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Deprivation and Hispanic Health Paradox: Neighborhood Effects on Children's Wheezing in El Paso, Texas

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DEPRIVATION AND THE HISPANIC HEALTH PARADOX:
NEIGHBORHOOD EFFECTS ON CHILDREN'S
WHEEZING OUTCOMES IN
EL PASO, TEXAS

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Young-An Kim

2013

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NEIGHBORHOOD EFFECTS ON CHILDREN'S
WHEEZING OUTCOMES IN
EL PASO, TEXAS

by

YOUNG-AN KIM

THESIS

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Abstract

This study examines the impact of hypothetical health determinants – including objective and relative economic deprivation, as well as foreign-born composition –at the neighborhood-level on respiratory wheezing among Hispanic children in El Paso, Texas while accounting for individual-level covariates based on hierarchical logistic modeling (HLM). Due to El Paso’s majority Latino/a population, focus is placed on the so-called “Hispanic health paradox” through analysis of the impact of neighborhood foreign-born composition on Hispanic children’s wheezing. Neighborhood-level variables at the census tract-level are derived from US Census data. The percent of families in poverty and the GINI coefficient for income (income inequality) are used to measure objective and relative economic deprivation, respectively.

The percent of foreign-born individuals in census tracts is used to operationalize neighborhood foreign-born composition. Individual-level data come from a survey (N=1904) of parents/guardians of fourth and fifth graders in all 58 elementary schools in the El Paso Independent School District. Child’s sex, socioeconomic status, indoor/housing exposures, health behaviors, body mass index, residential duration in El Paso and primary caretaker’s nativity are utilized at the individual-level, since they are well-established determinants of respiratory health outcomes. Due to the focus on neighborhood contextual effects, only Hispanic children living in the same home or within 1 km of that home for past year are included in the analysis (N=1322 children within 63 census tracts).

In addition, this study applies multiple imputation to the individual-level dataset (N=10 datasets) to address missing values and analyzes the multiply imputed data in the HLM statistical software package. Results reveal that the percent of families in poverty at the neighborhood-level consistently predicts less children’s wheezing, while income inequality (GINI) has no effect on wheezing. Percent foreign-born also has a significant neighborhood effect associated with reduced wheezing. In terms of cross-level interactions, children in poverty (as opposed to not in poverty), with better health status (as

opposed to worse) and with foreign-born (as opposed to US-born) primary caretakers enjoy respiratory health benefits from living in neighborhoods with a higher proportion of the population being foreign-born. In conclusion, this study provides evidence of neighborhood effects on children's wheezing in El Paso, Texas; some of those contextual effects conform to the extant literature and others do not.

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Chapter 1: Introduction

Children's asthma is a critical public health issue. Many studies have revealed that asthma disparities are not attributable to one individual factor, but to multiple and complex determinants. Moreover, previous research has suggested that those determinants are interrelated and operate across individual and neighborhood levels. This study is designed to assess effects of hypothetical health determinants at the neighborhood level on wheezing status among individual Hispanic children living in El Paso, Texas employing a multi-level modeling approach and GIS techniques. According to the US Bureau of the Census, in 2011, 81% of El Paso residents were Hispanic. Given ethnic composition of El Paso, only Hispanic children are included in this study.

Scholars of neighborhood effects on health disparities have made significant progress by demonstrating that individual health outcomes are partly determined by neighborhood environments. They have provided specific evidence that neighborhood objective deprivation is independently associated with individuals' health outcomes (Corburn et al., 2006; Cubbin et al., 2006; Ellen et al., 2001; Pickett & Pearl, 2001; Poortinga et al., 2008; Voigtländer et al., 2010). Lynch and Kaplan (2000) argued that measures of socioeconomic position indicate particular structural locations within society, which should be considered as powerful determinants of health damaging exposures and of possessing particular health-enhancing resources. Lynch and Kaplan (2000) stated that "This is perhaps the most basic principle in understanding how and why socioeconomic position is linked to health" (p.14). Moreover, Robert (1998) argued that socioeconomic characteristics at the community level impact the physical environments (i.e., quality of air and water, and exposures to toxins), social services (i.e., ability of mental health and family services), and social environments of communities (i.e., crime and human behavior), which may affect the health of residents.

