoking conditions in sending country among Mexican migrants. Ro et al. (2016) found that health selection was associated with country-level visa mode of entry, where health selection increased among countries with a higher proportion of work-related emigration. Therefore, migrant selection patterns among black immigrant sending countries may be distinct compared to Hispanic sending countries. I argue that migrant selection based on health status, early life conditions and migration likelihood may explain perinatal health differences by nativity status, particularly among African immigrants, who have the largest nativity advantage vis-à-vis Caribbean immigrants.

DISSERTATION OVERVIEW

The findings of this dissertation are presented in three chapters. In chapter two, I begin with an ecological examination of the relationship between immigrant co-ethnic density, black racial concentration, neighborhood deprivation and the proportion of black immigrant preterm births in California. In Chapter three, I use the same neighborhood attributes to assess the contribution of neighborhood context to the nativity advantage in preterm birth risk among black women. In Chapter four, I examine the contribution of migrant selection to the difference in birth weight among US- and Nigerian-born black women. Lastly, in Chapter five I present a summary of my findings and conclusions.

Chapter 2: Neighborhood Context and Black Immigrant Preterm Birth

The study of black immigrant neighborhoods is complex, and the social context can be examined through several distinct domains. Black immigrant neighborhoods characterized by a high spatial concentration of black immigrants may have higher levels of neighborhood social capital and subsequent social connectedness (Portes and Rumbaut 2014). However, a parallel body of segregation literature suggests that black immigrants are often subject to racial discrimination in their daily encounters with individuals and social structures, just as their US-born counterparts (Crowder 1999; Scopilliti and Iceland 2008). This context of opposing domains in black immigrant neighborhoods is understudied, due to siloed bodies of literature on immigrant enclaves, residential segregation and neighborhood socioeconomic conditions. Furthermore, black immigrant neighborhoods in the Northeast are the focus of most studies, but these neighborhoods are unique given the long history of black-white residential segregation that characterizes them. This narrow focus limits generalizability to other black immigrant settlement contexts without such a pervasive history of racial residential segregation.

In chapter two, I conduct an ecological study of three social domains of neighborhood context in immigrant neighborhoods: immigrant co-ethnic density, black racial concentration, neighborhood deprivation, and the proportion of preterm births to black immigrant women in California neighborhoods (census tracts). To assess these neighborhood features using a more robust approximation of social environments, I also conduct a set of analyses using a proximity-weighted measure of each neighborhood feature. Proximity-weighting allows for the examination of the social environment that does not rely on a census tract boundary (Reardon et al. 2008). Lastly, I include a set of GIS maps to examine the spatial distribution of each neighborhood attribute.

Chapter 3: Neighborhood Context and The Nativity Advantage in Preterm Birth Risk

Nativity advantages may stem from differences in the residential neighborhood context between US-born and black immigrant women. Neighborhood context is a meaningful predictor of adverse birth outcomes (Culhane and Elo 2005). Residing in a neighborhood with adverse conditions can lead to the accumulation of stressors that may directly influence women biologically through stress pathways, or indirectly through poor maternal coping behavior, e.g., substance use and poor diet (Hogue and Bremner 2005). If black immigrant women are more likely to reside in neighborhoods with lower levels of adverse conditions compared to US-born black women, this may explain why the risk for preterm birth is lower in infants of black immigrant women. Further, while black immigrants share a racialized social position with US-born blacks, they generally do not share the same life-long minority status and the associated accumulation of race-related stressors over the life course. Thus, the association between neighborhood context and birth outcomes may be muted among black immigrant women compared to US-born black women.

In chapter three, I examine whether differences in the exposure to adverse neighborhood conditions contribute to the nativity advantage in black preterm birth risk. I begin by comparing the proportion of births by neighborhood attribute to understand the variations in exposure by nativity status. I test whether immigrant co-ethnic density, black racial concentration, and neighborhood deprivation explain the nativity advantage. I also examine whether the association between each neighborhood attribute and preterm birth varies by nativity status.

Chapter 4: Migrant Selection and the Nativity Advantage in Infant Birth Weight among Black Women

Nativity advantages in black birth outcomes are most pronounced in African-born immigrants compared to non-Hispanic Caribbean immigrants (Elo et al. 2014). It follows that migrants who experience the most substantial nativity differences in health may also be the most selected. While migration among black immigrants has been rapidly increasing since 2005 due to changes in immigration policy, I expect that African immigrants are highly selected given most African immigrants enter on competitive diversity or employment visas and because the geographic distance from the US makes migration costlier than migration from Caribbean countries (Kent 2007).

In chapter four, I focus on the second theoretical explanation for immigrant health advantages: migrant selection. I use binational comparisons of Nigerian immigrants and Nigerian non-migrants to measure BMI selectivity, height selectivity, and migration likelihood. I test whether each measure contributes to the nativity advantage in birth weight between Nigerian immigrants and US-born black women.

In chapter five, I present a summary of the main findings and discuss their implications.

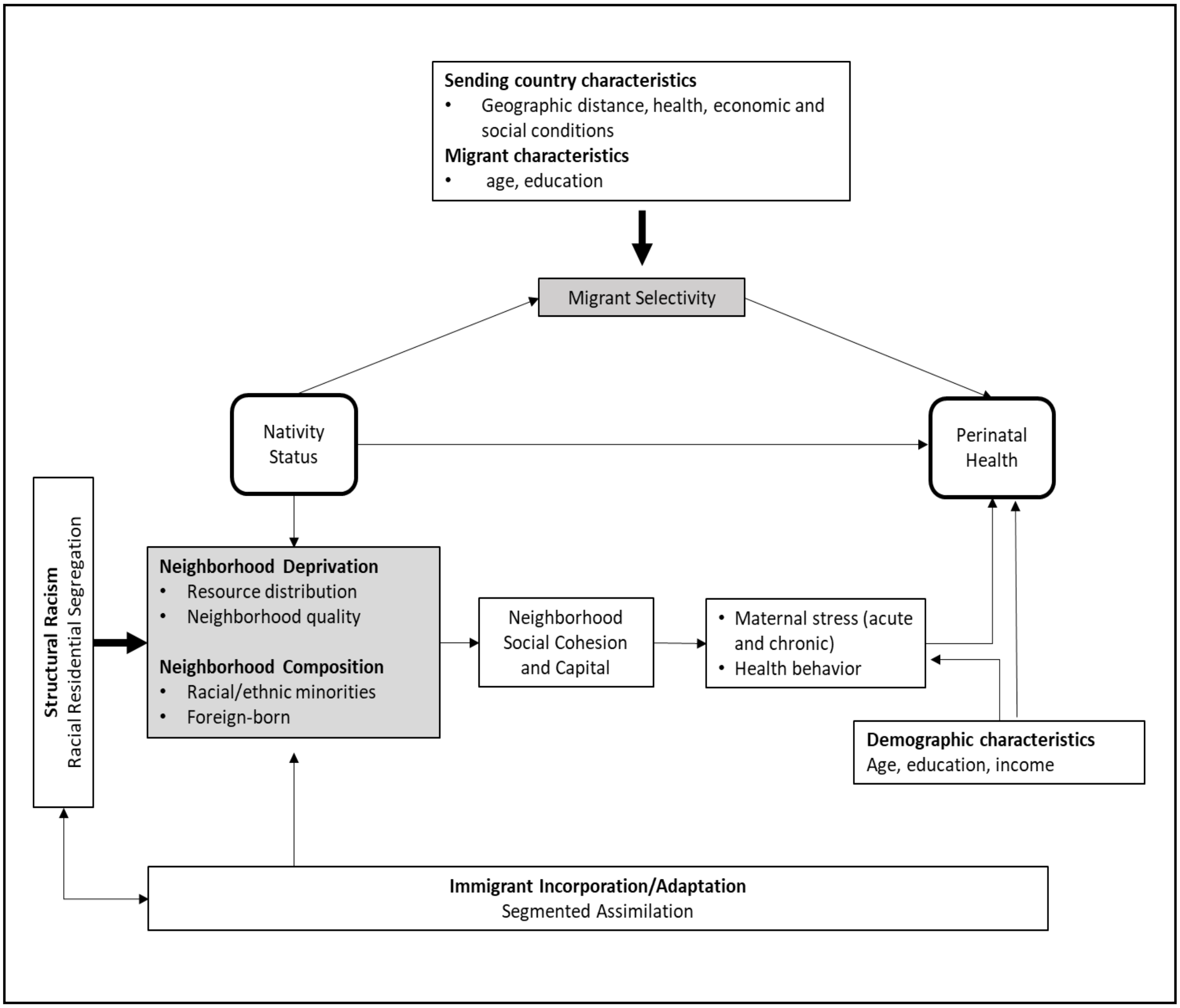

Figure 1.1. Conceptual framework of nativity status and black perinatal health

CHAPTER 2
Neighborhood Context and Black Immigrant Preterm Birth

Black immigrant women in the United States show at least a 30% lower risk of preterm birth (i.e., > 37 weeks of gestation) compared to US-born black women (Elo et al. 2014; Singh and Stella 1996). Comparisons of maternal characteristics between US- and foreign-born black women show that demographic characteristics, health behaviors, and medical risk factors do not fully explain the lower risk among black immigrant women (DeSisto et al. 2018; Elo and Culhane 2010; Elo et al. 2014; Stein et al. 2009). These findings have led some scholars to consider the role of neighborhoods, as black immigrants may have differential exposure to area-level risk and protective factors compared to their US-born counterparts. Following a socio-ecological framework, we can expect that black immigrant birth outcomes are influenced by a convergence of multiple factors including maternal characteristics, neighborhood physical and social attributes and broader macro-level factors such as racism (Alio et al. 2010).

The study of black immigrant neighborhoods is complex, and the social context can be examined through several distinct domains. Black immigrant neighborhoods characterized by a high spatial concentration of foreign-born blacks may have higher levels of neighborhood social capital and subsequent social connectedness (Portes and Rumbaut 2014). However, a parallel body of residential segregation literature suggests that black immigrants are often subject to racial discrimination in their daily encounters with individuals and social structures, just as their US-born counterparts (Crowder 1999; Scopilliti and Iceland 2008). Thus, black immigrants may have more exposures to race-related stressors in the neighborhood context such as racial residential segregation, compared to other immigrant groups. Research that aims to disentangle these opposing domains is limited, due to siloed bodies of literature on immigrant neighborhoods, residential segregation, and neighborhood socioeconomic conditions.

Furthermore, the literature on black immigrant neighborhoods is limited to regions in the Northeast, but these regions are unique given the long history of black–white residential segregation that characterizes them. This narrow focus limits generalizability to other black immigrant settlement contexts without such a pervasive history of racial residential segregation. In this chapter, I explore the relation between foreign-born black concentration, racial residential segregation, neighborhood deprivation and preterm birth California, where overall racial segregation is lower.

THE NEIGHBORHOOD CONTEXT OF BLACK IMMIGRANTS

Immigrant neighborhood research draws on theories such as the ethnic density hypothesis which posits that residing among co-ethnics promotes more favorable physical and mental health outcomes. Immigrant co-ethnic density then increases neighborhood social capital which buffers against the deleterious effects of material disadvantage, and limits exposure to stress-inducing discrimination (Becares et al. 2012; Becares, Nazroo, and Jackson 2014; Pickett and Wilkinson 2008). Immigrant co-ethnic density is often used to assess whether foreign-born concentration in neighborhoods represents a protective factor stemming from voluntary settlement decisions that are based on shared ethnic culture and opportunity (Logan et al. 2002). Studies that adopt this measure find protective associations between immigrant co-ethnic density and health in Hispanic and some Asian enclaves (Becares et al. 2012; Walton 2012). Interestingly, for black immigrants, the small body of literature reports living in neighborhoods with more black immigrants is associated with poorer reproductive health outcomes. For instance, Mason et al. found a higher preterm birth risk in non-Hispanic black immigrant mothers as co-ethnic density increases in New York City (Mason et al. 2010). Janevic and colleagues describe a similar negative association between immigrant co-ethnic density trends and gestational diabetes risk in New York City among sub-Saharan African mothers, though the association was not significant (Janevic et al. 2014). In a spatial analysis of Philadelphia neighborhoods, preterm births were more concentrated in areas of high foreign-born black density, unlike the patterns observed for non-Hispanic white density (Bloch 2011).

Racial Residential Segregation

Racial residential segregation of minorities describes the extent to which racial/ethnic minorities are involuntarily constrained to isolated communities with higher levels of socioeconomic disadvantage (Williams and Collins 2001). Despite overall declines in racial residential segregation since 1980, the US black population still experiences the highest levels of segregation compared to all other racial/ethnic minority groups—an important factor working against immigrant co-ethnic density in black immigrant neighborhoods (Iceland, Daniel H. Weinberg, and Steinmetz 2002). Despite carrying a foreign-born advantage and having lower exposure to lifelong minority status in the US, black immigrants remain a racialized group and experience similar race-related stressors to that of US-born blacks (Dominguez et al. 2009; Read and Emerson 2005).

For instance, a recent national study of residential segregation found that relative to US-born black women, black immigrant women are at similarly increased risk for preterm birth as residential segregation increases (Margerison-Zilko et al. 2017). In New York City, Grady and

McLafferty found that among black immigrant women, low birth weight risk was 15% higher for those living in highly segregated areas, compared to their counterparts living in less segregated areas, and the magnitude of this difference was similar to that of US-born black women. However, a study of racial residential segregation and black immigrant birth outcomes in the Midwest presents competing patterns and may indicate that the segregation patterns observed in the Northeast may differ in other regions. In 2006, Baker and Hellerstedt found an increased risk for preterm birth among native-born blacks as tract-level black racial concentration increased but found no significant associations with black racial concentration among foreign-born black mothers in Minnesota. While the study confirmed a nativity advantage after adjustment for maternal characteristics, no other area-level characteristics, like immigrant co-ethnic density, were included as possible explanations for the null association in that context.

The apparent deleterious impact of black immigrant co-ethnic density observed in Northeastern neighborhoods may relate to their location in segregated areas, such as New York City, which reflect a legacy of black-white residential segregation in the US. As Mary Waters described in her qualitative study of West Indian immigrants in New York City, black immigrant neighborhoods are inescapably embedded in residential contexts burdened by or near areas with high racial residential segregation (Waters 1999). In her study, this co-location increased exposure to neighborhood violence and had negative impacts on the socioeconomic mobility, educational outcomes, and identity formation of black immigrants and their children (Waters 1999). Compared to other racial/ethnic minority groups, the US black population experiences the highest levels of poverty and segregation from the US white population (across several segregation indices), and these trends are most prevalent in the Northeast where the US black population is largest (Iceland, Daniel H. Weinberg, et al. 2002). Unlike Hispanic and Asian neighborhoods, black immigrant neighborhoods in the Northeast may be subject to patterns of social disadvantage that are akin to segregated black neighborhoods, where high levels of black–white segregation result in stress-inducing contexts that lead to adverse birth outcomes (Williams and Collins 2001).

Neighborhood Socioeconomic Conditions

Many of the studies discussed here adjust for neighborhood socioeconomic conditions as a potential confounder of the associations between neighborhood immigrant co-ethnic density and birth outcomes, and between residential segregation and birth outcomes (Guest, Almgren, and Hussey 1998). However, much like the segregation literature, scholarship on neighborhood socioeconomic conditions rarely examines the simultaneous impact of immigrant co-ethnic density in black immigrant neighborhoods. For example, Fang and colleagues found that black immigrant mothers had similar low birth weight outcomes compared to white mothers, but in low-income communities, black immigrants had significantly higher birth weights compared to white mothers in similar low-income communities in New York City (Fang et al. 1999). Grady and McLafferty found similar patterns in their study of low birth weight and neighborhood poverty among native and foreign-born blacks (Grady and McLafferty 2007). These studies suggest that there may also be protective factors present that buffer against the deleterious impact of material disadvantage in black immigrant neighborhoods. However, since neither study included other neighborhood covariates, it is unclear if psychosocial benefits resulting from the spatial concentration of black immigrants (i.e., immigrant co-ethnic density) explains these associations.

The studies reviewed here indicate that immigrant co-ethnic density, racial residential segregation, and neighborhood socioeconomic conditions each have a distinct relationship with black immigrant birth outcomes. Immigrant co-ethnic density appears to increase black immigrant preterm birth, but because many of these studies focus on racially segregated neighborhoods in the Northeast, the findings may indicate that the social and structural benefits of immigrant co-ethnic density are blunted by the concurrent concentration of poverty and social adversity characterizing racially segregated black neighborhoods. Beyond this distinct context, the balance of protective social characteristics and neighborhood socioeconomic conditions in black immigrant neighborhoods is unknown.

I argue that beneficial immigrant co-ethnic density associations may be more pronounced in areas with lower black-white residential segregation, such as California. To test this, I examine black immigrant neighborhoods using three attributes: immigrant co-ethnic density, black racial concentration, and neighborhood deprivation. I begin the study with an analysis of each neighborhood attribute and the percentage of black immigrant preterm birth in California neighborhoods. I hypothesize that immigrant co-ethnic density is associated with lower preterm birth; black racial concentration is associated with higher preterm birth, and neighborhood deprivation is associated with higher preterm birth among infants born to black immigrant women. Lastly, I investigate the association between immigrant co-ethnic density and preterm birth after adjusting for black racial concentration and neighborhood deprivation.

METHODS

Data

In this chapter, I conducted an ecological analysis of births to foreign-born black women in urban California census tracts. I opted for an ecological analysis because of my exploratory interest in how each neighborhood attribute contributes to the black immigrant neighborhood context and distribution of preterm birth. I used California birth records of births occurring between 2007 and 2010. I incorporated a two-step process to link birth records with census data. I began with Geolytics software to get latitude and longitude information from maternal residential addresses and zip codes provided in birth records (Geolytics Inc., Brunswick, NJ). Then I spatially joined each birth to the appropriate census tract in California using ArcGIS software (Esri ArcGIS, Redlands, CA). I successfully geocoded and matched 107,872 (94%) live singleton births to women who reported their race as "black only" on birth records. My sample was limited to black women who reported their ethnicity as "Not Spanish/Hispanic/Latina" (N = 105,339). I coded nativity status as foreign-born if a woman reported her birthplace was an African (N=9,381) or non-Hispanic Caribbean country (N = 1, 324), excluding births to foreign-born women outside of these regions and women with missing birthplace (n=4,514). I also excluded births with a gestational age of fewer than 20 weeks or greater than 46 weeks, following existing studies of preterm birth (Alexander et al. 1996).

I included urban census tracts as my unit of analysis. In 2010, California had a total of 8,057 census tracts of which 7,836 (97%) were urban. I excluded rural tracts because they represent a qualitatively different settlement context for immigrants, and previous studies have only validated these exposure variables in urban settings (Lynne C. Messer et al. 2006). Census tract characteristics such as the proportion of foreign-born blacks were calculated using 2010 5-year American Community Survey (ACS) estimates of the foreign-born black population. I used 2010 ACS data to calculate neighborhood socioeconomic condition and total US black population by census tract. I linked California birth records of foreign-born black women to tract-level characteristics using census tract geographic identification numbers. The final tract-level dataset included all black immigrant births nested in 6,946 urban tracts (where black immigrant births occurred) of which 6,930 tracts had complete data for all three neighborhood attributes.

Variables

Preterm birth. I used the tract-level percent of black immigrant births that were preterm as the outcome of interest. I defined preterm birth as a live singleton birth with a gestation period of fewer than 37 weeks. The gestation period was based on last menstrual cycle dates. Given that neighborhood social context can be a source of psychosocial stress, I elected to study preterm birth based on evidence which links maternal stress during pregnancy as an independent risk factor for premature birth (Dole 2003; Hogue and Bremner 2005; Wadhwa et al. 2001).

Neighborhood attributes. I used tract-level census data to measure black immigrant co-ethnic density, which I defined as the proportion of foreign-born blacks per total tract population (Becares et al. 2012). Immigrant co-ethnic density ranged from 0.02% foreign-born black to 18.2% foreign-born black, with a mean of 0.51% (SD = 1.02). Black immigrant co-ethnic density percentages were highly skewed; most tracts had less than 1% black immigrants. Following other studies with similar distributions, I categorized tracts in the highest quartile of immigrant densities as having the highest co-ethnic density, compared to all others which I coded as having a low co-ethnic density (Janevic et al. 2014; Kane, Teitler, and Reichman 2018). Research has shown that black racial concentration correlates with higher preterm birth risk among black women and it has previously been used as a proxy measure for black-white racial residential segregation (White and Borrell 2011). Following previous studies of residential segregation and birth outcomes, I use tract-level black racial concentration as a proxy for formal segregation indices (Baker and Hellerstedt 2006; Messer, Oakes, and Mason 2010). Other measures of racial segregation, such as residential isolation would require block-level information, which is not available in public-use ACS census data I sought to access. I measured black racial concentration as the proportion of black residents (per total tract population) in each tract. Black racial concentration ranged from 0.4 to 87.2%, with an average of approximately 6.5% (SD = 9.9). I also dichotomized this variable using the same method described for immigrant co-ethnic density, because most tracts had less than 2% black racial concentration. Neighborhoods in the highest quartile of black racial concentration are coded as high black racial concentration, and all others are coded as low deprivation.