In addition, relative deprivation of neighborhoods should be considered as another possibly important determinant of health outcomes because it is highly related to social cohesion, social capital and collective efficacy (generally defined in terms of trust, friendships, and civic involvement) (Kawachi et al. 1997; Mangyo& Park, 2011), which have been demonstrated to have significant effects on health outcomes (Browning & Cagney, 2003; Cagney et al. 2007; Wen et al. 2003). Also, because relative deprivation is regarded as a trigger of stress, which causes both mental and physical disease, socioeconomic relative deprivation in a neighborhood has to be regarded as a hypothetically important independent variable in studies of health outcomes. For example, Kozyrskyj et al. (2008) found that there was a significant association between maternal distress in early life and subsequent expression of asthma in children. By extension, if mothers are depressed or stressed by due to the internalization of relative deprivation, it stands to reason that this might affect their children's asthma outcomes. Moreover, Marin et al. (2009) concluded that children with high chronic family stress showed increased production of asthma-relevant cytokines at times when they had experienced an acute event compared to times when they had not. By extension, it is possible that neighborhoods with high levels of relative deprivation and inequality may produce stressors that increase the risks of children's asthma attacks.

In any study of a Hispanic majority context, such as El Paso, Texas, the "Latino Paradox" or so called "Hispanic Health Paradox (HHP)" should be considered. A number of studies have found that there is a significant effect of neighborhood socioeconomic status, with higher morbidity and mortality rates occurring in more economically disadvantaged neighborhoods (Haan et al. 1987; Anderson et al. 1997; Pickett et al. 2001; Diez Roux et al. 2001). Latino immigrants are generally economically disadvantaged in the U.S. context. In El Paso, the rate of Hispanic US-born people living in poverty was 26.7%, while that of Hispanic foreign-born people was 32.2% (according to 2010 American Community Survey (ACS) 5-year estimates statistics). What the Hispanic Health Paradox argues is, paradoxically, foreign-born Latinos enjoy better health despite of their lower socioeconomic status would predict. This

paradox has been revealed in several studies examining various health outcomes, such as mortality, infant mortality, and general health status (Markides & Coreil, 1986; Morales et al. 2002; Patel et al. 2004; Scribner, 1996). Morales et al. (2002), for example, found that there is a health advantage for foreign-born Latinos in terms of morbidity compared with the US-born counterparts, which indicates substantial support for the existence of the epidemiological paradox, particularly among Mexican Americans. In their study of mortality, Eschbach et al. (2004) also found that there is a socio-cultural advantage for Mexican Americans who live in higher-density Mexican American neighborhoods, which appears to protect against the disadvantages associated with high poverty of those neighborhoods.

Recent work indicates that this paradox may have a neighborhood-level mechanism associated with the social and cultural capital that comes with living in enclaves with fellow foreign-born Latino immigrants. Cagney et al. (2007), for example, suggest that “homogeneity with respect to ethnicity and immigrant status may increase information exchange through a common language. Shared culture or lifestyle behaviors also may be at play... Thus, the role of community and cultural supports may not only influence individual-level behaviors but may also affect health in their own right” (p. 924).

This study will contribute to academic scholarship on several points. First, by testing the effects of neighborhood objective deprivation, this study will yield results that will provide a point of comparison with those from previous studies demonstrating independent effects of neighborhood deprivation on Hispanic children’s asthma (Salmondet al. 1999; Watson et al 1996; Holt et al 2012; Lin et al. 1999; Wissow et al. 1988). Second, while others have examined neighborhood-level predictors of children's asthma, there has been little focus on neighborhood-level relative deprivation, which is an established influence on other health conditions, like heart disease, diabetes, and obesity. Unlike those previous studies, this study will determine if there are significant associations between relative deprivation and Hispanic children’s asthma outcome. Third, while the majority of studies on relative deprivation have tested relationships with mental health, this study will test the relationship between

neighborhood relative deprivation and children's asthma outcomes. Fourth, considering neighborhood deprivation and the Hispanic health paradox (HHP) simultaneously, this study will examine how deprivation and the HHP have interrelated effects on individual level Hispanic children's wheezing. Employing multi-level analysis and GIS techniques, this is the first study to test the effects of neighborhood deprivation and the HHP on Hispanic children's wheezing outcomes in a Hispanic majority context (El Paso, Texas).

Neighborhood-level variables are derived from US Bureau of the Census and American Community Survey data and aggregated at the census tract level. To operationalize neighborhood income inequality (i.e., relative deprivation), this study uses the GINI coefficient of income. To measure objective neighborhood deprivation, percentage of families living under the poverty line is used. Percentage of the population that is foreign-born is used to examine the Hispanic Health Paradox and children's respiratory health. The individual-level data come from a social survey of parents and guardians of fourth and fifth grade students in all 58 elementary schools of El Paso Independent School District that was administered in English and Spanish. Socioeconomic status, indoor/housing exposures, health behaviors, demographics and other variables constructed from the social survey dataset are utilized as predictors at the individual level, since they are well-established determinants of asthma.

The primary research questions addressed by this study are: 1) "Do relative and objective neighborhood level deprivation have significant impacts on children's respiratory health independent of individual-level factors? 2) Are there neighborhood level effects of foreign-born composition on children's respiratory health outcomes that provide evidence of a Hispanic Health Paradox in El Paso (a predominantly Mexican-origin Hispanic majority city)? 3) Do the effects of individual-level independent variables on children's respiratory health outcomes vary based on neighborhood-level variables? (i.e., Are there cross-level interactions?)

Chapter 2: Literature Reviews

2.1 Objective Neighborhood Deprivation

In previous studies, the percentage of households/families/people below poverty line has been used as a measure of objective neighborhood deprivation (Brown et al., 2007; Krieger et al. 2003; Morenoff, 2003; Pearl, 2001; Pickett et al., 2002; Rauh et al. 2001). Based on prior studies, results have been mixed regarding the relationship between objective neighborhood deprivation and health outcomes. Most of studies of objective neighborhood deprivation were about low birthweight.

In the hierarchical modeling of birth weight in Chicago, Morenoff (2003) used the percent of families in poverty as measurement of neighborhood deprivation. He found that poverty had a negative relationship with birthweight, but its effect was not significant when analyzed with the rate of violent crime and exchange/voluntarism at the neighborhood level. Jaffee & Perloff (2003) employed percent of households below poverty at the census tract level in their study of low birthweight. Specifically, they dichotomized neighborhood poverty as women living in census tracts where 20% or more households live below poverty (high poverty= 1) or not (not high poverty= 0). They found no significant relationship between high neighborhood poverty and low birthweight.

Rauh et al. (2001) defined community-level poverty as the proportion of residents falling below the federal poverty line. They found that the community poverty had a significantly positive association with the risk of low birthweight among African American women. Pearl et al. (2001) utilized percent of families in poverty to analyze the relationship between birthweight and neighborhood socioeconomic characteristics among five ethnic groups (i.e., White, Black, US-born Latinas, and foreign-born Latinas) in California. They found that neighborhood poverty was associated with lower birthweight among Blacks and Asians. Interestingly, however, they found that at high levels of family poverty in

neighborhoods (above 25%), birthweight unexpectedly increased linearly with increasing poverty ($\beta=40$, $SE=11$, $P<.01$).

Brown et al. (2007) used hierarchical linear modeling to study the relationship between deprivation (as obtained from 1997 census estimates) and self-rated health in census tracts in Los Angeles County. Census tracts were classified as very deprived (90%–100% of residents living in poverty), deprived (60%–89%), and not deprived (1%–59%). Their results showed that greater deprivation at the census tract level was significantly associated with poorer self-rated health among participants. In sum, they concluded that individuals in economically disadvantaged neighborhoods had poorer self-rated health than residents of more economically advantaged areas.

In sum, the literature review suggests that neighborhood-level objective deprivation measured by percent of households/families/people below the poverty line may have negative effects on health outcomes at the individual-level. Thus, it suggests the hypothesis of this study that higher neighborhood-level objective deprivation will predict worse Hispanic children's respiratory health. This study utilizes the percent of families below poverty line.