I measured socioeconomic conditions using a standardized neighborhood deprivation index developed by Messer et al. to account for the multidimensionality of neighborhood socioeconomic conditions. This index captured several socio-demographic domains (i.e., poverty, education, employment, housing, residential stability, and occupation) associated with birth outcomes and was validated in urban census tracts (Lynne C. Messer et al. 2006). I used z-score standardization to standardize the index to have a mean of 0 and a standard deviation of 1. I interpreted low values on the deprivation index as less deprived neighborhoods and higher values as a more deprived neighborhood. Standardized deprivation scores ranged from −2.4 to 5.3. This variable was also dichotomized for analysis, where neighborhoods in the highest quartile of deprivation were coded as highly deprived, and all others coded as having low deprivation.

Although using aspatial census tract data to inform neighborhood social environment provides meaningful information to approximate the local social environments, spatial measures of the social environment that are not limited to a single census tract boundary offer additional information on neighboring census tracts. For instance, tracts with high concentrations of black immigrants may be distributed throughout a metropolitan area, or they may be regionally clustered into more significant black immigrant enclaves (Reardon and O'Sullivan 2004). With an aspatial immigrant co-ethnic density, these distinct contexts would be indistinguishable, but studies of birth outcomes show that clustering of black women in contiguous New York neighborhoods is related to better birth outcomes (Bell et al. 2006). To address this issue, I also compute a spatial measure of each neighborhood attribute using a proximity-weight that considers surrounding census tract information to approximate residential social context for a local tract.

Following Mason and colleagues, I developed proximity-weight for each neighboring tract based on the distance from a local tract (Mason et al. 2010, 2011). The weighting allows the influence (ranging from 0.0 to 1.0) of each neighboring tract to decay with increasing distance, with the local tract having the maximum influence (weight of 1.0). Distances between a local tract and neighboring tracts were calculated using ArcGIS software, which measures the distance between two tract centers (centroids). I set the radius to 8,000m for neighboring tracts, where tracts beyond this radius were not included in the proximity-weighting. I then multiplied each population count (e.g., foreign-born black or total black population) by the weight. For each tract, I summed the weighted black immigrant population of neighboring tracts and divided by the summed total population of all neighboring tracts, which was also proximity-weighted. The resulting value measures foreign-born black immigrant co-ethnic density given the foreign-born black concentration of neighboring tracts. The proximity-weighted measures will differ from the local measures (aspatial). For example, in regions where black immigrants are more dispersed, proximity-weighting will lower black immigrant co-ethnic density compared to the local measure, as it is informed by neighboring tracts with lower black immigrant concentration. However, in regions where black immigrants reside in contiguous tracts, proximity-weighted black immigrant co-ethnic density will be greater than or equal to the local density, as neighboring tracts with high densities will inform it. I applied the same proximity-weight to the black racial concentration and the neighborhood deprivation measures. Using proximity-weighting to create spatial measures of each attribute narrowed the range of values compared to the aspatial measures (Table 2.4).

Data Analysis

I began with descriptive GIS analysis of black immigrant co-ethnic density, black racial concentration, neighborhood deprivation and the proportion of black immigrant preterm births. Here I map each neighborhood attribute categorized as dichotomous to assess the distribution of tracts in the highest quartile compared to all other tracts. Next, I used ordinary least squares (OLS) regression to estimate the association between each of the neighborhood attributes and the tract-level proportion of black immigrant preterm births. I ran two sets of regression models. In the first set, I regressed each neighborhood attribute on the proportion of black immigrant preterm births in tracts individually. In the second set of regressions, I examined the association between immigrant co-ethnic density and preterm birth, adjusting for black racial concentration and neighborhood deprivation. All neighborhood attributes were treated as dichotomous variables, though I also ran sensitivity analysis using continuous measures of each neighborhood attribute to confirm my findings. I estimate the association between preterm birth and each neighborhood attribute using generalized linear models (GLM) with a logit link and binomial family instead of OLS regression because I measure preterm birth as the proportion of black immigrant preterm births of all births to black immigrant women that ranges from 0.0 to 1.0. Lastly, I repeated each analysis using the proximity-weighted measures. All statistical analyses and variable constructions were completed using Stata 15.0 (College Station, TX).

RESULTS

Descriptive Statistics

Table 2.1 describes the proportion of preterm birth among black immigrant mothers by each neighborhood attribute. I present the results using categories denoting neighborhoods that are in the highest quartile of each neighborhood attribute relative to all other neighborhoods. Overall, there was minimal variation in the proportion of black immigrant preterm births by neighborhood attribute and degree of exposure (i.e., highest quartile neighborhoods vs. all other neighborhoods). In neighborhoods with the highest immigrant co-ethnic density, about 7.6% of black immigrant births were preterm compared to 8.1% in lower co-ethnic density neighborhoods. Neighborhoods with the highest black racial concentration had a slightly lower percentage of black immigrant preterm birth compared to neighborhoods with lower black racial concentration (7.5% vs. 8.1%). Similar patterns were observed for neighborhoods with the highest neighborhood deprivation compared to neighborhoods with lower deprivation (7.5% vs. 8.1%).

Figures 1 – 4 depict the spatial distribution of immigrant co-ethnic density, black racial concentration, neighborhood deprivation and the proportion of black immigrant births that were preterm in California census tracts respectively. As expected, there is considerable overlap between black immigrant co-ethnic density and black racial concentration, but black immigrant co-ethnic density (Figure 2.1) is much more dispersed throughout the state, which follows existing literature on the spatial patterning of black immigrants (Kent 2007). Black racial concentration is highest in the city centers of the most populous counties, such as the San Francisco Bay Area and Los Angeles County (Figure 2.2). Visually, it appears that neighborhoods with the highest levels of deprivation also have the highest levels of black racial concentration. Neighborhood deprivation is also highest in Central Valley counties such as Fresno (Figure 2.3). There are very few neighborhoods with high levels of black immigrant preterm birth. In most tracts, the proportion of black immigrant preterm births is less than 12% (Figure 2.4).

Neighborhood Context and Preterm Birth

I examine the association between immigrant co-ethnic density, black racial concentration, neighborhood deprivation and black immigrant preterm birth in Table 2.2. Overall, the results suggest that there is no association between immigrant co-ethnic density, black racial concentration, neighborhood deprivation and the proportion of black immigrant preterm birth in California neighborhoods. For example, the immigrant co-ethnic density coefficient indicates that the proportion of preterm births did not differ significantly in neighborhoods with highest immigrant co-ethnic density compared to all other neighborhoods (b = −0.005; 95% CI −0.021, 0.011). Similarly, the black racial concentration coefficient shows that the proportion of black immigrant preterm birth for neighborhoods with the highest black racial concentration is not significantly different from those with lower concentrations (b = −0.006; 95% CI −0.021, 0.010).

In Table 2.3, I report the results on the association of immigrant co-ethnic density and black immigrant preterm birth adjusting for black racial concentration and neighborhood deprivation. I present the regression results of immigrant co-ethnic density models first adjusting for black racial concentration (model 2), then neighborhood deprivation (model 3), and then both black racial concentration and neighborhood deprivation in a fully adjusted model (model 4). I include the unadjusted co-ethnic density model from Table 2.2 for reference (model 1). Overall, after individually adjusting for neighborhood deprivation and black concentration there were no significant associations between immigrant co-ethnic density and black immigrant preterm birth. For example, the immigrant co-ethnic density coefficient in model 2 shows that the difference in the proportion of black immigrant preterm births between neighborhoods with the highest immigrant co-ethnic density (with low black racial concentration) and low density neighborhoods (with low black racial concentration) was not significant (b = −0.004; 95% CI −0.021, 0.013).

Similarly, in model 3, the immigrant co-ethnic density coefficient shows that the difference in black immigrant preterm birth between neighborhoods with the highest co-ethnic density and low co-ethnic density when neighborhood deprivation is low, is not significant (b = −0.005; 95% CI −0.021, 0.011). Compared to the unadjusted model, the magnitude of the immigrant co-ethnic density coefficient did not fluctuate between model 2, model 3 or model 4.

These results suggest that immigrant co-ethnic density is not related to black racial concentration or neighborhood deprivation in California neighborhoods.

I also conducted a set of sensitivity analyses using continuous neighborhood attributes and found similar results for each set of models (not included in tables). Unadjusted models for immigrant co-ethnic density, black racial concentration, and neighborhood deprivation were not related to the proportion of black immigrant preterm births. I also found no significant associations in adjusted models. For example, after fully adjusting for black racial concentration and neighborhood deprivation, immigrant co-ethnic density was not related to black immigrant preterm birth. The direction of immigrant co-ethnic density and preterm birth associations differed in the models with dichotomous (negative association) versus continuous (positive association) variables. Upon visual inspection of the data, I identified a set of extreme outcomes (n=135) relative to other tracts with lower co-ethnic density (the proportion of preterm births excluding these observations was 7.1%). I confirmed that the extreme patterns were due to the tracts having only one black immigrant birth. I ran the dichotomous models without these extreme proportions, which corrected the discrepancy and returned a positive association (though not significant). The second set of sensitivity analyses using GLMs yielded the same results as the OLS regression models, black immigrant co-ethnic density, black racial concentration, and neighborhood deprivation are not associated with the proportion of black immigrant preterm births.

I repeated the analyses using the proximity-weighted measures to assess whether using spatial measures of each neighborhood attribute would yield different results, but the results were the same. Proximity-weighted immigrant co-ethnic density, black racial concentration, and neighborhood deprivation are not associated with tract-level preterm birth among black immigrants (Table 2.5). Adjusting for proximity-weighted black racial concentration and neighborhood deprivation had no impact on the association between proximity-weighted immigrant co-ethnic density and tract-level preterm birth (Table 2.6).

DISCUSSION

The purpose of this study was to describe the association between residential context and black immigrant preterm birth, using three distinct neighborhood attributes (immigrant co-ethnic density, black racial concentration, and neighborhood deprivation). I tested the association between each neighborhood attribute and black immigrant preterm birth and then tested the association between immigrant co-ethnic density and black immigrant birth adjusting for black racial concentration and neighborhood deprivation. I found no significant associations between the tract-level attributes and black immigrant preterm birth. I also found that adjusting for black racial concentration and neighborhood deprivation had little impact on the relationship between immigrant co-ethnic density and black immigrant preterm birth in California census tracts. My null results contradict findings of positive associations between preterm birth risk and black immigrant enclaves in New York City, highlighting the importance of geographic heterogeneity in black immigrant enclaves, which reflects variations in the social condition of black populations. Black immigrant enclaves in New York and other Northeastern locales are more likely to be situated in residentially segregated neighborhoods compared to enclaves in California. This distinction is important and implicates the significance of merging literature on residential segregation and immigrant enclaves to improve theoretical conceptualizations of immigrant neighborhoods (Viruell-Fuentes, Miranda, and Abdulrahim 2012).

I hypothesized that tract-level immigrant co-ethnic density would be associated with lower proportions of black immigrant preterm birth and that black racial concentration and neighborhood deprivation would be associated with higher proportions of black immigrant preterm birth in California neighborhoods. Instead, I found these neighborhood attributes were not significantly related to tract-level patterns of black immigrant preterm birth. The null association between immigrant co-ethnic density and preterm birth could stem from the relatively low levels of ethnic concentration in these neighborhoods. For instance, the maximum level of immigrant co-ethnic density was only 18.2% foreign-born black in this study, and most neighborhoods had less than 1% foreign-born black residents. Compared to studies of Mexican enclaves in California which can have co-ethnic densities of over 50% Mexican, it is possible that immigrant co-ethnic density levels were too low to detect any associations in this sample (Peak and Weeks 2002). Future studies might consider a similar examination of black immigrant enclaves (using these three neighborhood attributes) in regions where black immigrants are much more concentrated in neighborhoods such as Miami, Florida (Kent et al. 2013).

The null association between immigrant co-ethnic density and preterm birth is similar to that found in Janevic et al.'s (2014) study of ethnic enclaves and gestational diabetes risk among pregnant women in New York City, where there was no association between residence in an ethnic enclave and gestational diabetes risk among sub-Saharan African women. While this study focused on a different pregnancy outcome and the sample included births to both Caribbean-born and African-born women, 86% of births in this study were to sub-Saharan African mothers. Sub-Saharan African immigrants are also highly selected on critical socio-demographic characteristics, such as higher levels of educational attainment, which may make their birth outcomes generally less sensitive to tract-level social conditions (Dodoo 1997). Thus, even if tracts had higher concentrations of black immigrants than what I observed, immigrant co-ethnic density might remain a weak predictor of black immigrant birth outcomes in California because of the higher proportion of African immigrants in the state.

The null associations I report black racial concentration and preterm birth is similar to another that found no association between black racial concentration and preterm birth in black immigrant women residing in Minnesota (Baker and Hellerstedt 2006). Similar null associations between neighborhood deprivation and preterm birth were reported in a New York City study which found no association between neighborhood deprivation and preterm birth among African and non-Hispanic black Caribbean women (Janevic et al. 2010). My research adds to this literature by exploring these associations in the state of California.

This study has a few notable limitations. First, I use tract-level measures of each neighborhood attribute, which may contribute to the null associations I report here. Smaller boundaries such as blocks, or block groups may offer a more appropriate geographic unit for detecting neighborhood associations with preterm birth in this population. Nonetheless, census tracts are a widely used measure of residential environments in public health studies, and my use of census tracts allows for comparability with existing studies. My findings are also subject to extrapolation. Given that the black immigrant population in California is small, and neighborhoods have low levels immigrant co-ethnic density my models may estimate immigrant co-ethnic density proportions that are not present in the state of California (Oakes 2004). Lastly, my ecological study design limits commentary on individual preterm birth risk among black immigrants.

Despite these limitations, this ecological study is the first to describe black immigrant neighborhoods with consideration of both race-related (e.g., black racial concentration) and immigrant characteristics in the state of California. Beyond the examination of black immigrant neighborhoods outside of historically segregated settlements, this study also offers an exploration of immigrant enclaves where immigrant co-ethnic density is much lower, and neighborhoods are less clustered compared to studies of larger immigrant populations. While immigrant co-ethnic density is protective among some immigrant groups and for specific health outcomes, black immigrant neighborhoods are unique compared to other immigrant neighborhoods. This study offers preliminary evidence that in some residential contexts, black immigrant birth outcomes are not associated with immigrant co-ethnic density, even after adjusting for overall black racial residential segregation and socioeconomic conditions.

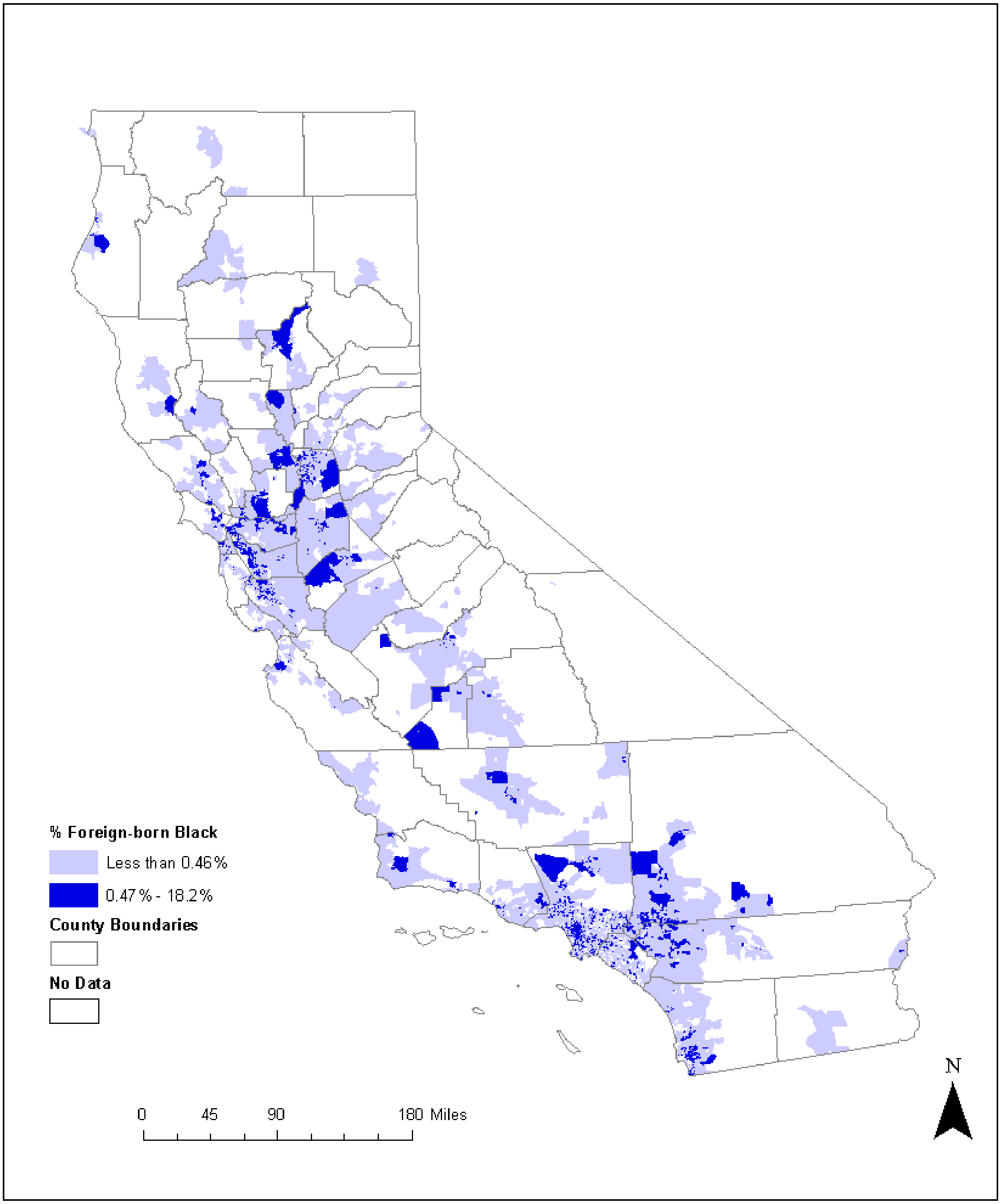

Figure 2.1. Distribution of black immigrant co-ethnic density in California census tracts. Source: 2010 American Community Survey 5-year estimates.

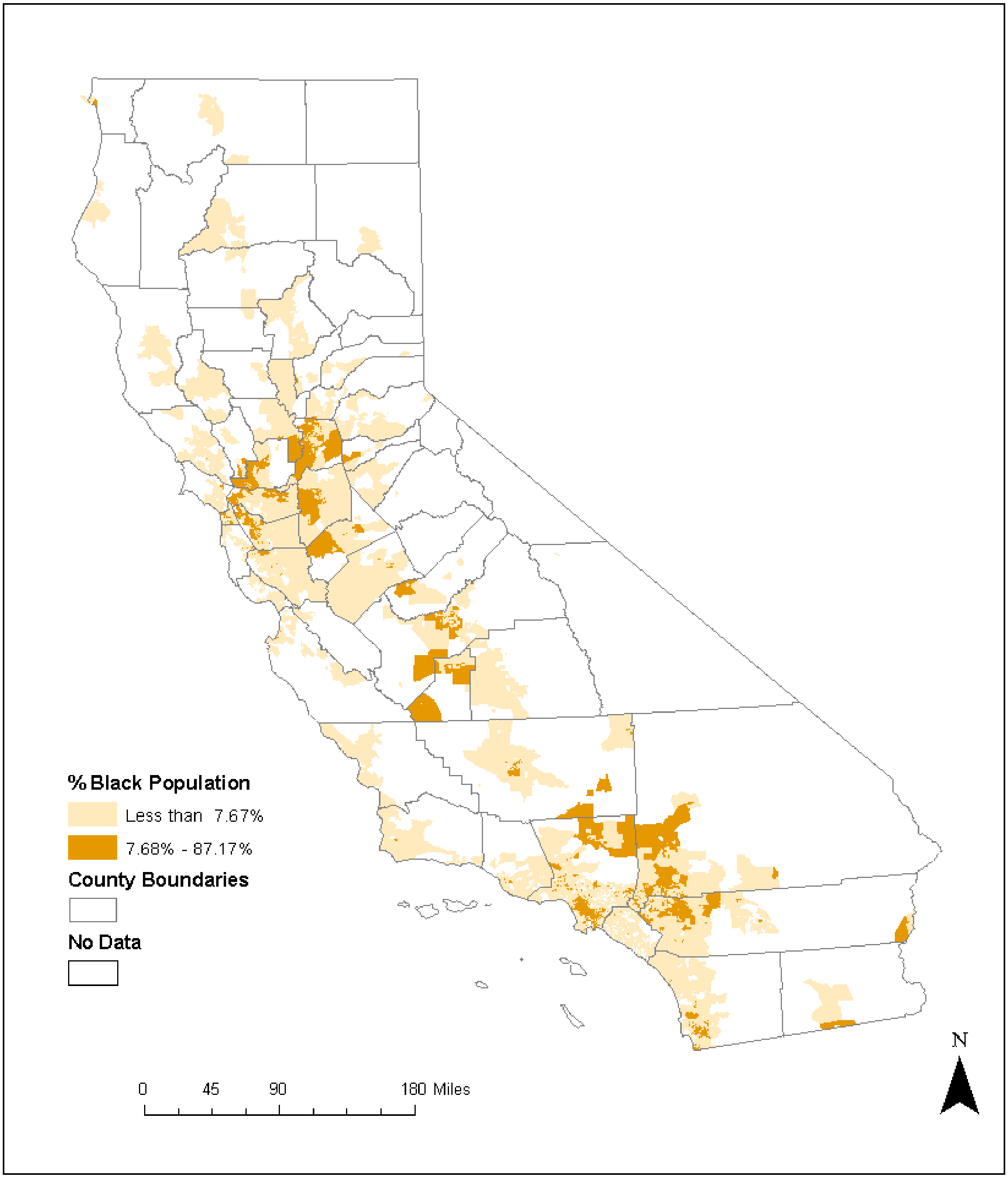

Figure 2.2. Distribution of black racial concentration in California census tracts. Source: 2010 American Community Survey 5-year estimates.