2.2 Relative Neighborhood Deprivation

As stated above, relative deprivation may have significant effects on individuals' health outcomes since: (1) neighborhoods which have high levels of socio-economic inequality may have less health-related social cohesion, social capital and collective efficacy; and (2) relatively deprived people feel more stress from negative comparisons, which could increase risk of mental and physical diseases. Hypothetically, neighborhoods characterized by higher income inequality levels are likely to have less social cohesion and generate more stressful social comparisons, both of which negatively affect health (Hou & Myles, 2004; Kaplan et al., 1997; Kawachi et al. 1999; Kawachi & Kennedy, 1997; Wen et al. 2003).

The GINI coefficient is one of the most widely used measures of economic relative deprivation (i.e., income inequality) based on previous research; results been mixed regarding the relationship between relative neighborhood deprivation and health outcomes. Because there have been few studies examining respiratory health and the GINI coefficient at the neighborhood-level, I will review the literature on self-reported health status. Using the GINI coefficient as a measure of income inequality and employing multi-level analysis methods, Wen et al. (2003) found that income inequality was a significant factor influencing self-rated health outcomes of individuals, but its effect disappeared when it analyzed with other neighborhood-level variables such as poverty and affluence. Hou and Myles (2004) employed hierarchical linear modeling, and found that after controlling for individual level socio-economic characteristics, the relationship between neighborhood income inequality and self-assessed health status was not statistically significant.

Lopez's (2004) multi-level study (combining data from a national survey of adults with 2000 US Census data) revealed that, for each 1 point rise in the GINI index (on a hundred point scale), there was a 4% decrease in self-reported health status (after controlling for smoking, age, education, race, Hispanic ethnicity, sex, household income, and metropolitan area per capita income). Based on his research results, he concluded that income inequality may be part of a chain of causality that affects the self-rated health outcomes. Also, in their research in Hong- Kong examining the association of neighborhood-level GINI – adjusting for age, sex, and income – with mortality rates from 1976 to 2006, Lau et al. (2012) found that the GINI was positively associated with death from cardiovascular diseases and respiratory diseases from 1991 to 2006. Similarly, in an international study on respiratory diseases and national income, Sembajwe et al. (2010) noted that the highest prevalence of current wheezing symptoms was found in low-income countries with high income inequality.

These research results are consistent with the suggested mechanisms that relatively deprived people feel more stress from negative comparisons, which increases their risks of mental and physical

diseases. According to these mechanisms, in neighborhoods with higher levels of socioeconomic inequality, children may have more socially isolated and stressed parents and, as a result, be more susceptible to adverse respiratory health outcomes. Indeed, previous studies have found that parental and household stress significantly affects children's asthma outcomes (Wolf et al., 2008; Donnelly, 1994; Kozyrskyj et al., 2008; Chen et al., 2006). Based on the literature review, this study uses the GINI coefficient of income to measure relative neighborhood deprivation. Given that the literature review suggested that neighborhood-level income inequality has an impact on self-reported health status and that country-level income inequality was detrimental to respiratory health, it suggests the following hypothesis: neighborhood-level relative deprivation, which is measured here by the GINI coefficient of income, will have detrimental effects on children's respiratory health outcomes.

2.3 The Hispanic Health Paradox

The contradiction that some foreign-born Hispanic populations have lower SES but better health outcomes than other ethnic populations in the United States, including asthma, is known as the Hispanic Health Paradox (HHP). Previously, studies have uncovered a HHP in which foreign-born Latinos enjoy relatively better health and longer life than their native-born counterparts (and the majority white Anglo group), despite of their lower socioeconomic status (Cagney et al. 2007; Cobas et al. 1996; Eschbach et al. 2004; Markides & Coreil, 1986; Patel et al. 2004).