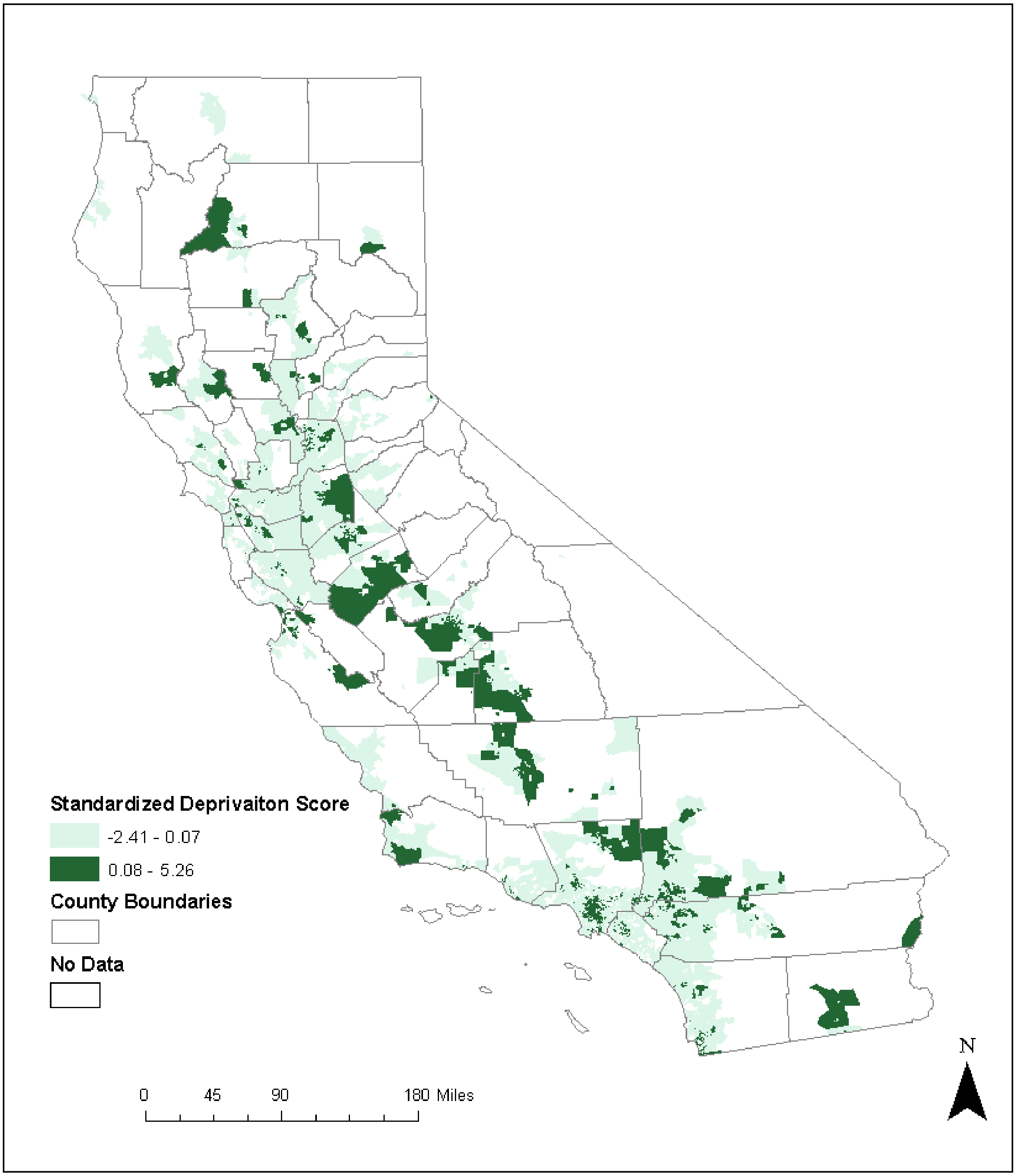

Figure 2.3. Distribution of standardized neighborhood deprivation index scores in California census tracts. Source: 2010 American Community Survey 5-year estimates.

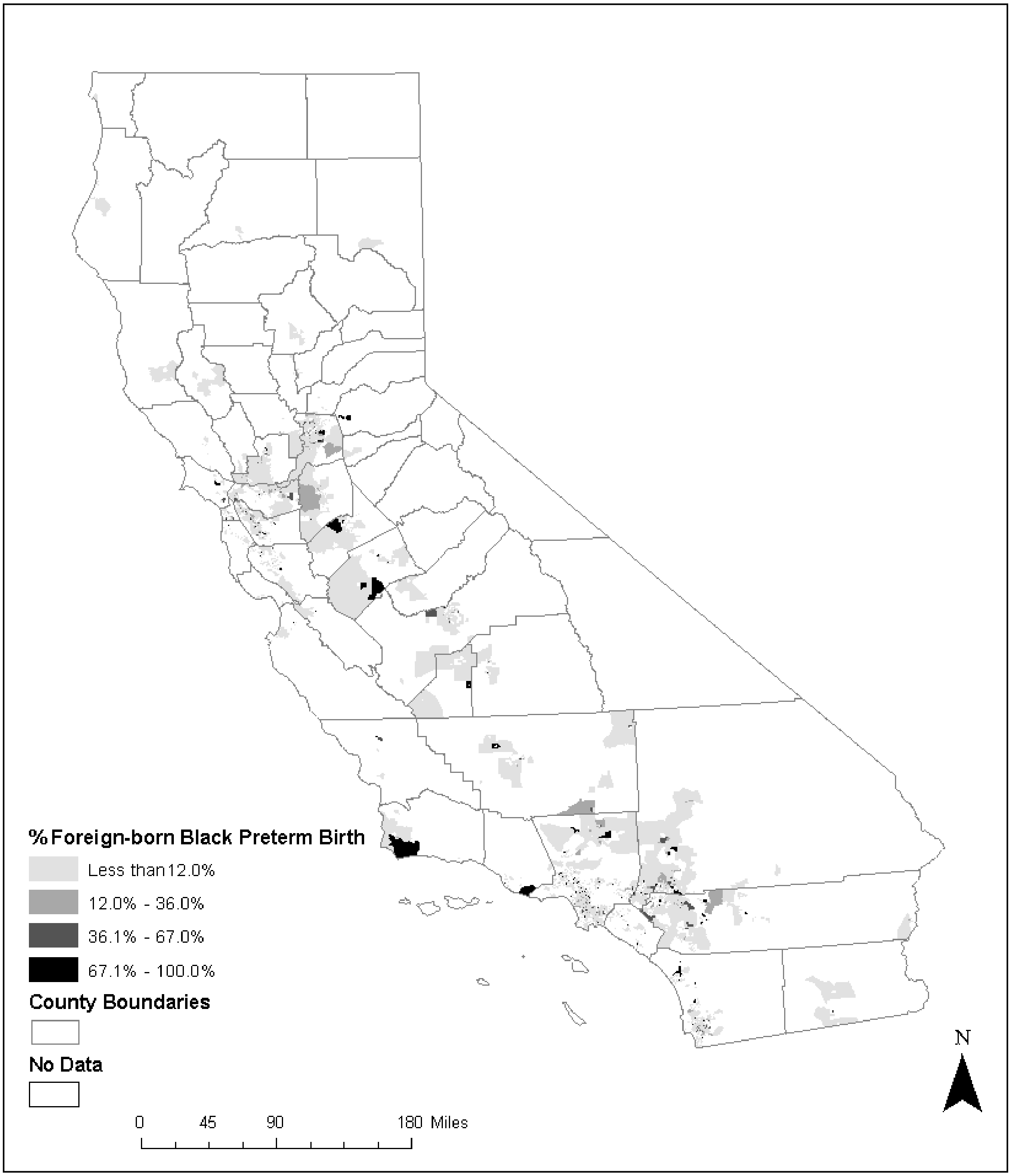

Figure 2.4. Distribution of black immigrant preterm births in California census tracts, California 2007 – 2010. Source: 2007 -2010 California Birth Record data.

Table 2.1. Distribution of tract-level preterm birth (percent) and total births among foreign-born black women and neighborhood attributes.

Neighborhood Attributes [a]	% Preterm Births (Foreign-born Black)	Foreign-born Black Births	Tracts	Range [c]
Immigrant co-ethnic density				
Highest density neighborhoods	7.55	4,650	1,731	0.48 – 18.20
Lower density neighborhoods	8.09	6,015	5,199	0.02 – 0.47
Black racial concentration				
Highest concentration neighborhoods	7.54	4,794	1,735	7.69 – 87.17
Lower concentration neighborhoods	8.11	5,871	5,195	0.03 – 7.67
Neighborhood deprivation				
Highest deprivation neighborhoods	7.48	2,927	1,789	0.08 – 5.26
Lower deprivation neighborhoods	8.10	7,792	5,157	-2.41 – 0.07
Total	*7.91*	*10,665*	*6,930*[b]	

[a] Neighborhoods with the highest quartile of proportion foreign-born black residents, black racial concentration, or neighborhood deprivation are classified as having the highest levels and all other tracts as having lower levels of each attribute.

[b] Excludes 16 tracts with incomplete neighborhood attribute data, also excluded 40 births that occurred in these tracts.

[c] All ranges presented as percentages except for neighborhood deprivation which are standardized index scores.

Table 2.2. Unadjusted OLS regression estimates for models of each neighborhood attribute and the tract-level preterm birth among foreign-born black women.

Variable	Regression Coefficient	Standard Error	95% CI
Model 1: Immigrant co-ethnic density			
Highest quartile immigrant co-ethnic density	-0.005	0.008	-0.021, 0.011
Intercept	0.081	0.005	0.072, 0.090
Model 2: Black racial concentration			
Highest quartile black racial concentration	-0.006	0.008	-0.021, 0.010
Intercept	0.081	0.005	0.071, 0.090
Model 3: Neighborhood deprivation			
Highest quartile neighborhood deprivation	-0.006	0.009	-0.024, 0.011
Intercept	0.081	0.004	0.073, 0.089

Table 2.3. Unadjusted and adjusted linear regression estimates of immigrant co-ethnic density and tract-level preterm birth among foreign-born black women

Model	Regression Coefficient	Standard Error	95% CI
Model 1: Unadjusted			
Highest quartile immigrant co-ethnic density	-0.006	0.008	-0.021, 0.011
Intercept	0.081	0.005	0.072, 0.090
Model 2: Adjusting for black racial concentration			
Highest quartile immigrant co-ethnic density	-0.004	0.009	-0.021, 0.013
Highest quartile black racial concentration	-0.004	0.009	-0.021, 0.012
Intercept	0.082	0.005	0.072, 0.092
Model 3: Adjusting for neighborhood deprivation			
Highest quartile immigrant co-ethnic density	-0.005	0.008	-0.021, 0.011
Highest quartile neighborhood deprivation	-0.005	0.009	-0.023, 0.012
Intercept	0.082	0.005	0.072, 0.092
Model 4: Fully Adjusted			
Highest quartile immigrant co-ethnic density	-0.004	0.009	-0.021, 0.013
Highest quartile black racial concentration	-0.003	0.009	-0.020, 0.014
Highest quartile neighborhood deprivation	-0.004	0.009	-0.022, 0.013
Intercept	0.083	0.005	0.072, 0.093

Table 2.4. Distribution of tract-level preterm birth (percent) and total births among foreign-born black women and proximity-weighted neighborhood attributes.

Neighborhood Attributes [a]	% Preterm Births (Foreign-born Black)	Foreign-born Black Births	Tracts	Range [c]
Proximity-weighted immigrant co-ethnic density				
Highest density neighborhoods	6.58	3,656	648	1.03 – 6.9
Lower density neighborhoods	8.15	7,005	6,282	0.02 – 1.02
Proximity-weighted black racial concentration				
Highest concentration neighborhoods	6.04	1,663	378	21.74 – 75.43
Lower concentration neighborhoods	8.08	8,998	6,552	0.01 – 21.73
Proximity-weighted neighborhood deprivation				
Highest deprivation neighborhoods	7.44	3,094	1,719	-2.97 – 0.91
Lower deprivation neighborhoods	8.08	7,570	5,157	0.92 - 6.28

[a] Neighborhoods with the highest quartile of proportion foreign-born black residents, black racial concentration, or neighborhood deprivation are classified as having the highest levels and all other tracts as having lower levels of each attribute.

[b] Excludes 16 tracts with incomplete neighborhood attribute data, also excluded 40 births that occurred in these tracts.

[c] All ranges presented as percentages except for neighborhood deprivation which are standardized index scores.

Table 2.5. Unadjusted OLS regression estimate for models of each proximity-weighted neighborhood attribute and tract-level preterm birth among foreign-born black women.

Variable	Regression Coefficient	Standard Error	95% CI
Model 1: Immigrant co-ethnic density			
Highest immigrant co-ethnic density	-0.016	0.010	-0.036, 0.004
Intercept	0.081	0.004	0.073, 0.090
Model 2: Black racial concentration			
Highest black racial concentration	-0.020	0.008	-0.049, 0.005
Intercept	0.081	0.004	0.073, 0.090
Model 3: Neighborhood deprivation			
Highest neighborhood deprivation	-0.006	0.009	-0.024, 0.011
Intercept	0.081	0.004	0.072, 0.089

Table 2.6. Unadjusted and adjusted OLS regression estimates for models of each proximity-weighted neighborhood attribute and tract-level preterm birth among foreign-born black women.

Model	Regression Coefficient	Standard Error	95% CI
Model 1: Unadjusted			
Highest immigrant co-ethnic density	-0.016	0.010	-0.036, 0.004
Intercept	0.081	0.004	0.073, 0.090
Model 2: Adjusting for black racial concentration			
Highest immigrant co-ethnic density	-0.010	0.012	-0.034, 0.013
Highest black racial concentration	-0.014	0.015	-0.044, 0.016
Intercept	0.082	0.005	0.074, 0.090
Model 3: Adjusting for neighborhood deprivation			
Highest immigrant co-ethnic density	-0.014	0.011	-0.035, 0.006
Highest neighborhood deprivation	-0.004	0.009	-0.022, 0.014
Intercept	0.082	0.005	0.073, 0.091
Model 4: Fully Adjusted			
Highest immigrant co-ethnic density	-0.010	0.012	-0.033, 0.013
Highest black racial concentration	-0.013	0.016	-0.044, 0.019
Highest neighborhood deprivation	-0.002	0.009	-0.020, 0.016
Intercept	0.082	0.004	0.073, 0.091

CHAPTER 3
Neighborhood Context and the Nativity Advantage in Preterm Births among Black Women

Preterm birth (< 37 weeks of gestation) is the leading contributor to infant mortality in the United States (MacDorman et al. 2006). Non-Hispanic black women still exhibit the highest rates of preterm birth compared to non-Hispanic white women (Martin et al. 2017). But within the black population, nativity status (i.e., US- or foreign-born) is a significant predictor of birth outcomes, where women from African and Caribbean countries (hereafter black immigrant women) are at lower risk for preterm birth, infant mortality, fetal growth restriction, and low birth weight, compared to US-born non-Hispanic black women (Howard et al. 2006; Hummer et al. 1999; Stein et al. 2009; Taylor and Sarathchandra 2016). The nativity advantage also varies by maternal birthplace, where African women have superior birth outcomes compared to Caribbean women who then have better outcomes than US-born black women (Elo et al. 2014). Despite these consistent patterns, there is little consensus on the origins of the nativity advantage. While comparisons of maternal demographic characteristics, health behaviors, and medical risk factors conclude that black immigrant women have more protective demographic and behavioral profiles, these individual characteristics do not fully account for the nativity advantage (Elo and Culhane 2010). This has led scholars to consider the neighborhood context.

Nativity advantages may stem from differences in the residential neighborhood context between US-born and black immigrant women. Neighborhood context is a meaningful predictor of preterm birth risk (Culhane and Elo 2005; Culhane and Goldenberg 2011). Residing in a neighborhood with adverse conditions can lead to the accumulation of stressors that may directly influence women biologically through stress pathways, or indirectly through poor maternal coping behavior including smoking, substance use, and poor diet (Hogue and Bremner 2005). If black immigrant women are more likely to reside in neighborhoods with lower levels of adverse conditions compared to US-born black women, this may explain why the risk for preterm birth is lower in infants of black immigrant women. Further, while black immigrants share a racialized social position with US-born blacks, they generally do not share the same life-long minority status and the associated accumulation of race-related stressors over the life course (Cheng et al. 2013; Lu and Halfon 2003). For instance, one study found that pregnant black immigrant women report lower levels of exposure to racial discrimination, though reports of exposure increased with longer duration of residence in the US (Dominguez et al. 2009). Other studies attribute the nativity difference in experiences of racism to differences in the racial context of black immigrant sending countries where black immigrants are a racial majority. Here, migrating from a racial majority context may contribute to their perceived exposure to minority status in the US (Read and Emerson 2005). Thus, the association between neighborhood context and birth outcomes may be muted among black immigrant women compared to US-born black women because of their lower exposure to racial minority status. In this study, I seek to examine whether differences in exposure to adverse neighborhood conditions contribute to the nativity advantage in black preterm birth risk.

There are several domains of neighborhood context that have been associated with the birth outcomes of black women. Much of the literature has focused on the association between racial residential segregation and birth outcomes, given that black women are the most likely to reside in segregated neighborhoods compared to other ethnic minorities, and because segregation is associated with concentrated neighborhood deprivation among racial/ethnic minorities. As Williams and Collins argue, residential segregation systematically concentrates racial/ethnic minorities in disadvantaged neighborhoods with a poor distribution of resources and limited opportunities for social advancement (2001). Segregation is associated with increased risk of low birth weight, preterm birth and small for gestational age among black women (Mason et al. 2009b; Ncube et al. 2016). Neighborhood deprivation is also associated with adverse birth outcomes where black women living in deprived neighborhoods are more likely to experience preterm birth (Messer et al. 2010). Deprived neighborhoods are also characterized by higher levels of violent crime which are associated with low birth weight and preterm birth (Masi et al. 2007b; Lynne C Messer et al. 2006). Social support networks of black women, which can be an important buffer against stress-inducing exposures like fear of crime, are also weakened in deprived neighborhoods (Buka et al. 2003; Giurgescu and Misra 2018).

Due to the pervasiveness of racial stratification in the US, differences in neighborhood context between US-born blacks and black immigrants are modest. Black immigrants are a racialized population and are thus subject to similar threats to social mobility as US-born blacks. Much like US-born blacks, black immigrants experience high levels of segregation from whites (Scopilliti and Iceland 2008). Compared to Hispanic and Asian immigrants, black immigrants have the highest levels of residential segregation from whites (Iceland, Daniel H. Weinberg, et al. 2002). Nonetheless, sociological research on the spatial assimilation of black immigrants has shown that despite black immigrant neighborhoods being segregated, they maintain reasonable spatial distances from US-born blacks and in some locales, this translates to improved neighborhood conditions (Freeman 2002). For instance, in New York City, Crowder (1999) found that while black-white segregation was high among black immigrants, they also reside in neighborhoods with lower levels of deprivation. Moreover, Vang (2012) found that while African immigrants in Boston reside in segregated neighborhoods, they maintain a moderate degree of separation from US-born blacks. Thus, while black immigrants may not achieve spatial assimilation with whites, they tend to reside in less deprived neighborhoods.

Other neighborhood characteristics of relevance include the proportion of foreign-born, following studies of immigrant enclaves which suggest that residing among a higher concentration of immigrant co-ethnic residents is associated with improved immigrant birth outcomes (Finch et al. 2007; Vega et al. 2011). However, black immigrant co-ethnic density appears to be an exception: two studies report increased preterm birth risk as immigrant co-ethnic density increases (Bloch 2011; Mason et al. 2010). Yet the neighborhoods included in these studies were in New York City and Philadelphia, cities where racial residential segregation is high. Neighborhood immigrant co-ethnic density in highly segregated regions may reflect patterns of downward assimilation or social immobility, where supportive immigrant networks are compromised due to lack of sufficient resources and reciprocity to produce social capital (Carpiano 2007; Portes and Zhou 1993). In less segregated regions, the impact of immigrant co-ethnic density has not been described. It may hold that in other less segregated neighborhoods, black immigrant co-ethnic density reduces the risk of adverse birth outcomes among black immigrants.

The small body of literature on nativity differences in the association between neighborhoods and birth outcomes is mixed; while some associations do vary by nativity status, others appear to be robust to nativity status. For instance, in New York City, two studies found that in neighborhoods with poor socioeconomic conditions, infants of black immigrant women are at lower risk of low birth weight compared to infants of US-born black women (Fang et al. 1999; Grady and McLafferty 2007). Racial segregation associations are more consistent across nativity status. Grady and McLafferty (2007) found that tract-level racial isolation is positively associated with low birth weight risk for both US- and foreign-born women and Margerison-Zilko et al. (2017) found that preterm birth risk increases with segregation for both US- and foreign-born black women. However, in Minnesota, Baker and Hellerstedt (2006) showed that tract-level black racial concentration is positively associated with preterm birth among US-born black women, but not among foreign-born black women.

As mentioned, the two existing studies of black immigrant co-ethnic density found that preterm birth risk increased among black immigrant women in New York City, but this only held for African-born women. Among Caribbean-born, immigrant co-ethnic density was not associated with preterm birth risk (Mason et al. 2010). These variations in the effects of neighborhood context on birth outcomes by nativity and country of origin may be related to geographic variation in racial segregation (Subramanian, Acevedo-Garcia, and Osypuk 2005). That is, when racial segregation is entrenched, black immigrant and US-born black women may have similar patterns of vulnerability to adverse neighborhood conditions, except for immigrants in neighborhoods with strong co-ethnic networks and a long history of migration like Caribbean immigrants in New York City (Kent 2007). However, in regions where racial segregation is less pervasive, nativity differences in the association between neighborhoods and birth outcomes may be larger. Therefore, I hypothesize that in the state of California, where racial residential segregation is less pronounced, the impact of neighborhood conditions will vary by nativity.

METHODS

Data

I used 2007 - 2010 California birth records from the Department of Public Health linked with the 2010 American Community Survey (ACS) census tract data. The years were chosen based on the availability of complete health information in the California birth records. In 2007, California birth records included information on maternal height and weight as a component of the revised U.S. Standard Certificate of Birth (CDC, 2003). I used a two-step process to link birth records with neighborhood data. First, I used Geolytics software to get latitude and longitude information from maternal residential addresses provided in birth records (Geolytics, Brunswick, NJ). Then I spatially joined each birth to the appropriate census tract in California using ArcGIS software. I successfully geocoded and matched 107,872 (94%) live singleton births to women who reported their race as “black only” on birth records.

I included black women who reported their ethnicity as “Not Spanish/Hispanic/Latina” (N = 105,339). I coded nativity status as US-born if a woman reported her birthplace as any state in the US (N = 93, 414). I coded nativity status as foreign-born if a woman reported that her birthplace was an African (N=9,381) or non-Hispanic Caribbean country (N = 1, 324), excluding births to foreign-born women born outside of these regions and women with missing birthplace. I also excluded births with missing maternal health or demographic information, births to women under 18 years of age, and women with missing maternal height and weight information for BMI calculations. I excluded births with a gestational age of less than 20 weeks or greater than 46 weeks, following existing studies of preterm birth. Lastly, I excluded births in census tracts with incomplete data on neighborhood variables of interest for a final analytic sample of 69,660 US-born black women and 6,595 black immigrant women.

Variables

Preterm birth. The outcome of interest is preterm birth, defined as a live singleton birth with a gestation period of less than 37 weeks and at least 20 weeks of gestation. Births were coded as a full-term birth if gestational age was between 37 and 46 weeks. The measurement of gestational age is based on the last known menstrual period in California birth records (Alexander et al. 1996).

Neighborhood attributes. I assessed three domains of the neighborhood social context: black immigrant co-ethnic density, black racial concentration, and neighborhood deprivation. I included the tract-level proportion of foreign-born blacks (per total tract population) as a measure of black immigrant co-ethnic density in each tract. Immigrant co-ethnic density ranged from 0.02% foreign-born black to 18.2% foreign-born black, with a mean of 0.51% (SD = 1.02). Black immigrant co-ethnic density percentages were highly skewed; most tracts had less than 1% black immigrants. Following other studies with similar distributions, I categorized tracts in the highest quartile of immigrant densities as having the highest co-ethnic density, compared to all others which I coded as low co-ethnic density (Janevic et al. 2014; Kane et al. 2018).

I measured black racial concentration as the proportion of black residents (per total tract population) in each tract. I used black racial concentration as a proxy measure of standard segregation indices, following other studies of black immigrant neighborhoods, and studies that show similar patterns between black racial concentration and several segregation indices and health (Baker and Hellerstedt 2006). I measured black racial concentration as the proportion of black residents (per total tract population) in each tract. Black racial concentration ranged from 0.4% to 87.2%, with an average of approximately 6.5% (SD = 9.9). I also dichotomized this variable using the same method described for immigrant co-ethnic density, because most tracts had less than 2% black racial concentration. Tracts in the highest quartile of black racial concentration were coded as most concentrated, and all other tracts were coded as less concentrated.

I measured socioeconomic conditions using a standardized neighborhood deprivation index developed by Messer et al. (2006) to account for the multidimensionality of neighborhood socioeconomic status. This index captures several socio-demographic domains (i.e., poverty, education, employment, housing, residential stability, and occupation) associated with birth outcomes and was validated in urban census tracts. I conducted a principal component analysis to assess how each domain contributed to variance in the sample of black mothers. Item loading value from the first component was then used to weight each domain's contribution to the deprivation index score (Messer et al. 2006). I used z-score standardization, to standardize the index to have a mean of 0 and a standard deviation of 1. I interpret lower values on the deprivation index as less deprivation in neighborhoods, while higher values represent greater deprivation in neighborhoods. Standardized deprivation scores ranged from -2.4 to 5.3. This variable was also dichotomized for analysis, where tracts with the highest quartile of deprivation were coded as most deprived, and all other tracts were coded as less deprived neighborhoods.

Maternal and infant characteristics. The main individual-level predictor was nativity status. I included nativity as dichotomous, where black immigrants were coded as 1 and US-born black women were coded as 0. I controlled for sociodemographic and health characteristics that are established (Elo and Culhane 2010; O'Campo et al. 2008). Maternal characteristics include: maternal age as a categorical variable (1 = 18 - 24, 2 = 25 - 34, 3 = 35 years or older), educational attainment (1 = less than high school, 2 = high school graduate 3 = some college or more), and insurance coverage at the time of delivery (0 = Medicaid, 1 = Private insurance).

Infant characteristics include infant sex (0 = female, 1 = male), parity (1 = first birth, 2= 2nd birth, 3 = third or more) and initiation of prenatal care as a measure of access to care (1 = care began in 1st trimester, 2 = care began in 2nd trimester or later). I also included measures of maternal health/health behavior including a categorical measure of pre-pregnancy BMI, using the BMI weight status categories and normal weight as the reference category (1=underweight: below 18.5, 2 = Normal: 18.5 – 24.9, 3 = Overweight: 25.0 – 29.9, 4 = Obese: over 30.0) and pre-pregnancy smoking behavior (0 = 0 cigarettes/day, 1 = at least one cigarette/day).

Analysis

My analyses test three hypotheses: (1) that nativity advantage in preterm birth risk is partially explained by differences in neighborhood conditions; (2) that the association between neighborhood conditions and preterm birth risk varies by nativity status; and (3) there are significant birthplace differences in the association between preterm birth and neighborhood conditions. I began the analysis with bivariate comparisons of maternal/infant characteristics and neighborhood conditions between US- and foreign-, African- and Caribbean-born women. I also compared the proportions of preterm birth in each neighborhood context by maternal birthplace.

I test the first hypothesis using logistic regression models to estimate preterm birth risk adjusting for nativity status and maternal/infant characteristics (model 1), black immigrant co-ethnic density (model 2), black racial concentration (model 3) and neighborhood deprivation (model 4). I adjust for all neighborhood attributes as well (model 5). To test the second hypothesis, I add interaction terms between nativity status and each neighborhood characteristic (model 6).

To test differences in the association between neighborhoods and preterm birth risk by maternal birthplace, I also ran the same set of models including maternal birthplace instead of nativity status, given the variations in nativity advantages by country of origin. Birthplace is included as a categorical variable with US-born as the referent group (0 = US-born, 1=African-born, 2=Caribbean-born). I use logistic regression models with robust standard errors to account for clustering of births in census tracts. All statistical analyses and data manipulations were conducted using Stata 15.0 (College Station, TX).

RESULTS

Descriptive Statistics

Table 3.1 compares the maternal and infant characteristics of all foreign-born, African-born and Caribbean-born black women to that of US-born black women. Foreign-born black women are significantly older and have higher education levels. Foreign-born black women also have significantly higher proportions of private insurance coverage at delivery (56.4% vs. 40.3 %) and lower proportions of smokers during pregnancy (0.5% vs. 6.8%). Foreign-born black women are less likely to delay initiation of prenatal care (17.6% vs. 20.5%). The proportion of foreign-born women who are obese before pregnancy is lower than that of Us-born women (22.1% vs. 36.8%). Comparisons by birthplace (African or Caribbean countries) indicate that both African-born and Caribbean-born black women have better risk profiles compared to US-born black women, except for the proportion of Caribbean immigrants who have attended some college, where Caribbean-born women have similar proportions compared to US-born black women (37.4% vs. 37.2%). African-born women (7.0%) have a lower percentage of preterm births compared to Caribbean-born (9.6%) and US-born black women (10.8%). Distribution of total births by neighborhood characteristic was also different among black immigrant women and US-born women. A higher proportion of black immigrant births occurred in neighborhoods with the highest immigrant co-ethnic density (28.8% vs. 23.9%), lower black racial concentration (55.3% vs. 37.2%) and lower deprivation (74.5% vs. 53.6%) compared to US-born black births. Both African-born and Caribbean-born black women were less likely to reside in a neighborhood in the highest quartile of black racial concentration and neighborhood deprivation compared to US-born black women.

Table 3.2 describes patterns of preterm birth and each neighborhood characteristics for US-born, foreign-born, African-born and Caribbean-born black women. Overall there is minimal variation in the proportion of preterm births by each neighborhood characteristic. The proportion of preterm births among foreign-born black women is lower than that of US-born black women but does not vary by neighborhood characteristic. For instance, among black immigrants, the proportion of preterm births among neighborhoods in the highest quartile of black immigrant co-ethnic density (7.8%) does not differ significantly from the proportion among neighborhoods in the lower quartiles (7.4%). Similar trends occur among US-born blacks and neighborhoods with the highest immigrant co-ethnic density (10.6%) and lower immigrant co-ethnic density (11.0%). For Caribbean-born black women, the proportion of preterm birth by each neighborhood characteristic is higher than African-born black women.

Neighborhood Context and the Nativity Advantage

Regression analyses indicate that the nativity advantage in preterm birth is robust to all neighborhood attributes after adjusting for maternal and infant characteristics (Table 3.3). In model 1, nativity is a strong and significant predictor of preterm birth, after adjusting for maternal and infant characteristics, where black immigrant women are at 34% lower odds of preterm birth compared to US-born black women (OR = 0.65, 95% CI: 0.59, 0.72). In model 2, immigrant co-ethnic density is not associated with preterm birth risk (OR = 0.98, 95% CI: 0.92, 1.04) and the nativity coefficient remains significant (OR = 0.65, 95% CI: 0.59, 0.72). Black racial concentration (OR = 0.99, 95% CI: 0.94, 1.04) is also not associated with preterm birth risk and does not contribute to the nativity advantage (model 3). In model 4, I adjust for neighborhood deprivation and find that it is significantly associated with preterm birth risk among black women, where residence in neighborhoods with the highest deprivation results in a 9% increase in preterm birth risk compared to residence in a neighborhood with lower deprivation (OR = 1.09, 95 CI: 1.03, 1.14). But neighborhood deprivation has little impact on the nativity advantage (OR = 0.66, 95% CI: 0.60, 0.73). Lastly, the nativity advantage is also robust to fully adjusting for all neighborhood attributes although neighborhood deprivation remained a significant predictor of preterm birth risk (model 5). Across all models, maternal age (especially being 35 years or older), parity (having 3 or more children compared to having one live birth), and pre-pregnancy BMI (being underweight and overweight compared to normal weight), and smoking before pregnancy are significant risk factors for preterm birth among black women. Alternatively, higher education levels and private insurance coverage lower the risk of preterm birth among black women. Prenatal care initiation is not associated with preterm birth risk among black women.

In table 3.4, I include the results of model 6, which interacts nativity status and each neighborhood attribute after adjusting for maternal and infant characteristics. The results indicate that generally there across different neighborhood contexts (e.g. neighborhoods with highest immigrant co-ethnic density vs. lower immigrant co-ethnic density), there are no significant differences in preterm birth risk between US- and foreign-born women. For instance, the relationship between nativity status and preterm birth risk is not significantly different in neighborhoods with the highest immigrant co-ethnic density compared to neighborhoods with lower levels of immigrant co-ethnic density (OR = 1.12, 95% CI: 1.06,1.04). Similarly, there is no difference in the relationship between nativity status and preterm birth risk in neighborhoods with the highest black racial concentration and neighborhoods with lower black racial concentration (0.99, 95% CI: 0.80, 1.22). However, there is one exception with neighborhood deprivation. Here, the relationship between nativity status and preterm birth risk is slightly different in neighborhoods with the highest deprivation compared to neighborhoods with lower deprivation (OR = 0.83, 95% CI: 0.67, 1.04). To explore these differences further, I plot the predicted probabilities of preterm birth for US-born and foreign-born black women at each level of neighborhood deprivation (Figure 3.1). The plot shows that the nativity difference in preterm birth for neighborhoods with the highest deprivation is slightly larger (11.3% vs. 6.8 %) than the nativity difference in preterm birth in neighborhoods with lower deprivation (10.3% vs. 7.3%).

Neighborhood Context and Maternal Birthplace

Regression analyses including maternal birthplace are reported in Table 3.5. As seen in model 1, the nativity advantage in preterm birth risk varied by region of origin, after adjusting for maternal characteristics. African immigrants have a significant advantage in preterm birth risk while, where preterm birth risk is 35% lower compared to US-born black women. But there is no significant difference in preterm birth risk among US-born black women and Caribbean immigrants (OR = 0.65, 95% CI: 0.55, 0.76 vs. OR = 0.91, 95% CI: 0.64, 1.30). Like the analyses with nativity status, the birthplace advantage in preterm birth risk among African-born women remains unchanged after additionally adjusting for immigrant co-ethnic density (model 2), black racial concentration (model 3) and neighborhood deprivation (model 4). Adjusting for all neighborhood attributes (model 5) simultaneously also does not change the birthplace advantage among African-born women. Black immigrant co-ethnic density (model 2; OR = 0.98, 95% CI: 0.92, 1.04) and black racial concentration (model 3; OR = 0.97, 95% CI: 0.91, 1.02) are not associated with preterm birth risk, but neighborhood deprivation is associated higher preterm birth risk (model 4; OR = 1.11, 95% CI: 1.04, 1.17). All the maternal and infant characteristics remain significant predictors of preterm birth in these models, except for prenatal care initiation and infant sex.

I include the results of the interaction model of neighborhood attributes and maternal birthplace in Table 3.6. For African and Caribbean women, there are no significant nativity differences in preterm birth risk, at different levels of immigrant co-ethnic density and black racial concentration. However, like the nativity interaction model, there is a marginally significant nativity difference in preterm birth risk in neighborhoods with the highest deprivation compared to neighborhoods with lower neighborhood deprivation (OR = 0.83, 95% CI: 0.65, 1.04). The predicted probabilities indicate that the nativity difference in preterm birth risk for African-born is larger in neighborhoods with the highest deprivation (11.3% vs. 6.5%) compared to neighborhoods with lower deprivation (10.3% vs. 7.0%). Among Caribbean women, there is no significant nativity difference in preterm birth risk difference in neighborhoods with the highest deprivation compared to neighborhoods with lower deprivation (OR = 0.85, 95% CI: 0.49, 1.47). These results indicate that the marginally significant interactions of nativity status I report in the previous interaction model are driven by the African-born sample.

DISCUSSION

My objective was to assess the extent that neighborhood context contributes to the nativity advantage in preterm birth among black immigrant women living in California. I examined this by testing whether differential exposure accounted for the difference in preterm birth between black immigrant and US-born black women or whether the association between neighborhood attributes and preterm birth differed by nativity status. black immigrant women were more resilient to neighborhood attributes associated with preterm birth. I chose to examine the state of California because it is an understudied region for black birth outcomes and racial residential segregation is less pervasive. Similar to existing literature, my results confirm a nativity advantage for black immigrants in California. Black immigrant women are at lower risk for preterm birth and have significantly better demographic and behavioral profiles as reported in existing literature (Elo and Culhane 2010).

Following other studies, I also found that African-born immigrants have considerable nativity advantages, while Caribbean immigrants do not (Vang and Elo 2013). Most of the immigrant sample was born in an African country, the most common being Nigeria and Ethiopia (Table 3.7). There are significant differences in the educational attainment of African immigrants, and African immigrants are much more likely to enter the US through competitive diversity visas, which may make them more selected (Dodoo 1997; Kent 2007; Lobo 2001). These characteristics are also related to migrant selection, where migrants are selected on characteristics that render them healthier and more likely to migrate compared to non-migrants remaining in the sending country (Jasso et al 2004). Future research should consider the extent that migrant selection explains nativity advantages in the birth outcomes of African immigrants.

The bivariate analysis of neighborhood characteristics across nativity status and maternal birthplace confirm differences in exposure to immigrant co-ethnic density, black racial concentration and neighborhood deprivation. However, these differences are not related to the nativity advantage. My inability to explain nativity advantages with neighborhood conditions is similar to studies of different neighborhood attributes in other locales. For instance, one study found that neighborhood minority diversity in New Jersey is not associated with the nativity advantage in birth weight among black immigrants (Vang and Elo 2013). However, my study findings depart from other studies that find significant associations between neighborhoods and black birth outcomes (Baker and Hellerstedt 2006; Bell et al. 2006, 2007; Fang et al. 1999).

While immigrant co-ethnic density and black racial concentration is associated with black birth outcomes, I found no such associations in this sample of California births. Following my initial hypothesis, this may stem from the role of racial residential segregation across geographic locations. Subramanian and colleagues (2005) report that the relationship between racial residential segregation and health varies with the degree of segregation across geographic locations. Thus, an important contribution of my study is that the apparent lack of association between black birth outcomes, black racial concentration and immigrant co-ethnic density may stem from lower levels of residential segregation in California. Further, to my knowledge, there are no studies that examine black immigrant co-ethnic density and US-born black birth outcomes. For instance, studies among US-born Mexican women find immigrant co-ethnic density is associated with higher birth weight (Osypuk et al. 2010). In areas where segregation is less pronounced, black immigrant co-ethnic density may also narrow nativity differences by improving birth outcomes of US-born blacks. However, in this study, black immigrant co-ethnic density was not associated with US-born black or black immigrant preterm birth risk. Nonetheless, this study did confirm that neighborhood deprivation remains a meaningful predictor of black birth outcomes, suggesting that material disadvantage is a critical factor in preterm birth risk irrespective of broader residential segregation patterns.

While this study is the first to examine neighborhood contributions to nativity differentials in preterm birth of black women living in the state of California, it has some limitations. First, I assessed immigrant co-ethnic density using total foreign-born black population and was unable to assess region specific co-ethnic density, i.e., African density and Caribbean density. Doing so may have increased the sensitivity of the measure, given that social support networks are more likely to be homogenous based on ethnicity rather than only foreign-born status and race. Further, this study did not include marital status as a predictor of preterm birth risk. Marital status is a significant predictor of adverse birth outcomes including preterm birth and some studies have shown that foreign-born black women are more likely to be married at the time of birth compared to US-born black women (Shah, Zao, and Ali 2011; Dominguez et al. 2009; Hummer et al. 1999). In this study, I was unable to account for marital status due to reporting limitations in California birth records. Accounting for differences in maternal marital status may have narrowed the nativity advantage in this sample, although other studies did not report significant decreases in the nativity advantage after adjusting for marital status (Elo, Vang, and Culhane 2014). Future studies should consider the role of marital status or paternal absence in the nativity advantage of black immigrants. Lastly, the measure of immigrant co-ethnic density in this study does not consider the spatial distribution of black immigrants, and only measures the concentration of black immigrants in a given census tract. However, this measure may be more appropriate given that black immigrants are a much smaller population in California (which also has significant variations in tract size), and likely do not reside in contiguous tracts, that would make a spatial definition of immigrant co-ethnic density more informative. Therefore, these contributions also offer a unique context to consider immigrant co-ethnic density where adjacent ethnic neighborhoods are less likely. Overall, my findings address important gaps in black immigrant neighborhood research and speak to the heterogeneity of outcomes in this population.

Table 3.1. Comparisons of maternal and infant characteristics and neighborhood attributes by nativity status and birthplace (N = 76,255).