Most studies documenting the HHP in respiratory health outcomes have not been multi-level; hence, most have not examined the role of neighborhood effects in the HHP. There have been a few exceptions. Using multi-level models, Peak & Weeks (2009) found some evidence of the HHP in their study of low birthweight of Mexican origin women in San Diego, California. They examine the effect of community effect and found that there is a reduced risk of low birth weight (LBW) of for Mexican-origin mothers when they live in a Mexican enclave. This suggests that there is a protective effect of

living in a Mexican enclave for Mexican-origin women and infants. Moreover, according to their finding, this is not experienced by non-Hispanic whites in the same neighborhoods. In their study of neighborhood effects on mortality among older Mexicans, Eschbach et al. (2004) found that Mexican Americans have lower mortality rates than non-Hispanic Whites in several causes of death. With this result, they concluded that socio-cultural advantages of Mexican Americans by living in high-density Mexican American neighborhoods eliminate the effect of high poverty of those neighborhoods.

At the individual-level, many studies have shown that U.S-born children have higher risk of asthma than children born out of the U.S. (Eldeirawi & Persky 2007; Eldeirawi et al. 2009; Eldeirawi et al. 2005; Holguin et al. 2005). These results are interesting since immigrants have worse access to health care due to poverty, legal status, and English limitations (Holguin et al. 2005; Javier et al. 2007). Eldeirawi et al. (2009) found that the effects of nativity and duration of residence in the U.S. on the risk of asthma in Mexican-American children are all significant suggesting that potentially modifiable factors that change with migration may be linked with prevalence of children's asthma. Specifically, they revealed that US-born children had higher risk of asthma than their counterparts born in Mexico and that the prevalence of asthma increased in Mexican immigrants with prolonged residential duration in the US. Also, Eldeirawi et al. (2007) showed that the risk of asthma in US-born children was higher than that observed in Mexican-born children after accounting for several covariates. Moreover, in the US, Mexican Americans, particularly those who were born out of the US, have been shown to have the lower rates of asthma compared to other groups (Akinbami et al. 2012; Arif et al. 2003; Holguin et al. 2005).

Returning to a multi-level study, Cagney et al. (2007) employed hierarchical logistic modeling to examine neighborhood contextual effects that might help explain the HHP for asthma and several other respiratory health conditions. In their study, they included the logged percentage of the population that was foreign-born at the neighborhood level. They found a neighborhood level effect on breathing

problems among foreign-born Latinos by community composition. That is, foreign-born Latinos in neighborhoods having a high percentage of foreign-born residents had significantly less asthma and other respiratory diseases. This result suggests that percent of foreign-born at the neighborhood level may have protective effects on children's respiratory health at the individual-level.

In addition, in their multi-level analysis, Cagney et al. (2005) found that foreign-born Latinos were shown to have less prevalent asthma than other ethnic groups, including US-born Latinos, when living within concentrated immigrant neighborhoods. Importantly, they revealed that foreign-born Latinos have less asthma and the lowest rates of other breathing problems overall when they live in a neighborhood with a high percentage of foreign-born ($p < .05$). However, foreign-born Latinos who live in neighborhoods with a low percentage of foreign-born people reported the highest rates of asthma/other breathing problems across all groups. With this result, they concluded that asthma prevalence among foreign-born Latinos depends on the composition of the community. This means when foreign-born Latinos live in a neighborhood with high level of foreign-born composition, their asthma risk is abated. Several studies suggested that these findings reflect co-ethnic social ties or collective efficacy of the community, which may reduce the risk of diseases (Browning & Cagney, 2003; Cagney et al. 2007; Wen et al. 2003). Thus, the literature review supports the hypothesis that higher neighborhood-level foreign born composition will predict less children's respiratory health problems at the individual level.

2.4 Individual Level Control Variables

Individual level co-variates – such as gender, socio-economic status (SES) of children's household, children's general health status, smoking behavior, indoor housing conditions, children's body mass index, residential duration in El Paso, and primary care taker's place of birth (in the US and out of the US) are included as control variables in this study because they have previously been

demonstrated to be associated with respiratory health outcomes. In terms of gender, it has been found that females have better health than males, including respiratory health (Browning & Cagney, 2003; Cagney & Browning, 2004; Hou & Myles, 2004; Lopez, 2004; Ross & Mirowsky, 2001). This trend is consistent in the relationship between children's gender and their asthma. That is, boys have higher rates of asthma than do girls (Anderson et al. 1992; Schatz et al. 2006; Schönberger et al. 2005; Van Merode et al. 2007).