	US-born black (N = 69,660)	Foreign-born (N = 6,595)	African-born (N = 5,863)	Caribbean-born (N = 732)
Age, years				
18 - 24	42.9	10.1***	9.4***	15.6***
25 - 34	44.7	59.8***	60.6**	53.6***
35+	12.3	30.1***	30.0**	30.9***
Educational Attainment				
Less HS	13.3	5.6***	5.7**	5.2***
HS/GED	36.7	25.6***	25.9***	23.2***
Some College	37.2	34.2***	33.8***	37.4
Bachelor	8.7	24.5***	25.0***	20.8***
Graduate	4.1	10.1***	9.7***	13.4***
Insurance coverage				
Medicaid	60.4	43.4***	43.7***	41.3***
Private	40.3	56.4***	56.1***	58.7***
Infant sex				
Male	49.3	48.9	49.0	48.3
Parity				
1st	40.0	39.8	39.4	42.2
2nd	28.0	31.3***	31.3***	31.1
3rd or more	31.9	28.9***	29.3***	26.2**
Pre-pregnancy smoking status				
Smoker	6.8	0.5***	0.5***	0.8***
Prenatal Care Initiation				
1st trimester	80.0	82.4***	82.0***	85.0***
2nd or later trimester	20.5	17.6***	18.0***	14.8***
Pre-pregnancy BMI (%)				
Underweight	3.5	4.6***	4.6***	4.1
Normal	35.6	45.9***	45.6***	48.4***
Overweight	24.1	27.4***	27.9***	23.1
Obese	36.8	22.1***	21.8***	24.5***
Preterm Birth	10.8	7.3***	7.0***	9.6
Neighborhood Attributes				
Black immigrant co-ethnic density				
Highest Quartile	23.9	28.8***	28.7***	29.6***
Lower Quartiles	76.1	71.2***	71.3***	70.4***
Black racial concentration				
Highest Quartile	62.8	44.7***	44.1***	48.7***
Lower Quartiles	37.2	55.3***	56.9***	51.3***
Neighborhood deprivation				
Highest Quartile	44.4	25.5***	24.9***	30.6***
Lower Quartiles	53.6	74.5***	75.1***	69.3***

All figures presented are percentages. Some proportions do not sum to 100 due to missing data. Significance tests compare proportions for characteristics of US-born to Foreign-born, African-born and Caribbean-born. ***p < 0.001, **p < 0.01, *p < 0.05.

Table 3.2. Percentage of preterm births by neighborhood characteristic for US-born, foreign-born black, African and Caribbean mothers.

	US-born black	Foreign-born black	African-born	Caribbean-born
Black immigrant co-ethnic density				
Highest quartile	10.6%	7.8%	7.5%	10.0%
Lower quartiles	11.0%	7.4%	7.2%	9.1%
Black Concentration				
Highest quartile	11.1%	7.3%	7.1%	8.4%
Lower quartiles	10.7%	7.8%	7.5%	10.4%
Neighborhood Deprivation				
Highest quartile	11.6%	7.4%	7.2%	8.7%
Lower quartiles	10.4%	7.7%	7.4%	9.9%

Table 3.3. Logistic regression results for nativity status, neighborhood context and maternal/infant characteristics.

	Model 1	Model 2	Model 3	Model 4	Model 5
Nativity Status (ref: US-born black)					
Foreign-born black	0.65 (0.59- 0.72) ***	0.65 (0.59 - 0.72) ***	0.65 (0.59 - 0.72) ***	0.66 (0.60 - 0.73) ***	0.66 (0.59 - 0.73) ***
Black immigrant co-ethnic density (ref: lower quartiles)					
Highest quartiles		0.98 (0.92 - 1.04)			0.98 (0.93 - 1.04)
Black racial concentration (ref: lower quartiles)					
Highest quartiles			0.99 (0.94 - 1.04)		0.97 (0.92 - 1.02)
Neighborhood deprivation (ref: lower quartiles)					
Highest quartiles				1.09 (1.03 - 1.14) **	1.10 (1.04 - 1.16) **
Age (ref: 18 - 24)					
25 - 34	1.12 (1.05- 1.19) ***	1.12 (1.05 - 1.19) ***	1.12 (1.05 - 1.19) ***	1.12 (1.06 - 1.19) ***	1.12 (1.06 - 1.20) ***
35+	1.65 (1.52- 1.79) ***	1.65 (1.52 - 1.79) ***	1.65 (1.52 - 1.79) ***	1.66 (1.52 - 1.80) ***	1.66 (1.53 - 1.80) ***
Education (ref: Less HS)					
HS/GED	0.85 (0.79- 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***
Some College	0.83 (0.77- 0.89) ***	0.83 (0.77 - 0.89) ***	0.83 (0.77 - 0.89) ***	0.83 (0.77 - 0.90) ***	0.83 (0.77 - 0.90) ***
Bachelor	0.66 (0.59- 0.74) ***	0.66 (0.59 - 0.74) ***	0.66 (0.59 - 0.74) ***	0.67 (0.59 - 0.75) ***	0.67 (0.59 - 0.75) ***
Graduate	0.73 (0.63- 0.85) ***	0.73 (0.63 - 0.85) ***	0.73 (0.63 - 0.84) ***	0.75 (0.64 - 0.86) ***	0.74 (0.64 - 0.86) ***
Insurance coverage (ref: Medicaid)					
Private	0.85 (0.80- 0.89) ***	0.85 (0.80 - 0.89) ***	0.85 (0.80 - 0.89) ***	0.85 (0.81 - 0.90) ***	0.85 (0.81 - 0.90) ***
Infant sex (ref: Female)					
Male	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)
Parity (ref first born)					
2nd	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)
3rd or more	1.14 (1.07- 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***
Pre-pregnancy smoking status (ref: non-smoker)					
Smoker	1.22 (1.12- 1.34) ***	1.22 (1.11 - 1.33) ***	1.22 (1.12 - 1.33) ***	1.23 (1.12 - 1.34) ***	1.22 (1.12 - 1.34) ***
Prenatal Care Initiation (ref = 1st trimester)					
2nd or later trimester	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)
Pre-pregnancy BMI (ref = Normal)					
Underweight	1.16 (1.03- 1.32) **	1.16(1.03 - 1.32) **	1.16 (1.03 - 1.32) **	1.16 (1.03 - 1.31) **	1.16 (1.03 - 1.31) **
Overweight	0.93 (0.88- 1.00) **	0.93 (0.88 - 1.00) **	0.93 (0.88 - 1.00) **	0.93 (0.88 - 0.99) **	0.93 (0.88 - 1.00) **
Obese	1.03 (0.98 - 1.09)	1.03 (0.98 - 1.09)	1.03 (0.98 - 1.09)	1.03(0.97 - 1.09)	1.03 (0.97 - 1.09)

Significant findings are denoted as follows: *** $p \leq 0.001$, ** $p \leq 0.01$, $^{*}p \leq 0.05$. 95% Confidence intervals are noted in parentheses.

Table 3.4. Logistic regression results for interaction model of nativity status and neighborhood context.

Interaction Model	OR (95% CI)
Nativity Status (ref: US-born black)	
Foreign-born black	0.67 (0.58 - 0.78) ***
Black immigrant co-ethnic density (ref: lower quartiles)	
Highest quartiles	0.98 (0.92 - 1.04)
Black racial concentration (ref: lower quartiles)	
Highest quartiles	0.97 (0.91, 1.02)
Neighborhood deprivation (ref: lower quartiles)	
Highest quartiles	1.12 (1.06 - 1.18) ***
Nativity x Immigrant co-ethnic density	
Foreign-born, highest quartile	1.12 (0.89 - 1.41)
Nativity x black racial concentration	
Foreign-born, highest quartile	0.99 (0.80 - 1.22)
Nativity x neighborhood deprivation	
Foreign-born, highest quartile	0.83 (0.67 - 1.04)
Age (ref: 18 - 24)	
25 - 34	1.12 (1.06 - 1.20) ***
35+	1.66 (1.53 - 1.80) ***
Education (ref: Less HS)	
HS/GED	0.85 (0.79 - 0.92) ***
Some College	0.84 (0.77 - 0.90) ***
Bachelor	0.67 (0.59 - 0.75) ***
Graduate	0.74 (0.64 - 0.86) ***
Insurance coverage (ref: Medicaid)	
Private	0.85 (0.81 - 0.90) ***
Infant sex (ref: Female)	
Male	1.02 (0.98 - 1.07)
Parity (ref first born)	
2nd	0.97 (0.91 - 1.03)
3rd or more	1.14 (1.07 - 1.22) ***
Pre-pregnancy smoking status (ref: non-smoker)	
Smoker	1.22 (1.12, 1.34) ***
Prenatal care initiation (ref = 1st trimester)	
2nd or later trimester	0.99 (0.94 - 1.05)
Pre-pregnancy BMI (ref = Normal)	
Underweight	1.16 (1.03 - 1.31) **
Overweight	0.93 (0.88 - 1.00) **
Obese	1.03 (0.97 - 1.09)

Significant findings are denoted as follows: *** $p \leq 0.001$, ** $p \leq 0.01$, *$p \leq 0.05$. 95% Confidence intervals (CI) are noted in parentheses.

Table 3.5. Logistic regression results for birthplace, neighborhood context and maternal/infant characteristics.

	Model 1	Model 2	Model 3	Model 4	Model 5
Birthplace (ref = US-born black)					
Africa-born black	0.62 (0.56 - 0.70) ***	0.62 (0.56 - 0.70) ***	0.62 (0.56 - 0.69) ***	0.63 (0.57 - 0.71) ***	0.63 (0.57 - 0.70) ***
Caribbean-born black	0.88 (0.69 - 1.12)	0.88 (0.69 - 1.12)	0.88 (0.69 - 1.12)	0.89 (0.70 - 1.13)	0.89 (0.70 - 1.12)
Black immigrant co-ethnic density (ref = lower quartiles)					
Highest quartile		0.98 (0.92-1.03)			0.98 (0.93 – 1.04)
Black racial concentration (ref = lower quartiles)					
Highest quartile			0.99 (0.94 - 1.04)		0.97 (0.92 - 1.02)
Neighborhood deprivation (ref = lower quartiles)					
Highest quartile				1.10 (1.04 - 1.15) ***	1.11 (1.05 - 1.16) ***
Maternal age (ref = 18 – 24)					
25 - 34	1.12 (1.06 - 1.19) ***	1.12 (1.06 - 1.19) ***	1.12 (1.06 - 1.19) ***	1.12 (1.06 - 1.20) ***	1.13 (1.06 - 1.20) ***
35+	1.65 (1.52 - 1.79) ***	1.65 (1.52 - 1.79) ***	1.65 (1.52 - 1.79) ***	1.66 (1.53 - 1.80) ***	1.66 (1.53 - 1.80) ***
Maternal Education (ref = less HSD)					
HSD/GED	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***	0.85 (0.79 - 0.92) ***
Associate/Some college	0.83 (0.77 - 0.89) ***	0.83 (0.77 - 0.89) ***	0.83 (0.77 - 0.89) ***	0.83 (0.77 - 0.90) ***	0.83 (0.77 - 0.90) ***
Bachelor	0.66 (0.59 - 0.74) ***	0.66 (0.59 - 0.74) ***	0.66 (0.59 - 0.74) ***	0.67 (0.60 - 0.75) ***	0.67 (0.59 - 0.75) ***
Graduate	0.73 (0.63 - 0.84) ***	0.73 (0.63 - 0.84) ***	0.73 (0.63 - 0.84) ***	0.74 (0.64 - 0.86) ***	0.74 (0.64 - 0.86) ***
Insurance coverage at delivery (ref = Medicaid)					
Private	0.85 (0.80 - 0.89) ***	0.85 (0.80 - 0.89) ***	0.85 (0.80 - 0.89) ***	0.85 (0.81 - 0.90) ***	0.85 (0.81 - 0.90) ***
Sex (ref = female)					
Male	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)	1.03 (0.98 - 1.07)
Parity (ref = 1st live birth)					
2nd	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)	0.97 (0.91 - 1.03)
3rd or more	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***	1.14 (1.07 - 1.22) ***
Smoking status pre-pregnancy (ref = non-smoker)					
Smoker	1.22 (1.12 - 1.33) ***	1.22 (1.11 - 1.33) ***	1.22 (1.11 - 1.33) ***	1.23 (1.12 - 1.34) ***	1.22 (1.12 - 1.34) ***
Prenatal care initiation (ref = 1st trimester)					
2nd or later trimester	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)	0.99 (0.94 - 1.05)
Pre-pregnancy BMI (ref = Normal)					
Underweight	1.17 (1.03 - 1.32) **	1.17 (1.03 - 1.32) **	1.17 (1.03 - 1.32) **	1.16 (1.03 - 1.31) **	1.16 (1.03 - 1.31) **
Overweight	0.94 (0.88 - 1.00) **	0.94 (0.88 - 1.00) **	0.94 (0.88 - 1.00) **	0.93 (0.88 - 1.00) **	0.93 (0.88 - 1.00) **
Obese	1.03 (0.98 - 1.09)	1.03 (0.98 - 1.09)	1.03 (0.98 - 1.09)	1.03 (0.97 - 1.09)	1.03 (0.97 - 1.09)

Significant findings are denoted as follows: *** $p \leq 0.001$, ** $p \leq 0.01$, *$p \leq 0.05$. 95% confidence intervals displayed in parentheses.

Table 3.6. Logistic regression results for interaction model of birthplace and neighborhood context.

	Model 6 (95% CI)
Birthplace (ref = US-born black)	
Africa-born black	0.65 (0.55 - 0.76) ***
Caribbean-born black	0.91 (0.64 - 1.30)
Black immigrant co-ethnic density (ref = lower quartiles)	
Highest quartile	0.98 (0.92 - 1.04)
Black racial concentration (ref = lower quartiles)	
Highest quartile	0.97 (0.91- 1.02)
Neighborhood deprivation (ref= lower quartiles)	
Highest quartile	1.11 (1.04 - 1.17) ***
Black immigrant co-ethnic density x birthplace	
African-born, highest quartile	1.10 (0.85 - 1.41)
Caribbean-born, highest quartile	1.30 (0.77 - 2.20)
Black concentration x birthplace	
African-born, highest quartile	0.99 (0.79 - 1.24)
Caribbean-born, highest quartile	0.89 (0.52 - 1.52)
Neighborhood deprivation x birthplace	
African-born, highest quartile	0.83 (0.65 - 1.04)
Caribbean-born, highest quartile	0.85 (0.49 - 1.47)
Maternal Age (ref = 18 – 24)	
25 - 34	1.13 (1.06 - 1.20) ***
35+	1.66 (1.53 - 1.80) ***
Maternal Education (ref = less HSD)	
HSD/GED	0.85 (0.79 - 0.92) ***
Associate/Some college	0.84 (0.77 - 0.90) ***
Bachelor	0.67 (0.59 - 0.75) ***
Graduate	0.74 (0.64 - 0.86) ***
Insurance coverage at delivery (ref = Medicaid)	
Private	0.85 (0.81 - 0.90) ***
Sex (ref = female)	
Male	1.02 (0.98 - 1.07)
Parity (ref = 1st live birth)	
2nd	0.97 (0.91 - 1.03)
3rd or more	1.14 (1.07 - 1.22) ***
Smoking status pre-pregnancy (ref = non-smoker)	
Smoker	1.22 (1.12 - 1.34) ***
Prenatal care initiation (ref = 1st trimester)	
2nd or later trimester	0.99 (0.94 - 1.05)
Pre-pregnancy BMI (ref = Normal)	
Underweight	1.16 (1.03 - 1.31) **
Overweight	0.94 (0.88 - 1.00) **
Obese	1.03 (0.97 - 1.09)

Significant findings are denoted as follows: *** $p \leq 0.001$, ** $p \leq 0.01$, *$p \leq 0.05$.
95% Confidence intervals (CI) are noted in parentheses.

Table 3.7. Maternal birth places for African immigrant women, California birth records 2007-2010 (N = 9,381)

African Countries	N	African Countries	N	African Countries	N
Algeria	7	Gambia	47	Rwanda	29
Angola	11	Ghana	387	Senegal	115
Benin	21	Guinea	33	Seychelles	3
Botswana	9	Guinea-Bissau	3	Sierra Leone	199
Burkina Faso or Upper Volta	8	Ivory Coast	86	Somalia	1,114
Burundi	28	Kenya	531	South Africa	92
Cameroon	282	Lesotho	1	Sudan	296
Cape Verde	8	Liberia	238	Swaziland	3
Central African Republic	5	Libya	4	Tanzania	87
Chad	4	Madagascar	7	Togo	31
Comoros	1	Malawi	19	Tunisia	6
Congo (Brazzaville)	42	Mali	27	Uganda	224
Congo Republic/Zaire	142	Mauritania	2	Zambia	42
Djibouti	5	Mauritius	1	Zimbabwe	76
Egypt	3	Morocco	33		
Equatorial Guinea	3	Mozambique	2		
Eritrea	585	Namibia	6		
Ethiopia	2,045	Niger	7		
Gabon	7	Nigeria	2,418		

Table 3.8. Maternal birth places for Caribbean immigrant women, California birth records 2007 -2010 (N = 1,324)

(Non-Hispanic) Caribbean Countries	N
Antigua and Barbuda	11
Bahamas	23
Barbados	21
Bermuda Islands	12
Cayman Islands	3
Dominica	31
Grenada	22
Guadeloupe	1
Haiti	218
Jamaica	622
Martinique	2
Montserrat	3
Saint Kitts and Nevis	4
Saint Lucia	28
Saint Vincent and the Grenadines	18
Trinidad and Tobago	183
Turks and Caicos Islands	3
Virgin Islands	119

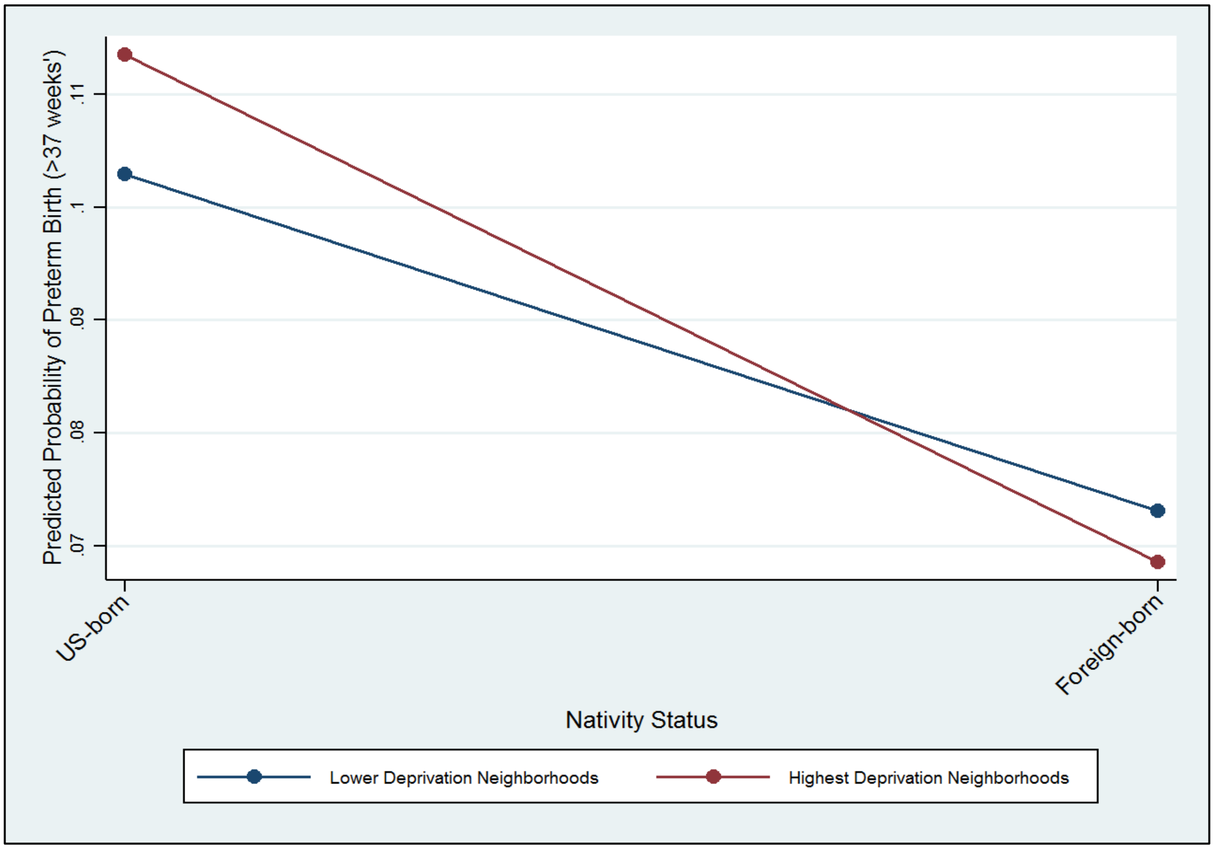

Figure 3.1. Predicted probability of preterm birth by nativity status and neighborhood deprivation level.

CHAPTER 4
Migrant Selection and the Nativity Advantage in Infant Birth Weight among Black Women

The immigrant population in the United States experiences lower mortality and morbidity compared to the US-born population despite their low socioeconomic position. Compared to US-born blacks, black immigrants are advantaged on several health outcomes including self-rated health, activity limitation and adult mortality (Hamilton and Hummer 2011; Read and Emerson 2005). Foreign-born black women are also at lower risk for adverse birth outcomes including low birth weight (Wartko, Wong, and Enquobahrie 2017). Explanations for the immigrant health advantage typically follow two theoretical frames. The first suggests that immigrants are protected by cultural factors that promote better health behaviors including lower substance use and healthier dietary patterns, especially when immigrants reside in co-ethnic enclaves with supportive networks and greater access to culturally specific resources (Logan et al. 2002).