Previous studies have shown that people with higher (as compared to lower) household/family income, educational attainment, or SES enjoy better health in general (Browning & Cagney, 2003; Hou & Myles, 2004; Lopez, 2004; Ross & Mirowsky, 2001; Taylor et al. 2006; Wen et al 2003), and this is consistent with results of studies on respiratory health outcomes in particular (Chen et al. 2010; Basagaña. et al 2004; Corburn. et al 2006). For example, in a cross-national study of 13 diverse countries, Gehring et al. (2006) found that children's respiratory and allergic symptoms depended on parental education. Additionally, the literature suggests that children's overall health status should be adjusted for at the individual level. For example, Aligne et al. (2000) employed children's health status in their study as a control variable to examine the contributions of poverty, race, and urban residence on risk of pediatric asthma. Therefore, this study accounts children's overall health status as a control variable.

According to previous studies, smoking behavior is highly related to respiratory health outcomes. Burr et al. (1999) found that the presence of passive as well as active smoking in households was an important cause of respiratory symptoms in adolescents. Radic et al. (2011) also showed that parents' smoking behavior contributes to illness among children with asthma. Prior studies have also shown that indoor/housing exposures, e.g., due to moldy and damp housing environments, have significant effects on children's asthma. Strachan (1988) concluded that the association between moldy or damp housing environments and wheezing (a symptom of active asthma) meets many of the criteria for an

epidemiological relationship to be considered strongly causal. Strachen & Sanders (1989) also found a relationship between respiratory disease (cough and wheeze in children) and dampness in their respondents' homes. Williamson et al. (1997) found that asthma is associated with living in damp housing, and suggested action to improve damp housing conditions is needed to reduce asthma morbidity.

Children's body mass index (BMI) should also be accounted for in a study of children's respiratory health. Prior studies have found that the prevalence of asthma rose significantly with increasing quartiles of BMI (Corbo et al. 2008; Mutius et al. 2001). In their study on BMI, age and asthma, Behmanesh et al. (2010) divided their respondents as three groups by age (<5 years old, 5-10 years old, and > 10 years old). In the group age-under-five, severity of asthma and BMI were negatively related. In the second group, age 5-10 years, BMI and severity of asthma had no statistically significant association. They found a statistically significant positive relationship between BMI and severity of asthma in the third group, age-over-10 years, which is the age group that includes the children in my study.

Specifically in relation to the study context, children's residential duration in El Paso should be regarded as a potentially important influence on their respiratory health status. In their study of fourth and fifth grade children in the El Paso Independent School District, Sevendsen et al. (2009) revealed that asthma and allergy prevalence increased with longer residential duration in El Paso. Compared with immigrants who arrived in El Paso after entering first grade, lifelong El Paso residents had a higher prevalence of both allergies and asthma (Sevendsen et al. 2009).

Subramanian et al. (2009) stated that asthma prevalence among Hispanic children is affected by maternal nativity or country of origin. They measured maternal nativity by categorizing mothers as foreign-born or US-born. Finally, they found that reported asthma was significantly lower among children born to immigrant mothers (OR=0.54; 95% CI=0.40, 0.73) than among their counterpart

children who are born to US-born mothers. They concluded that mother's nativity (i.e., country of birth) is a strong factor of asthma prevalence among Hispanics and their children. This suggests that primary caretaker's nativity should be considered as one important control variable in this study.

In sum, the literature review suggests that individual-level co-variates such as children's gender, SES, smoking behavior in children's homes, child's overall health status, other indoor/housing exposures (especially those associated with dampness and moldiness), children's BMI, child's residential duration in El Paso, and nativity of the children's primary caretaker should be included as control variables. By adjusting for the effects of these documented co-variates, they will not confound my analysis of the effects of neighborhood-level relative, objective deprivation and foreign-born composition on children's asthma.

2.5 Hypotheses

In sum, the literature review supports several hypotheses:

H1. The relationship between neighborhood-level objective economic deprivation (the percent of families below the poverty line) and Hispanic children's respiratory health problems will be positive and significant; i.e., Hispanic children in neighborhoods with higher levels of objective economic deprivation will have more wheezing.

H2. The relationship between neighborhood-level relative economic deprivation (based on the GINI coefficient for income) and Hispanic children's respiratory health problems will be positive and significant; i.e., Hispanic children in neighborhoods with high GINI scores (corresponding with high levels of economic relative deprivation or income inequality) will have more wheezing.

H3. The relationship between neighborhood-level immigrant composition (based on percent of foreign-born people) and Hispanic children's respiratory health problems will be negative and

significant; i.e., Hispanic children in neighborhoods with high percent of foreign-born (corresponding with high levels of social ties, social and cultural capital) will have less wheezing.

Chapter 3: Data and Methods

3.1 Data

For each individual child, measures for the child's sex, poverty, affluence (as measures of the SES of children's households), child's overall health status, household smoking behavior, indoor/housing exposures, child's BMI, child's residential duration in El Paso, and primary caretaker's place of birth (In the US and out of the US) were constructed based on data from a social survey of parents and guardians of fourth and fifth grade students in all 58 elementary schools of El Paso Independent School District. In terms of the data collection of the individual-level survey, the questionnaire was sent out to all primary caretakers (parents and guardians) of 4th and 5th graders of all 58 elementary schools of El Paso Independent School District (EPISD), which was administrated in both English and Spanish during May and June of 2012. 6,295 primary caretakers received surveys and 30% of them responded (N=1904). Respondents were primarily mothers (82%), and some of them are fathers (10%) and grandparents (4%).

El Paso shows highly Hispanic dominance in population. According to the US Bureau of the Census, in 2011, 81% of its residents were Hispanic. Due to the ethnic composition of El Paso, only Hispanic children are included in this study. As an inclusion criterion for cases at the individual level, a variable asking "How long has this child lived within 1 mile (1.6 km) of your current residence?" was employed, and the cases answered "For less than 12 months" were excluded. Since this study examines neighborhood effects on behaviors and health conditions occurring over the past 12 months, it was valid to exclude cases if children had lived at their current residence for less than 12 months. 1364 Hispanics were selected and 4 of them from out of El Paso were excluded (N=1360). The concept of a neighborhood is operationally defined as the equivalent of a 2010 Census Tract.