Alternatively, migrant selection theories focus on processes that begin in the countries of origin. For instance, the health selection hypothesis posits that selective migration of individuals who are healthy enough to migrate may contribute to immigrant health advantages after migration (Riosmena, Kuhn, and Jochem 2017). These theories suggest that immigrants are not a representative sample of those left behind in the country of origin (non-migrants), but rather a group selected on characteristics associated with better health and a higher likelihood of migration (Akresh and Frank 2008; Jasso et al. 2004). While much of the literature has focused on cultural explanations for nativity differences in health, fewer studies have considered the role of migrant selection—especially among black immigrants. To date, migrant selection studies show that migrants are selected on several health conditions compared to non-migrants, including smoking status and obesity, and one study has examined whether migrant selectivity contributes to post-migration health (Ro et al 2016; Ro and Fleischer 2017). However, while this study did examine a diverse sample of immigrant sending countries, it did not include non-Hispanic black immigrant sending countries, which suggests the findings may not be generalizable to black immigrants. Further, the study focused on nativity differences in self-rated health. For other health outcomes, such as low birth weight, the association between migrant selection and post-migration health may differ. I extend this line of research by using an individual-level measure of migrant selection among black immigrants to explain nativity differences in infant birth weight among black women living in California.

Migrant Selection and Immigrant Health Advantages

The decision to migrate ultimately rests on whether the benefits of migration outweigh the social, physical and economic costs of leaving one's home country (Jasso et al. 2004). Thus, migrants are individuals who are more capable and/or have the social and economic means to migrate compared to non-migrants. The extent of migrant selection among immigrants can vary by country, given that before migration, immigrant health is also shaped by country of origin conditions including the distribution of health and illness, and social determinants such as age and socioeconomic status (Acevedo-Garcia et al. 2012). For instance, a 2008 study of US immigrants evaluated immigrants' self-perception of health relative to non-migrants in their home country and found that immigrants from African and European countries were most likely to report positive health selection, compared to Mexican immigrants who were least likely to report positive health selection (Akresh and Frank 2008). While this study relied on self-reports of migrant selection rather than direct comparisons of health outcomes, the results indicate that there are important differences in the degree of selectivity across immigrant groups. In countries where conditions are exceedingly difficult (e.g., large wealth gaps), migrants will be much more selected in order to overcome the costs of migration. Similarly, migrants from countries where the physical distance to the US is great will likely represent individuals who have the means to overcome the costs of the longer distance (Feliciano 2005; Jasso et al. 2004). For instance, Feliciano (2005) found that immigrants from Asian countries were more selected than immigrants from Latin American and Caribbean countries (e.g. Jamaica and Haiti) and that this variation in migrant selection was related to distance from the US, where immigrants from countries that are farther from the US have higher education selectivity compared to immigrants in countries that are closer to the US.

Other sending country conditions related to health trends and migration history are also important to variations in migrant selection. For instance, Fleischer et al. (2017) found that smoking selectivity (where migrants are less likely to smoke than non-migrants) is sensitive to country-level smoking patterns over time among Mexican migrants, indicating that the degree of selectivity is not constant over time. Further, Ro et al. (2016) found that health selection, measured as differences in self-rated health between migrants and non-migrants, is associated with country-level visa mode of entry, where health selection increases among countries with a higher proportion of work-related emigration.

To date, there is a growing body of literature that examines migrant selection by assessing the health and economic position of migrants relative to non-migrants using binational comparisons. However, most of these studies have been conducted among immigrants from

Hispanic (primarily Mexico) countries, because Hispanic migrants comprise the most substantial proportion of immigrants in the United States. Black immigrants from sub-Saharan African countries have received relatively little attention. In light of the country of origin variations described above, this is a considerable gap in migrant selection literature.

Among black immigrants, there is some evidence that migrant selection varies by country of origin. Nativity differences in black birth outcomes are most pronounced in African-born immigrants compared to non-Hispanic Caribbean immigrants. It follows that migrants who experience the most substantial nativity differences in health may also be the most selected. I expect that African immigrants are a particularly selected population due to several important distinctions in their sending country conditions. For instance, African countries are much further from the US compared to Latin American countries, which means migration, in general, is somewhat more complicated. Immigrants from African countries are also much more recent compared to other immigrant groups, which may indicate that social networks are less established in the US, which lowers their social capital upon arrival and may render them more selected when navigating the US social and economic structure as recent immigrants. Furthermore, African migration is much more likely to occur through diversity visas, which are more competitive and require highly educated/skilled migrants (Dodoo 1997; Kent 2007; Lobo 2001). Lastly, the overall health patterns in African countries is different and may contribute to differences in health selectivity (Peltzer et al. 2014). In this study, I focus on the selectivity of Nigerian immigrants who represent one of the largest African immigrant groups in many states including California (Kent 2007).

Dimensions of Migrant Selection

There are several ways to compare migrants and non-migrants in order to understand migrant selection. Much of the literature to date, focuses on health selection, by using binational data sources to compare various health outcomes of migrants and non-migrants. However, other studies also examine differences in early childhood conditions, using indicators like height, which captures early childhood nutritional patterns as well as social status. Other studies consider sociodemographic characteristics like educational attainment and age, which contribute to migration likelihood, a measure that captures the probability of migration among migrants and non-migrants given important demographic factors are associated with migration. In this study, I conceptualize each of these comparisons as a different domain of migrant selection that has a unique association with post-migration health among immigrants.

Health Selectivity. Binational comparisons of migrant and non-migrant health show that immigrants are selected on several health outcomes including hypertension, obesity, disability/activity limitation, smoking status and infant mortality (Barquera et al. 2008; Bostean 2013; Fleischer et al. 2017; Landale, Gorman, and Oropesa 2006; Mehta and Elo 2012; Riosmena, Wong, and Palloni 2013). Barquera and colleagues (2008) found that hypertension prevalence is higher among Mexicans than Mexican Americans living in the US. Alternatively, Bostean (2013) found that Mexican immigrants are selected on activity limitation but not hypertension, heart disease or other chronic conditions. Mexican immigrants are however selected on smoking status and obesity, but selectivity related to obesity patterns is most salient among Mexican immigrant women (Fleischer et al. 2017; Ro and Fleischer 2014). While a small number of studies have also found other immigrant groups to be selected on health, I focus on Mexican immigrants to highlight the considerable amount of heterogeneity in health selectivity, indicating that not only does selectivity vary across migrants, it varies depending on the health outcome used to measure selectivity. In this study, I opt to study selectivity related to body mass index (BMI), because obesity is related to several other health conditions that influence birth outcomes directly including diabetes, hypertension and nutritional status (Goldenberg et al. 2009). Black immigrant women with high levels of BMI selectivity may be at lower risk for adverse pregnancy outcomes (Albrecht et al. 2013; Grady and Ramírez 2008). I posit that this measure of health selection may explain nativity differences in infant birth weight among Nigerian immigrants and US-born black women.

Height Selectivity. Height is associated with better health, higher education, and earnings among adults (Maurer 2010; Wadsworth et al. 2002). Because height is generally determined in early childhood by the quality of nutrition and incidence of disease, it is often used as an indicator of early life circumstances that shape the trajectory of health and socioeconomic status in adulthood. To date, several studies have shown that immigrants are selected on height and thus have more favorable early life conditions. For instance, a 2008 study of Mexican immigrants and non-migrants found that Mexican immigrant women are selected on height (Rubalcava et al. 2008). In another study, Mexican immigrants were not only selected on height, but taller Mexican immigrants also had higher levels of education (Crimmins et al. 2005). Riosmena et al. (2017) examined height selectivity in several different immigrant groups and found that Indian and Filipino immigrants were selected on height, indicating that height selectivity may be generalizable to other immigrant groups, although this has not been studied among Nigerian immigrants. Following the height selectivity findings here, black immigrant women who are selected on height may have favorable early life conditions that indirectly reduce their risk of having a low birth weight infant. This may be associated with a lower accumulation of stressors over the life course. Given the importance of early life stressors on the birth outcomes of women, particularly black women (Lu and Halfon 2003), I posit that height selectivity will be an important predictor of nativity differences in infant birth weight.

Migration Likelihood. While health status indicators capture differences in the distribution of health between migrants and non-migrants, sociodemographic indicators are also an important domain of migrant selection as they capture a migrant's human and social capital (Jasso et al. 2004). When taken together, health status and demographic characteristics offer a complete assessment of migrant selection that doesn't rely solely on differences in health outcomes (in early childhood or adulthood) that may contribute to post-migration health. Sociological studies have found migrants to be selected on sociodemographic characteristics like educational attainment—an important determinant of post-migration health and socioeconomic status. For instance, in a study of immigrants from 32 different countries, Feliciano (2005) found that immigrants from all sending countries but Puerto Rico, have higher levels of educational attainment than their respective non-migrants. It is also well-established that migrants tend to be younger compared to non-migrants which has implications for their health. By comparing migration likelihood between migrants and non-migrants based on age, education and health status and early life conditions, I expect that migration likelihood will be a robust measure of migrant selection particularly among sending countries where the cost of migration is high, as is the case with African immigrants.

Current Study

In this chapter, I consider whether two dimensions of migrant selection—health status and early childhood conditions, and a comprehensive measure of migration likelihood, contribute to the nativity advantage in infant birth weight among black women. Using data from the Nigerian Demographic Health Survey (NDHS) and a subsample of Nigerian immigrant women who gave birth in California, I quantify the extent that Nigerian immigrants are selected on BMI, height and migration likelihood (as a function of age, educational attainment, BMI and height) relative to Nigerian non-migrants. Then, I use this score to test whether migrant selection explains differences in infant birth weight between US-born black women and Nigerian immigrant women. I use two analytic approaches to test the following hypothesis:

> H1: If migrant selection contributes to nativity differences in infant birth weight, then Nigerian immigrants with the highest degree of migrant selection (i.e., Nigerian immigrants are very different from Nigerian non-migrants) will have the largest nativity advantages, while Nigerian immigrants with the lowest degree of selectivity (i.e., Nigerian immigrants are similar to Nigerian non-migrants) will have the smallest nativity differences in infant birth weight.

In the first analytic approach, I examine whether nativity differences in birth weight vary by degree of migrant selection for each measure of selection, adjusting for maternal characteristics. In the second analytic approach, I use a more direct method to test whether increases in migrant selection among Nigerian immigrant women, explain the nativity difference in infant birth weight for each measure of selection.

METHODS

Data

To develop each measure of selectivity and compare Nigerian immigrants to Nigerian non-migrants, I merged two datasets: the 2013 Nigerian Demographic Health Survey (NDHS) birth record dataset and 2007 - 2010 California birth records from the California Department of Public Health. Other studies have used similar approaches to describe migrant selection in binational studies, and the country-specific Demographic Health Survey datasets provide data on representative samples of non-migrants (Ro et al. 2016). The NDHS is a nationally representative cross-sectional survey with a stratified three-stage cluster design conducted between February and May 2013. This dataset contains birth record information on every child ever born (up to 20 children) to a woman age 15 to 49 who was interviewed. I included a subset of births that occurred between 2007 and 2010. For both the California birth records and NDHS datasets, the years were chosen based on the availability of complete health information in the California birth records. In 2007, California birth records included information on maternal height and weight as a component of the revised U.S. Standard Certificate of Birth (Centers for Disease Control, 2003).

In the NDHS, selection of samples is based on geographic clusters in rural and urban areas, from which a representative sample of 40,320 households was selected. A total of 38,948 (98% response rate) individual questionnaires were completed for women ages 15 - 49 who had one or more children. Before appending the NDHS to California birth records, I incorporated the NDHS sample weighting, by expanding the unweighted sample to reflect the survey person weighting (range of person weight: 0.06 - 4.4). The total number of completed surveys corresponds to 175,900 births in the weighted sample (unweighted sample = 119,386 births) between 1975 and 2013. From this, I included 31,463 live singleton births that occurred between 2007 and 2010 to non-migrant Nigerian women. I excluded births with missing maternal age, education, height or BMI information, and births to women under 18 years of age. The final sample consisted of 30,964 births to Nigerian non-migrants.

California birth records included 105,339 live singleton births to women (19 – 59) who reported their ethnicity as "Not Spanish/Hispanic" and their race as "black only." I coded nativity status as US-born if a woman reported her birthplace as any state in the US (N = 93, 414). I coded nativity status as foreign-born Nigerian if a woman reported her birthplace as Nigeria (N = 1,944). I excluded births with missing birth weight, missing maternal health or demographic information, births to women outside the age range of 18 - 49, and women with implausible maternal height and weight information, for a final sample of 65,804 US-born black women and 1, 319 Nigerian immigrant women.

To ensure the sample of Nigerian non-migrants and Nigerian immigrants were comparable, I only include births to women age 18 to 49 in the California dataset, following the age range in the NDHS. Further, I recoded some demographic variables to harmonize maternal characteristics across the datasets. For instance, in the NDHS educational attainment is reported as a categorical variable denoting completion of primary education, secondary education or higher. However, in the California dataset, educational attainment is coded with greater detail, denoting completion of each grade of primary school, high school, college, and graduate school. To address this, I created a new education variable with collapsed education categories in the California dataset to match that of Nigerian non-migrants (described in greater detail below). Pre-pregnancy smoking behavior is coded as a yes or no response for the NDHS, and as the number of cigarettes in the California dataset. Here, I classified smokers as those who reported smoking as "yes" in the NDHS and those who smoked at least one cigarette/day in the California dataset. Maternal age and parity were similarly coded as years and the total number of live births in both datasets. In the NDHS, insurance coverage was reported as a "yes" or "no" response, while the California birth dataset provides the type of insurance coverage at the time of birth, so I did not include the type of insurance coverage for Nigerian non-migrants. There was also no information on prenatal care initiation in the NDHS, so I did not include measures of prenatal care initiation for that sample.

The availability of birth weight data in the NDHS sample varied because infants were weighed at birth (N= 3,377), not weighed at birth (N = 14,798), or weight at birth was reported as unknown (N = 2,718). For infants who were weighed, birth weight information was either collected by the mother's recall (n = 2,346) or written hospital record (n = 1,031). There were important differences in maternal characteristics between those who provided birth weight information (written or recall) and those who did not. Women who provided birth weight data were older, more educated, more likely to have health insurance coverage, more likely to live in an urban region and deliver in a private hospital (compared to giving birth in a government hospital or at home). In the California dataset, all infants birth weights were recorded at birth, and very few births occurred outside of a hospital setting (less than 1%). Height, weight, and body mass index were reported in metric units for the NDHS sample, and imperial units for the California sample, so I converted all measures to metric units.

Variables

Infant birth weight. I include infant birth weight (grams) as a continuous variable following previous studies of birth weight among black immigrants (Elo, Vang, and Culhane

2014; Vang and Elo 2013). As a continuous variable, birth weight offers more precise measures of the associations of interest given that there may be overlaps in the distribution of birth outcomes among US-born blacks, Nigerian immigrants and Nigerian non-migrants.

Migrant selection. I included three measures of migrant selection: BMI selectivity (kg/m^2), height (meters) selectivity (meters) and migration likelihood (a probability score ranging from 0.0 to 1.0). In the first analytic approach, each measure of selection is modeled as a categorical variable, representing quartiles of migrant selectivity, to examine whether nativity differences increase as the degree of selectivity increases. In the second approach, I include height selectivity and migration likelihood as continuous to assess the relationship between selectivity and infant birth weight among Nigerian immigrants and test whether it explains nativity differences in infant birth weight. BMI selectivity is included as categorical in this analysis because of the non-linear relationship between BMI and health outcomes.

BMI and height selectivity are standardized using z-scores based on the distribution of Nigerian non-migrant births among women 18-49 years old (Riosmena et al. 2017). In the NDHS and California birth records, I calculated BMI by dividing pre-pregnancy weight in kilograms by height in square meters (World Health Organization 2019). BMI scores ranged from 11.4 to 82.7 in the California sample and 12.1 to 59.6 in the NDHS sample. Height was measured in meters and ranged from 0.82 to 2.08 meters in the California sample and 0.81 to 2.0 in the NDHS sample. I computed a BMI selectivity score that represents the difference in BMI of a Nigerian immigrant and the median BMI among Nigerian non-migrants, then standardized each score using the standard deviation of BMI among Nigerian non-migrants. BMI selectivity scores ranged from -2.12 to 6.43 standard deviations, with an interquartile range of 1.31 standard deviations.

Height selectivity scores were calculated using the same computation. Height selectivity scores ranged from -5.91 to 7.65 standard deviations with an interquartile range of 1.13 standard deviations. When the BMI or height selectivity score is 0 among Nigerian immigrants, it indicates that an immigrant has the same BMI or height as the median among Nigerian non-migrants and thus is not selected on that characteristic. Alternatively, I interpret positive values as migrant selectivity. Negative values indicate that an immigrant has a worse BMI or height selectivity compared to Nigerian non-migrants.

The final selectivity measure simultaneously considers multiple dimensions of selectivity: health (BMI), education, early life conditions (height), and age. I first combined the Nigerian immigrant women from the birth records and the Nigerian non-migrants into a single sample. On this combined sample, I then used logistic regression to estimate the odds of migration for Nigerian immigrants compared to Nigerian non-migrants as a function of age, education, BMI, and height. Then I calculated the predicted probability of migration, where Nigerian immigrants with a lower probability of migration (i.e., similar odds of migration as a Nigerian non-migrant net of age, education, BMI and height) are less selected, and those with a higher probability of migration are more selected. This method has been used in other studies to estimate migration likelihood among non-migrants who remain in the countries of origin (Buttenheim et al. 2010; Ro and Fleischer 2014). In both studies, a household migration variable was computed by regressing household migration history on age and education (along with other relevant variables) using logistic regression, followed by a calculation of the predicted probability of migration. In this study, Nigerian immigrant migration likelihood scores ranged from 0.0 to 1.0 with an interquartile range of 0.34.

Maternal and infant characteristics. The main individual-level predictor was nativity status. I included nativity as dichotomous, where Nigerian immigrants were coded as 1, and US-born black women were coded as the referent group. I control for sociodemographic and health characteristics that are established as important predictors of perinatal health, following previous studies of infant birth weight (Elo et al. 2014; Kane, Teitler, and Reichman 2018; Osypuk, Bates, and Acevedo-Garcia 2010). The maternal characteristics include: maternal age as a categorical variable (1 = 18 - 24, 2 = 25 - 34, 3 = 35 years or older), educational attainment (1 = less than high school, 2 = high school graduate 3 = some college or more), and insurance coverage at the time of delivery (0 = Medicaid, 1 = Private insurance), prenatal care initiation (0 = 1st trimester, 1 = 2nd trimester or later). Infant characteristics include infant sex (0 = female, 1 = male) and parity (1 = first live birth, 2= 2nd live birth, 3 = third or more). I also included measures of maternal health/health behavior including pre-pregnancy BMI the BMI weight categories (1= Underweight: Under, 2= Normal, 3 = Overweight, 4 = Obese) and pre-pregnancy smoking behavior (0 = 0 cigarettes/day, 1 = at least 1 cigarette/day). In the analyses, I center BMI using the median for Nigerian immigrant and US-born black women in the California sample.

Data Analysis

To compare the distributions of birth weight across US-born blacks, Nigerian immigrants living in the United States, and Nigerian non-migrants, I first combined California birth records with NDHS data on Nigerian non-migrants. I then graphed the distribution of infant birth weight for US-born black women, Nigerian immigrants and Nigerian non-migrants for which I had infant birth weight data using kernel densities. Next, using the same combined dataset I examined the maternal and infant characteristics of US-born black women, Nigerian immigrants, and Nigerian non-migrants with complete demographic data.

To examine whether migrant selection contributes to the nativity difference in infant birth weight, I created a categorical variable in which US-born were coded as the reference group and Nigerian immigrants was were classified into quartiles of selectivity: Low, Medium, High, and Highest. This coding approach enables important comparisons. First, if migrant selection is the driving force behind the nativity advantage, I would expect the smallest differences in birth weight between infants of Nigerian immigrants with low selectivity and infants of US-born blacks. Similarly, I would expect higher levels of selectivity to follow a gradient pattern where the largest differences in birth weight is between infants of Nigerian immigrant with the highest selectivity and infants of US-born blacks. However, in the case of BMI selectivity, the largest nativity differences would occur among Nigerian immigrants with a the most optimal BMI (e.g. normal BMI). Alternatively, the smallest nativity differences would occur among Nigerians in a high-risk BMI category (e.g. underweight or obese). To test this, I used OLS regression to estimate the difference in infant birth weight between US-born black women and Nigerian immigrants at each level of selectivity net of maternal and infant characteristics. Then, I tested for significant differences between the coefficients at each level of selectivity, using a Wald test with Bonferroni adjustment of the p-values for six pairwise comparisons.

As an alternative to the categorical coding of migrant selectivity, I model height selectivity and migration likelihood as continuous using conditionally relevant variables in OLS regression models. Unlike the categorical coding of migrant selection, this formulation of migrant selection helps understand how a unit increase in migrant selectivity contributes to

Nigerian immigrant birth weight. This variable can then be included in multivariate analyses with nativity status, to assess if nativity differences are attenuated. Conditionally relevant variables have been used in other studies to examine predictors that pertain to some observations but are irrelevant or implausible for others, which presents a type of missing data where values are undefined for a subgroup of observations (Dziak and Henry 2017; Gee et al. 2008; Ross and Mirowsky 1992). In this study, migrant selectivity is missing among US-born blacks given their status as neither migrant nor non-migrant. Instead of coding migrant selectivity as missing among US-born black women, I code their migrant selectivity as 0, and interact migrant selectivity scores with nativity status while omitting the main effect variable for selectivity to allow for the inclusion of US-born black women (otherwise these models would be subject to collinearity). I accomplished this by computing and interaction term for each migrant selection measure (e.g. height selectivity = nativity x height selectivity score) that corresponds to Nigerian immigrant women only. For BMI selectivity, I interact each quartile of BMI selectivity scores with nativity status and use the lowest level of BMI selectivity among Nigerian immigrant women as the referent category.

Equation (1) represents a simplified model for this analysis, with birth weight (Y) regressed on nativity and migrant selection (*Selectivity*), where nativity = 0 for US-born black women, nativity = 1 for Nigerian immigrant women, and selectivity = 0 for US-born black women. Equation (2) reformulates equation (1) in its conditionally relevant form, adjusting for all maternal and infant covariates. In equation (2), $\beta_{0,\,FB} = \beta_0 + \beta_1$ from equation (1) and $\beta_{0,\,USB} = \beta_0$ from equation (1).

$$Y = \beta_0 + \beta_1 Nativity + \beta_2 Nativity\ x\ Selectivity + e \quad (1)$$

$$Y = \begin{cases} \text{when nativity status} = 1: \\ \beta_{0,FB} + \beta_2 Nativity\ x\ Selectivity + \beta_3 Age + \beta_4 Educ + \beta_5 Coverage + \beta_6 Sex + \beta_7 Parity + \beta_8 Smoke + \beta_9 BMI + e \\ \text{Otherwise:} \\ \beta_{0,USB} + \beta_3 Age + \beta_4 Educ + \beta_5 Coverage + \beta_6 Sex + \beta_7 Parity + \beta_8 Smoke + \beta_9 BMI + e \end{cases} \quad (2)$$

The coefficients in equation (2) are now representative of the appropriate comparisons. For example, $\beta_{0,\ FB}$ is the average infant birth weight among first-born, female infants to Nigerian immigrant women who have a selectivity score of 0 (not different from Nigerian non-migrants) and are 18 – 24 years of age, with less than a high school education, Medicaid coverage, began prenatal care in the 1st trimester and have a normal BMI. $\beta_{0,\ USB}$ can be interpreted as the average infant birth weight among first-born female infants to US-born black women with the same base characteristics as described above. β_1 is interpreted as the difference in birth weight between infants of US-born black and Nigerian immigrant women, when Nigerian immigrant selectivity is 0, holding all other maternal and infant characteristics constant. Thus, this coefficient represents the nativity advantage. Lastly, β_2 is interpreted as the difference in birth weight per unit increase in selectivity, among Nigerian immigrant women only. This is the coefficient that measures migrant selection. For each model, I examined multicollinearity among the migrant selection predictors and maternal characteristics, by assessing the variance inflation factors. To help with interpretation of the nativity and selectivity coefficients, I then plot the linear prediction of infant birth weight among for Nigerian immigrant women for the full range of selectivity scores in the sample.

RESULTS

Descriptive Characteristics

Figure 4.1 depicts the distribution of infant birth weights for US-born black women, Nigerian immigrant women, and non-migrant Nigerian women. While there is considerable overlap in the distributions, Nigerian immigrants have heavier infants (median = 3,402 g) compared to Nigerian non-migrant women (median = 3,200 g) and US-born black women (median = 3,197 g) who have similar birth weight distributions.

Table 4.1 describes the maternal and infant characteristics for US-born black women, Nigerian immigrant women, and Nigerian non-migrant women. I provide the characteristics of the unweighted sample of Nigerian non-migrants for reference. At the time of birth, in general Nigerian immigrant women are older and more likely to be between the ages of 25 - 34 (63%) compared to US-born black women (44%) and Nigerian non-migrants (52%). Nigerian immigrant women are also more educated than both US-born black women and Nigerian non-migrants. For instance, 87% of Nigerian immigrant women have more than a high school education compared to 48% of US-born black women and 6% of Nigerian non-migrant women. Nigerian immigrant women are also more likely to have private insurance coverage at the time of delivery (58%), compared to US-born black women (39%) and less likely to be a smoker three months before pregnancy compared to US-born black women (0.2% vs. 7%). Nigerian non-migrant women have lower BMI (23.3) than both Nigerian immigrants (26.6) and US-born black women (27.4). Sixty-three percent of Nigerian non-migrants have 3 or more live births compared to 35% of Nigerian immigrant and 33% US-born black women. Mean birth weight is lowest among US-born black women (3152.8, SD = 611.7) and highest among Nigerian immigrant women (3372.3, SD = 631.5). Nigerian non-migrants are in between with a mean infant birth weight of 3365(716.6).

Low birth weight prevalence is highest among infants US-born black women (10.3), while infants of Nigerian immigrant women have the lowest prevalence of low birth weight (6.5%). In Table 4.2, I include the range of selectivity scores for each measure of selectivity. As mentioned, I categorize each measure into quartiles to capture variation in the degree of selectivity among Nigerian immigrant women. For instance, the lowest quartile of BMI selectivity captures Nigerian immigrants with a BMI that is lower than or roughly equal to the median BMI of Nigerian non-migrants (lowest quartile range = -2.12 - 0.17). Scores in the highest quartile have the largest differences in BMI compared to Nigerian non-migrants (highest quartile = 1.49 – 6.43). I consider these Nigerian immigrants to be the most selected.

Nativity Differential by Degree of Migrant Selection

The linear regression results modeling the nativity difference in infant birth weight at each level of migrant selectivity are presented in Table 4.3. In these models, I include each migrant selection measure as a factor variable using the quartiles of selectivity and US-born black women as the reference category, to test whether the nativity difference infant birth weight persists at each level of migrant selectivity. In model 1, net of all maternal characteristics, Nigerian immigrant infant birth weight is significantly different from US-born black infant birth weight, and this persists at every level of BMI selectivity. For example, the difference in infant birth weight between US-born black women and Nigerian immigrant women with the lowest degree of BMI selectivity is 115g ($b = 130.3$, $p < 0.001$). At the next level of BMI selectivity (medium), the nativity difference in infant birth weight is 207g ($b = 207.2$, $p < 0.001$). Nigerian immigrants with high BMI selectivity have an infant birth weight that is 206g higher than that of US-born black women ($b = 205.7$, $p < 0.001$). Among Nigerian immigrant women with the highest level of BMI selectivity, the nativity difference in infant birth weight is 165g ($b = 165.4$, $p < 0.001$). The pattern of nativity differences at each level of BMI selectivity suggest that nativity advantage is largest among Nigerian immigrant women with normal or overweight BMI (see table 4.2 for range of BMI at each level of selectivity). Nigerian immigrant women with the lowest nativity advantage also has lower BMI.

Nativity differences in infant birth weight are also significant at every level of height selectivity, though compared to BMI selectivity the magnitude of the nativity advantage appears to be increase as height selectivity increases (model 2). For instance, net of maternal and infant characteristics, Nigerian immigrants at the lowest level of height selectivity have an infant birth weight that is 108g ($b = 107.6$, $p < 0.001$). At the highest level of height selectivity, the nativity difference in birth weight is 310g ($b = 309.8$, $p < 0.001$). For migration likelihood, the nativity difference in infant birth weight is significant at all levels of migration likelihood (model 3). However, the magnitude of nativity differences in birth weight is different than the other two selectivity measures. At the lowest level of migration likelihood, Nigerian immigrant women have an infant birth weight that is 120g higher than the infant birth weight of US-born black women ($b = 120.2$, $p < 0.001$). Among Nigerian immigrant women with the highest migration likelihood infant birth weight is 304g higher than infant birth weight of US-born black women ($b = 304.2$, $p < 0.001$). Interestingly, among Nigerian immigrant women with medium migration likelihood (2nd quartile), the nativity difference is 79g—the smallest nativity difference across all measures and levels of selectivity ($b = 78.7$, $p < 0.01$).

The results of this analysis indicate that the nativity difference in infant birth weight persists at all levels of selectivity, but that the magnitude of the differences varies across domains of migrant selection. Figure 4.2 visually depicts these nativity differences at each level of selectivity for the three measures (selectivity coefficients in models 1 – 3). If migrant selection drives nativity differences in birth weight, there would be significant increases in the nativity difference as the degree of selectivity increases. For BMI selectivity, the nativity difference increases between the lowest level and the medium level but does not increase much between the other levels of BMI selectivity. The nativity differences at each level of height selectivity and migration likelihood however show a more consistent gradient, except for the second level of migration likelihood. To test whether the nativity differences at each level of selectivity are significantly different from each other, I conduct pairwise Wald tests, adjusting for multiple comparisons (Table 4.4). The results indicate that none of the nativity differences in birth weight at each level of BMI selectivity are significantly different from each other. The only significant nativity differences in infant birth weight for height selectivity are between the lowest and highest levels (Q1 vs. Q4), and the medium and highest (Q2 vs. Q4) levels of height selectivity. The same patterns hold for migration likelihood.

Nativity Differential and Migrant Selection among Nigerian immigrants

Results from the regression models which include migrant selectivity as continuous and conditionally relevant variables are presented in Table 4.5. The purpose of this analysis is to examine the relationship between migrant selectivity and nativity differences in infant birth weight, by accounting for the extent that migrant selectivity contributes to birth weight among Nigerian immigrant women. In model 1, the unadjusted coefficient for nativity indicates that

Nigerian immigrant women have an average infant birth weight that is 219g higher than that of US-born black women (3,153g). In model 2, after adjusting for maternal and infant characteristics, infants born to Nigerian immigrant women weigh about 177g more than infants born to US-born black women (b = 176.6, $p < 0.001$). Model 2 indicates that there is a significant difference in infant birth weight between Nigerian immigrants and US-born blacks, even when they have the same base profile: i.e., having a first-born female infant, being18-24 years of age with less than a high school education, having Medicaid insurance coverage, beginning prenatal care in the first trimester, being a non-smoker before pregnancy, and a normal pre-pregnancy BMI.

In model 3, I additionally adjust for BMI selectivity among immigrant women. BMI selectivity is a standardized z-score of Nigerian immigrant BMI, relative to the median BMI of Nigerian non-migrants. In this analysis, BMI selectivity is included as a categorical variable where Nigerian immigrants in the lowest quartile of selectivity are set as the referent group. The BMI selectivity coefficients indicate that among Nigerian immigrant women, there is no significant difference in infant birth weight between Nigerian immigrants in the lowest quartile of selectivity and the second quartile of selectivity (b = 76.9, p = 0.10). Similarly, there are no significant differences in infant birth weight between Nigerian immigrants with the lowest level of selectivity and those with high (b = 75.4, p = 0.10) or the highest level of selectivity (b = 35.1, p = 0.45). Including BMI selectivity in the model has little impact on the association between nativity status and infant birth weight, which means that there is still a significant difference in infant birth weight between US-born black women and Nigerian immigrant women who are not selected on BMI (e.g., they have the same BMI as Nigerian non-migrants) and have the same base profile as US-born black women.

In model 4, I adjust for height selectivity among Nigerian immigrant women. Like BMI selectivity, height selectivity is a standardized z-score of Nigerian immigrant height relative to the median height of Nigerian non-migrants. In this model, the height selectivity coefficient indicates that for Nigerian immigrant women there are significant differences in infant birth weight as height selectivity increases, where a one standard deviation increases in height selectivity results in a 70g increase in infant birth weight ($b = 70$, $p < 0.001$). The nativity coefficient in model 4 also shows that adjusting for height selectivity among Nigerian immigrant women lowers the difference in infant birth weight between Nigerian immigrant women who are not selected (height selectivity = 0) and have the same base profile as US-born black women ($b = 78.4$, $p < 0.001$). This suggests that while height selectivity may mediate the relation between birth weight and nativity, it does not do so entirely.

Lastly, in model 5 I adjust for migration likelihood among Nigerian immigrants. Migration likelihood is a score that represents the probability of migration among Nigerian immigrants and Nigerian non-migrants as a function of different domains of selectivity including BMI, height, age and education. The coefficient for migration likelihood shows that there are significant differences in infant birth weight among Nigerian immigrants per unit increase in migration likelihood scores, where a 1-unit increase in the probability of migration yields a 265g increase in infant birth weight ($b = 264.8$, $p < 0.001$). After adjusting for migration likelihood, there is no significant difference between infant birth weights of US-born black women and Nigerian immigrant women who are not selected and have the same base characteristics.

Figure 4.3 illustrates the results of models (2) – (5) by displaying the predicted infant birth weight for Nigerian immigrants as selectivity increases (blue line). I include the estimated baseline infant birth weight of US-born black women for reference (red line). In the figure for BMI selectivity, there are no significant differences in infant birth weight for Nigerian immigrant at any level of BMI selectivity. As the model for height selectivity suggests (model 3), there is a significant difference in infant birth weight between Nigerian immigrants and US-born black women, when Nigerian immigrant selectivity is 0. The figure for height selectivity shows that the nativity difference between infant birth weight decreases when selectivity is 0 for Nigerian immigrants, and there are significant increases in birth weight as height selectivity increases among Nigerian immigrants. When probability of migration is 0 among Nigerian immigrants, there are no significant nativity differences in in infant birth weight net of other maternal and infant characteristics. However, Wald tests at each level of migration likelihood suggest that once the probability of migration reaches 10% among Nigerian immigrants, there are significant nativity differences in infant birth weight ($F_{(1, 67,107)} = 5.29$, $p < 0.05$).

In each model, age (35 years and older), education, type of insurance coverage, infant sex, parity, pre-pregnancy smoking status, and pre-pregnancy BMI are significant predictors of infant birth weight. I examined the variance inflation factor scores (VIF) of each predictor to assess multicollinearity. All VIF values were under the recommended threshold of 10.0, indicating that the predictors in each model are uniquely associated with birth weight.

DISCUSSION

This chapter aimed to examine whether migrant selection contributes to nativity differences in infant birth weight. I explored three different domains of migrant selection: health status, early life conditions and migration likelihood. My central hypothesis was that if migrant selection was associated with nativity differences in infant birth weight, the smallest nativity differences would be among Nigerian immigrant women with the lowest selectivity and the largest difference would be seen among immigrant women with the highest selectivity. To test this, I used binational data to score Nigerian immigrants based on how different their BMI, height and migration likelihood are from Nigerian non-migrants. Then I used these selectivity scores to explain differences in infant birth weight between US-born black women and Nigerian immigrant women. I used two different approaches to test the hypothesis that migrant selectivity contributes to the nativity difference in infant birth weight.

First, I examined whether the nativity differential in infant birth weight persisted at different levels of migrant selection, for each domain of selection. I found that for each measure of selection, the nativity differential is significant across all levels of selectivity, though the magnitude of each differential varied across each measure. In other words, the nativity advantage persists regardless of how selected Nigerian immigrants are relative to Nigerian non-migrants. I also examined whether the nativity advantage increased as the degree of selectivity increased. For BMI selectivity the pattern suggests that the nativity advantage in infant birth weight is largest among Nigerian immigrants with selectivity scores that place them in the Normal BMI range. Nigerian immigrants with selectivity scores that place them in underweight BMI range had the smallest nativity advantages. Here, these patterns offer a crude indication that those with the healthiest BMI have the largest nativity advantages. For height selectivity and migration likelihood significant increases in the nativity differential were only present at certain levels of selectivity. Thus, overall, I found some support my hypothesis on whether the nativity advantage increases as migrant selection increases.

Next, I examined whether the relation between migrant selectivity and birth weight among Nigerian immigrants, contributed to nativity differences in infant birth weight. This method offered a more precise approach, as it assesses per unit changes in migrant selection and infant birth weight instead of categorical comparisons of nativity differences in infant birth weight. Like the results from the first analysis, I found that the relation between BMI selectivity does not differ among Nigerian immigrants and has no impact on nativity differences in infant birth weight. However, for height selectivity, increases in selectivity are associated with significant increases in infant birth weight among Nigerian immigrant women. Adjusting for this relationship did lower the magnitude of the nativity difference in infant birth weight, though it remained significant. Lastly, increases in migration likelihood are associated with increases in birth weight among Nigerian immigrant women. For Nigerian immigrant women who had a migration likelihood of 0, there were no significant differences in infant birth weight compared to US-born black women.

Because this study is the first to examine migrant selection among Nigerian immigrants to explain nativity differences in health, comparisons with other studies are limited. However, my null findings on health selectivity and infant birth weight are similar to Ro et al’s (2016) null findings on the association between health selection and nativity differences in self-rated health. However, the findings on migration likelihood, and to some extent height selectivity depart from the findings of this study.

The null findings of BMI selectivity and the nativity advantage in infant birth weight may also stem from the inclusion of maternal pre-pregnancy BMI in fully adjusted models. It is possible that BMI selectivity is correlated with pre-pregnancy BMI, such that Nigerian immigrants with the highest BMI selectivity compared to Nigerian non-migrants are also going to have a high BMI relative to US-born black women. Here, adjusting for pre-pregnancy BMI may reduce the explanatory power of BMI selectivity. Nonetheless, my regression diagnostic analyses confirm that these two constructs although related, are still distinct.

I also found that nativity differences in birth weight are significant at all levels of migrant selection, but there is minimal evidence for gradients in the nativity advantage that relate to degree of migrant selection, as these patterns only hold at certain levels of migrant selection. These patterns indicate that the nativity advantage is robust, regardless of the degree of migrant selection, but particularly as it relates to height selectivity and migration likelihood, high levels of selection are related to significantly larger nativity differences among Nigerian immigrants. This suggests that social and human capital are important domains of migrant selection in this population, perhaps more so than being healthy enough to migrate. Future studies should assess whether the same differences in selection hold across various domains of migrant selection for other immigrant groups.

There are some limitations to this study. First, I use measures of migrant selection that are highly correlated with infant birth weight. For instance, taller women are more likely to give birth to infants who weigh more. Thus, part of the explanatory power of height selectivity may be related to confounding. Second, although I model BMI selectivity as categorical in each analysis, the BMI selectivity scores may not accurately capture migrants who are selected (e.g. are in the optimal BMI range) relative to non-migrants. The results, should be interpreted with caution because Nigerian immigrants with the highest selectivity scores relative to the Nigerian non-migrant distribution, are also those with the highest BMI (e.g. are in a poor BMI range). Future studies of nativity differences in birth outcomes may consider other health measures, but this is challenging given that heterogeneity in health indicators among birth records (the most generalizable source of birth data) is limited. However, this limitation is partially offset by the inclusion of migration likelihood in this study. This measure of migration likelihood predicted the probability of migration as a function of age, educational attainment, BMI and height. Therefore, it is likely the most reliable measure of selectivity for this health outcome and population given the inclusion of sociodemographic characteristics that reflect significant differences between Nigerian migrants and non-migrants.

Second, I only consider nativity differences in infant birth weight using a small sample of Nigerian immigrants, which may not be generalizable to African immigrants from different countries or black immigrants at large. Future studies will need to consider a more generalizable population of black immigrants to assess whether migrant selection contributes to the nativity advantage in infant birth weight. Nonetheless, my country-specific focus in this study builds on the existing literature which uses binational comparisons of migrant selection by examining an understudied immigrant population. Lastly, my findings provide supporting evidence to other studies that associate nativity advantages in black birth outcomes with migrant selection but do not empirically test them using binational comparisons.

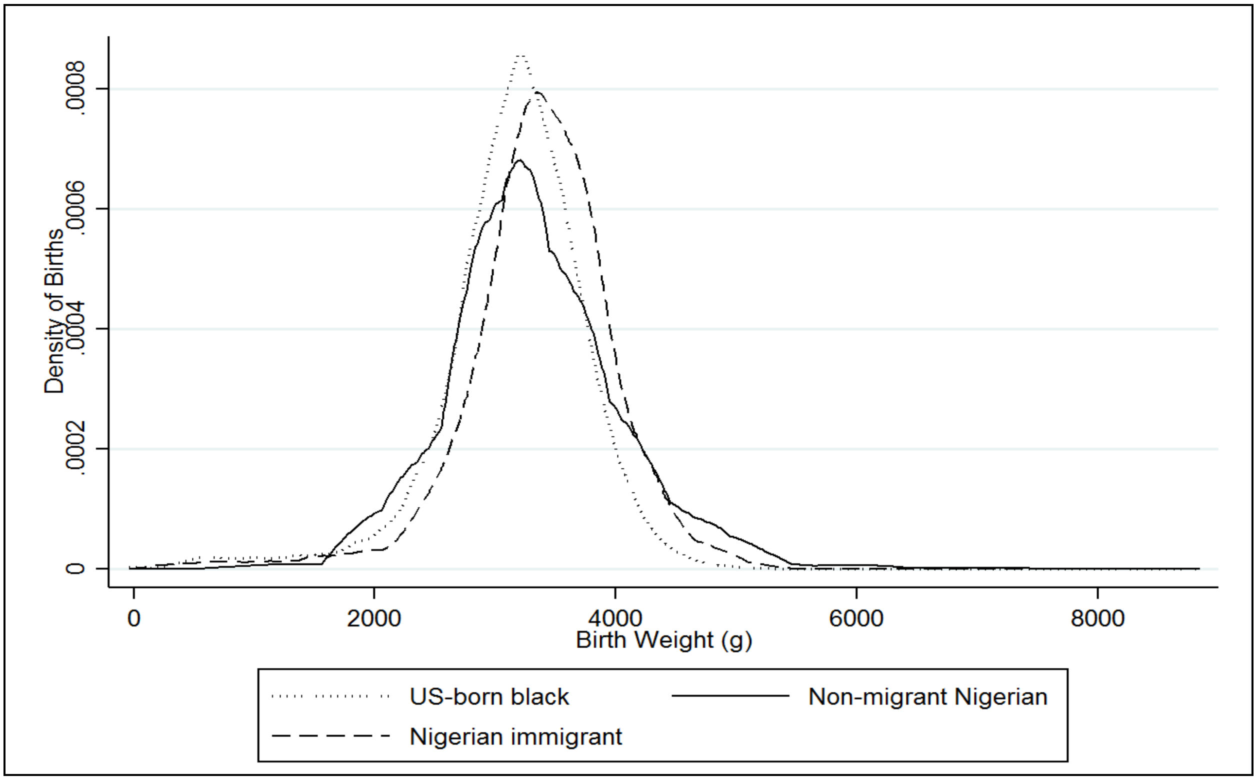

Figure 4.1. Kernel density of infant birth weight for US-born black women, Nigerian immigrant women, and Nigerian non-grant women. *Note*: Nigerian non-migrant sample includes only births with reported birth weight (n = 3,376).

Table 4.1. Descriptive characteristics of US-born black, Nigerian immigrants and Nigerian non-migrants.

	US-born black (N = 65,804)	Nigerian immigrant (N=1, 319)	Nigerian non-migrant (N = 30,964)	Nigerian non-migrants, unweighted sample (N = 21,022)
Maternal Age (%)				
18 - 24	43.7	4.2	16.1	15.8
25 - 34	44.2	62.9	51.8	51.7
35+	12.1	32.9	32.1	32.5
Educational Attainment (%)				
Less than HS	14.1	1.7	80.0	79.8
HS	37.8	11.5	14.4	14.3
Higher	48.2	86.8	5.6	5.9
Infant sex (%)				
Male	50.8	50.9	50.6	50.4
Insurance coverage (%)				
Private	39.1	58.2	--	--
BMI (%)				
Underweight	3.9	2.4	8.0	8.1
Normal	39.8	37.8	65.2	64.7
Overweight	26.3	39.2	19.2	19.5
Obese	30.1	20.6	7.6	7.7
Prenatal Care Initiation (%)				
1st trimester	79.5	81.0	--	--
2nd trimester or later	20.5	19.0		
Pre-pregnancy smoking (%)				
Smoker	6.9	0.2	0.2	0.2
Parity				
1st live birth	39.3	35.0	19.5	19.5
2nd live birth	27.9	29.6	17.6	17.4
3rd or more	32.8	35.4	62.9	63.1
Birth weight, g (SD)	3152.8 (611.7)	3372.3 (631.5)	3365.0 (716.5)	3366.8 (712.3)
Low birth weight (%)	10.3	6.5	6.3	5.7

Table 4.2. Range of Nigerian immigrant selectivity scores by degree of selectivity.

	BMI Selectivity		Height Selectivity		Migration Likelihood
Quartile	Score Range	BMI (kg/m^2) range	Score Range	Height (m) range	Score Range
Low	-2.12 - 0.17	13.0 – 23.3	-5.92 - 0.71	1.22 – 1.63	0.0 – 0.34
Medium	0.18 - 0.74	23.3 – 25.9	1.03 – 1.52	1.65 – 1.68	0.35 – 0.54
High	0.76 – 1.48	25.9 – 29.1	1.84 – 1.84	1.70 – 1.70	0.55 – 0.68
Highest	1.49 – 6.43	29.2 – 51.3	2.33 – 7.65	1.73 – 2.06	0.69 – 1.00

Table 4.3. OLS Regression results for nativity differences in birth weight by degree of selectivity (N = 67,123).

	Model 1	Model 2	Model 3
BMI selectivity (ref = US-born black)			
Low (Q1)	130.3 (32.9) ***		
Medium (Q2)	207.2 (33.9) ***		
High (Q3)	205.7 (32.7) ***		
Highest (Q4)	165.4 (32.9) ***		
Height selectivity (ref = US-born black)			
Low (Q1)		107.6 (29.5) ***	
Medium (Q2)		125.4 (30.8) ***	
High (Q3)		193.8 (43.0) ***	
Highest (Q4)		309.8 (32.7) ***	
Migration Likelihood (ref = US-born black)			
Low (Q1)			120.2 (32.4) ***
Medium (Q2)			78.7 (34.1) **
High (Q3)			197.9 (32.6) ***
Highest (Q4)			304.2 (32.9) ***
Age (ref = 18 - 24)			
25 - 34	-9.1 (5.8)	-9.3 (5.8)	-9.1 (5.8)
35+	-66.3 (8.5) ***	-65.6 (8.5) ***	-64.9 (8.5) ***
Education (ref = Less than HS)			
HS/GED	45.0 (7.5) ***	45.1 (7.5) ***	45.2 (7.5) ***
Higher	70.8 (7.7) ***	70.6 (7.7) ***	70.4 (7.7) ***
Insurance coverage (ref = Medicaid)			
Private	70.5 (5.2) ***	70.3 (5.2) ***	70.2 (5.2) ***
Infant sex (ref = Female)			
Male	-113.7 (4.6) ***	-113.7 (4.6) ***	-113.6 (4.6) ***
Parity (ref = 1st live birth)			
2	68.8 (5.8) ***	68.7 (5.8) ***	68.6 (5.8) ***
3 or more	56.9 (6.3) ***	56.9 (6.3) ***	56.8 (6.3) ***
Prenatal Care Initiation (ref = 1st trimester)			
2nd trimester or later	-5.8 (5.8)	-5.6 (5.8)	-5.6 (5.8)
Pre-pregnancy smoking status (ref = non-smoker)			
Smoker	-116.1 (9.2) ***	-116.2 (9.2) ***	-116.3 (9.2) ***
Pre-pregnancy BMI (ref = Normal)	7.2 (0.3) ***	7.3(0.3) ***	7.3 (0.3) ***
Underweight	-120.9 (12.4) ***	-121.5 (12.4) ***	-121.4 (12.4) ***
Overweight	68.8 (5.9) ***	69.9 (5.8) ***	69.8 (5.8) ***
Obese	101.1 (5.7) ***	101.5 (5.6) ***	101.3 (5.6) ***
Constant	3106.5 (7.4) ***	3106.5 (7.4) ***	3106.6 (7.4) ***

Note. Standard errors in parentheses. Significance denoted as: * p<0.05, ** p<0.01, *** p<0.001

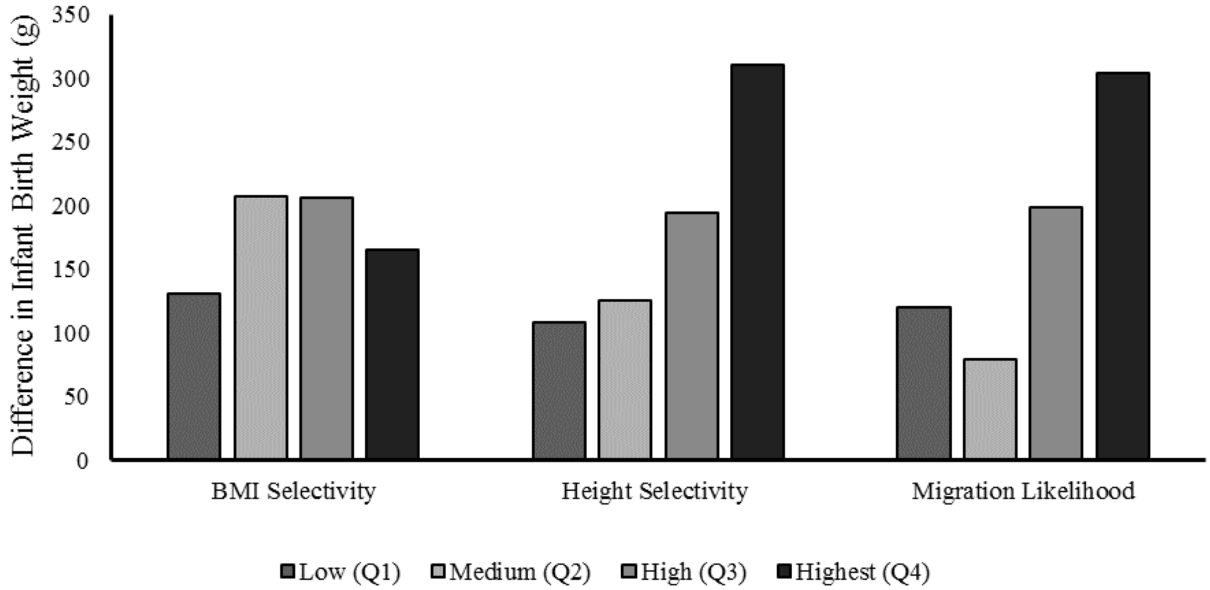

Figure 4.2. Comparison of the nativity differential in birth weight by level of migrant selectivity, adjusted for maternal covariates. Note: These values correspond to the adjusted coefficients for each selectivity measure in Table 4.3.

Table 4.4. Wald test results (Bonferroni-adjusted p-values) comparing difference in birth weight (US-born v. Nigerian immigrant) by degree of migrant selection.

	BMI Selectivity	Height Selectivity	Migration Likelihood
Low - Medium	0.61	1.00	1.00
Low - High	0.61	0.68	0.54
Low - Highest	1.00	< 0.001	< 0.001
Medium - High	1.00	1.000	0.07
Medium - Highest	1.00	< 0.001	< 0.001
High - Highest	1.00	0.19	0.13

Bonferroni correction for significance levels of 6 pairwise comparisons: 0.05/6 = 0.008

Table 4.5. Linear regression results of migrant selectivity and nativity differential in birth weight (N = 67,123).

	Model 1	Model 2	Model 3	Model 4	Model 5
Nativity (ref: US-born black)					
Nigerian immigrant	219.4 (14.0) ***	176.6 (16.8) ***	130.3 (32.8) ***	78.4 (26.9) ***	46.7 (36.6)
Nativity x BMI selectivity (Q1 vs. Q2)			76.9 (47.0)		
Nativity x BMI selectivity (Q1 vs. Q3)			75.4 (46.2)		
Nativity x BMI selectivity (Q1 vs. Q4)			35.1 (46.5)		
Nativity x Height selectivity				70.0 (15.0) ***	
Nativity x Migration likelihood					264.8 (66.2) ***
Age (ref: 18 - 24)					
25 - 34		-9.3 (5.8)	-9.1 (5.8)	-9.2 (5.8)	-8.9 (5.8)
35+		-66.0 (8.4) ***	-66.3 (8.4) ***	-65.5 (8.4) ***	-64.9 (8.5) ***
Education (ref: Less than HS)					
HS/GED		45.0 (7.5) ***	45.0 (7.5) ***	45.1 (7.5) ***	45.4 (7.5) ***
Higher		70.8 (7.7) ***	70.8 (7.7) ***	70.6 (7.7) ***	69.8 (7.7) ***
Insurance coverage (ref: Medicaid)					
Private		70.5 (5.2) ***	70.5 (5.2) ***	70.3 (5.2) ***	70.2 (5.2) ***
Infant sex (ref: Female)					
Male		-113.7 (4.6) ***	-113.7 (4.6) ***	-113.6 (4.6) ***	-113.7 (4.6) ***
Parity (ref: first live birth)					
2nd		68.9 (5.8) ***	68.8 (5.8) ***	68.7 (5.8) ***	68.7 (5.8) ***
3 or more		57.1 (6.3) ***	56.9 (6.3) ***	56.8 (6.3) ***	56.8 (6.3) ***
Prenatal care initiation (ref = 1st trimester)					
2nd trimester or later		-5.8 (5.8)	-5.8 (5.8)	-5.5 (5.8)	-5.6 (5.8)
Pre-pregnancy smoking status (ref: non-smoker)					
Smoker		-116.1 (9.2) ***	-116.1 (9.2) ***	-116.2 (9.2) ***	-116.4 (9.2) ***
Pre-pregnancy BMI (ref = Normal)					
Underweight		-121.1 (12.4) ***	-120.9 (12.4) ***	-121.6 (12.4) ***	-121.5 (12.4) ***
Overweight		69.8 (5.8) ***	68.8 (5.9) ***	69.9 (5.8) ***	69.8 (5.8) ***
Obese		101.3 (5.6) ***	101.1(5.7) ***	101.6 (5.6) ***	101.3(5.6) ***
Constant	3,152.9 (2.1) ***	2,964.5 (8.1) ***	2,964.8 (8.1) ***	2,964.6 (8.1) ***	2,964.9 (8.1) ***

Standard errors in parentheses. Significance denoted as: * p<0.05, ** p<0.01, *** p<0.001

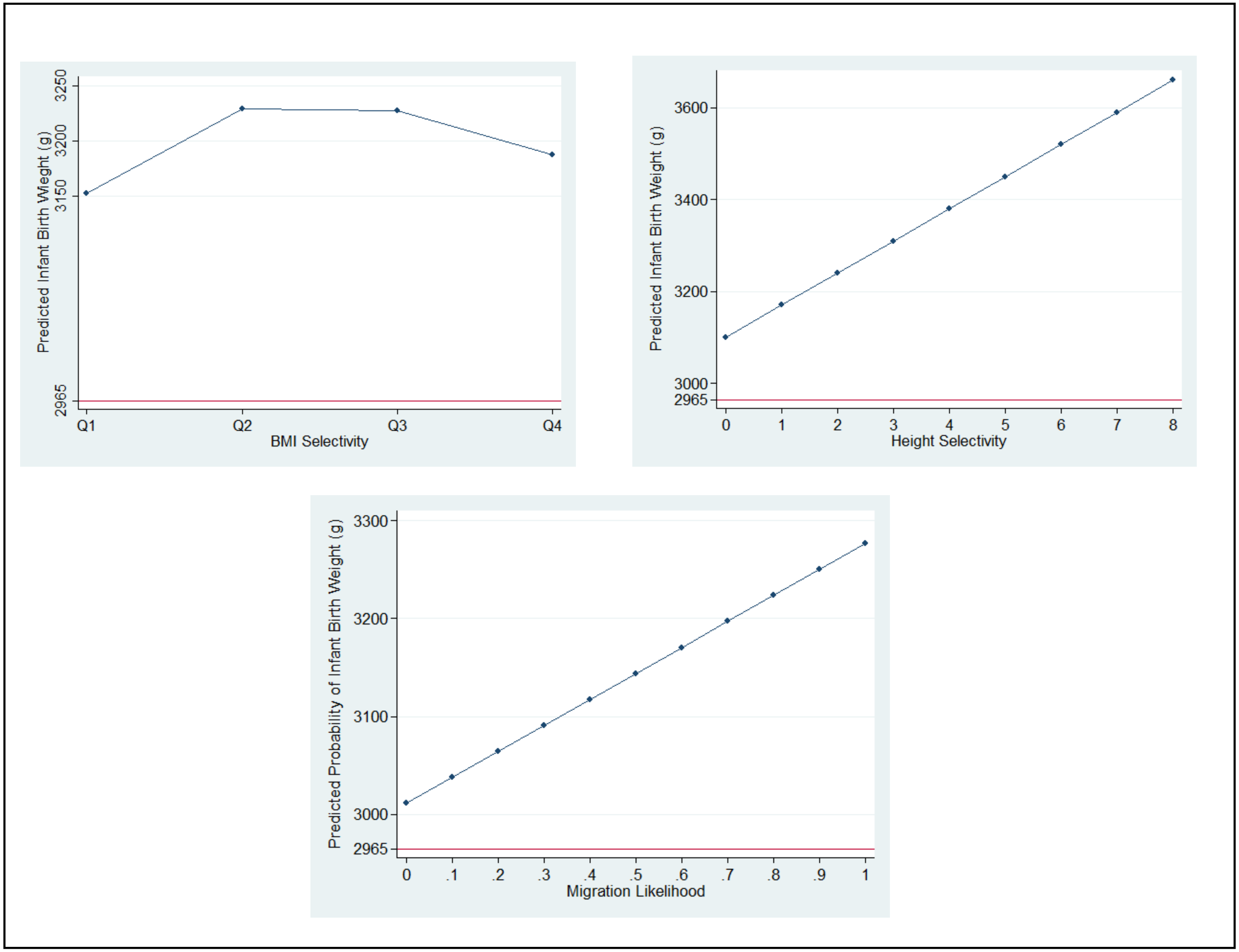

Figure 4.3. Predicted infant birth weight among Nigerian immigrant women by BMI selectivity, height selectivity and migration likelihood. Note. The red line indicates the US-born black infant birth weight (constant) in each fully adjusted model.

CHAPTER 5
CONCLUSION

This dissertation sought to explain the nativity advantage in black birth outcomes. I considered two theoretical explanations for the immigrant health advantage: protective neighborhood contexts and migrant selection. I argued that, in addition to studying the benefits of neighborhood immigrant co-ethnic density among black immigrants, exploration of other neighborhood attributes like racial residential segregation and neighborhood deprivation, which are closely tied with social stratification in the US, are critical for a more comprehensive understanding of the nativity advantage in black birth outcomes. For both US-born blacks and black immigrants, racial residential segregation is an important construct that limits spatial assimilation with predominantly white neighborhoods. However, many studies are limited to settings where neighborhoods are entrenched in residential segregation. This does not offer generalizability to other neighborhoods that are in less segregated areas, like neighborhoods in California. In these areas, black immigrants may be less likely to reside in disadvantaged neighborhoods with high levels of black racial concentration and neighborhood deprivation.

While studies of neighborhood context assess differences in area-level exposure between US- and foreign-born, studies of migrant selection suggest that nativity advantages begin in the country of origin. Here, immigrants are not representative of those left behind in the country of origin but rather are a selected group with better health and characteristics that increase their likelihood of migration. Because nativity differences in birth outcomes of black women are largest among African immigrant women, I argued that they are a highly selected population and examined whether three domains of migrant selection: health, early childhood conditions, and migration likelihood, contribute to the nativity advantage in infant birth weight.

Summary of Findings

In chapter 2, I examined the extent that neighborhood conditions are associated with black preterm birth in California, using three distinct neighborhood attributes (immigrant co-ethnic density, black racial concentration, and neighborhood deprivation) which capture the dueling forces of foreign-born advantage and racial disadvantage in black immigrant enclaves. I found that none of these characteristics are associated with black immigrant preterm birth. While these null results contradict findings of positive associations between preterm birth risk and black immigrant enclaves in New York City, it highlights the importance of considering geographic heterogeneity in neighborhood studies. These findings are important and implicate the significance of merging literature on residential segregation and immigrant enclaves to improve theoretical conceptualizations of immigrant neighborhoods.

In Chapter 3, my objective was to assess the extent that neighborhood context contributed to the nativity advantage in preterm birth among black immigrant women. I tested whether differential exposure to neighborhood attributes is associated with preterm birth among black women accounted for the difference. Similar to existing literature, my results confirm a nativity advantage for black immigrants in California, where black immigrant women are at lower risk for preterm birth and have significantly better demographic and behavioral profiles as reported in existing literature (Elo and Culhane 2010). I also observed distinct region of origin patterns, where African-born immigrants have large nativity advantages, and Caribbean immigrants did not have significant nativity differences in preterm birth risk when compared to

Us-born black women (Vang and Elo 2013). Although the bivariate analyses showed significant variation in exposure to neighborhood conditions by nativity and maternal birthplace, these differences do not explain the nativity advantage. There is also little evidence for differential vulnerability to neighborhood conditions between black immigrants and US-born black women.

In Chapter 4, I focus on migrant selection among a subsample of Nigerian immigrants. I proposed that because African immigrants have the most significant nativity differential compared to Caribbean immigrants, and because they are highly selected on characteristics related to migration (e.g., educational attainment), migrant selection would be a significant contributor to their nativity advantage. Using binational data of Nigerian non-migrants and Nigerian immigrants living in California I created three selectivity measures: BMI selectivity, height selectivity and migration likelihood that reflect different domains of migrant selection. I found some support for the hypothesis that migrant selection explains nativity differences in birth weight, but only when migrant selection is measured as migration likelihood. Migration likelihood completely explains the nativity advantage, but only when migration likelihood is less than 0.10 among Nigerian immigrants. Thus, migrant selection, when measured as the probability of migration as a function of age, education level, BMI and height for migrants compared to non-migrants seems to be the most robust contributor to nativity differences in birth weight between Nigerian immigrants and US-born black women living in the state of California.

Study Implications

The findings of this dissertation have important contributions to the literature. First, my findings show that there are important variations in neighborhood associations with preterm birth when broader patterns of racial residential segregation are considered. These findings complement other studies that call for greater attention to how racial residential segregation selects individuals into regions with certain types of exposures, that may not be replicated in other regions with a different segregation landscape (Osypuk 2013). Lastly, most of the literature examining immigrant health advantages finds that the nativity advantage is robust to maternal characteristics and some neighborhood characteristics. However, few studies consider the role of migrant selection, despite many studies of immigrant health advantages stating that migrant selection contributes to nativity differences in post-migration health. Here, I provide some preliminary empirical evidence that migrant selection may explain the nativity advantage, although I focus on a small subpopulation of Nigerian immigrants.

This research also has important implications for the broader literature on foreign-born black health outcomes. While the health of the foreign-born black population in the US has received considerably more attention over time, there are still several studies that examine the US black population as a homogenous group, which masks essential differences among this population. This is a significant limitation given the growth of the foreign-born population in the US. This study contributes to literature that shows US- and foreign-born black individuals have important similarities and differences in exposures throughout the life course. But more importantly, this study shows that the health of foreign-born blacks is uniquely shaped by factors both in the receiving and sending country context. Future research should consider the interplay of these contexts in the health of foreign-born blacks living in the United States.

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