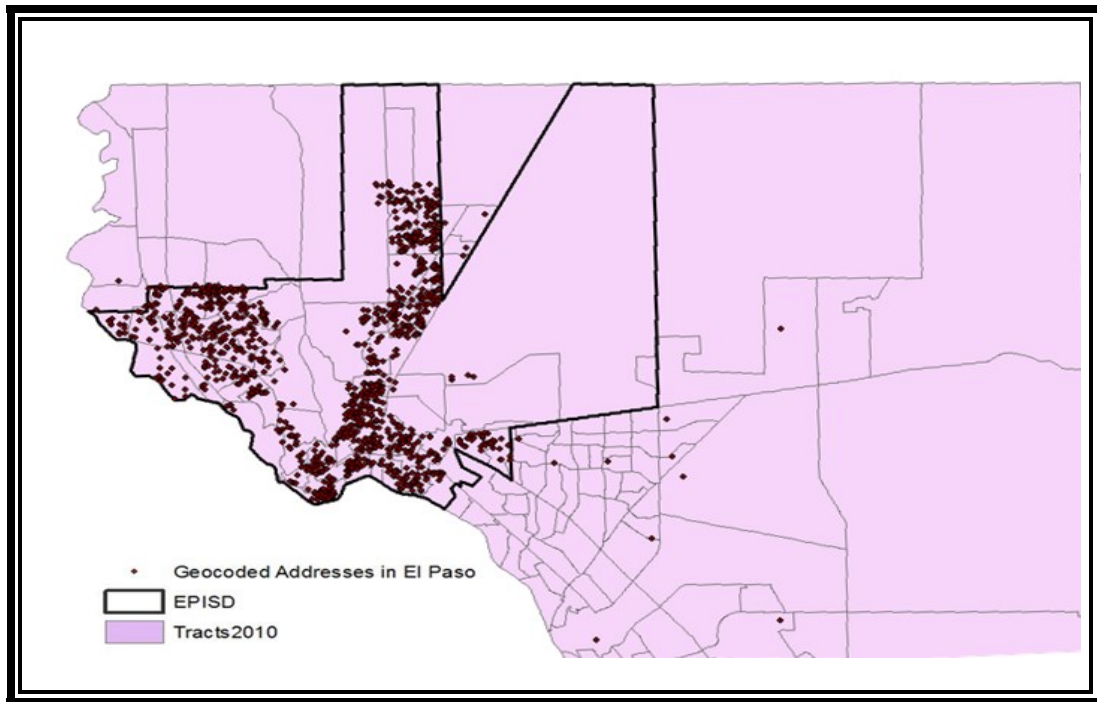


Figure 3.1: Geo-coded Addresses of Hispanic Children in El Paso

With the consent address form from the individual level survey, 1360 addresses of Hispanic children are geo-coded. After the geo-coding process was completed, the geo-coded points were spatially joined to the 2010 census tracts shape file and a count of the number of points (i.e., Hispanic children's home addresses) within each census tract was produced. Figure 1 shows the all geo-coded addresses of Hispanic children in El Paso. Among all the census tracts in El Paso County, this study includes 63 tracts having at least 7 Hispanic children within each tract, since it is regarded as a reasonable and conservative cut-off in a multi-level analysis. The third inclusion criterion is due to the requirements of hierarchical logistic modeling, and so 38 individual-level cases of Hispanic children were excluded because they were located in census tracts (level 2 units) that contained less than 7 individual cases (level 1 units). This resulted in 1322 Hispanic children who met the inclusion criteria.

This study applied multiple imputation (MI) to the individual-level dataset (N=10 datasets) to address missing values and non-response bias, and analyzed the multiply imputed data in HLM. MI

creates multiple sets of values for missing observations using a regression-based approach (Penn, 2007). It is used to avoid the bias that can occur when missing values are not missing completely at random (MCAR). In this procedure, missing data are replaced by a sample of observations drawn randomly from a multivariate distribution fit to all analysis variables. The advantage of MI is that all cases can be included in the analysis, and the potential biased effects due to missing values can be minimized. HLM software accommodates the multiple imputation procedure by performing separate analyses on each data set and then pooling results across the analyses. In this study, ten imputed data sets were created in which different samples were selected for missing observations utilizing SPSS 19. Even though using 20 datasets is the current “rule of thumb” in multiple imputation (Enders, 2010), this study used 10 datasets, since HLM allows only 10 datasets in its MI option. The percent missing for the variables ranged from a low of 0.59% (Health Status) to a high of 29.4% (BMI).

3.2 Independent Variables

In terms of neighborhood-level variables, percent of families below the poverty line, percent of foreign-born people, and GINI of income at the census tract-level are available from US Bureau of the Census (2011 American Community Survey 5-year estimates). Child’s sex was coded as 0= ‘Female’ and 1= ‘Male.’ Socio-economic status of children’s household is measured by two variables: poverty and affluence. Poverty is created based on total household income level and number of people in the household of the child. For example, according to the U.S. Department of Health and Human Services (2013), if a household has four members and it has annual income below than \$23,550, it should be considered as poor household. Likewise, poverty variable is coded as 1= ‘Poor’ if the household income is less than the designated amount of income of each category of numbers of members in a household in poverty guideline, or as 0= ‘Non-poor.’ Also, affluence is defined as upper 10% of all income categories

in the survey. That is, all respondents who have annual household income over \$80,000 are recoded as 1= 'Affluent' and rest of them are coded as 0= 'Non-Affluent.'

In terms of indoor/housing exposures, the survey asked respondents several questions relevant to child's respiratory health such as "Has your child's home had moldy or musty odors, or damp spots on the walls, ceiling, or surfaces?" during the past 12 month. All answers of those questions were coded 1= 'Yes' and 0= 'No'. Child's overall health status is measured by survey question "How would you describe the overall health of the child?" The answers were coded 1= 'Very poor,' 2= 'Poor,' 3= 'Fair,' 4= 'Good,' 5= 'Very good,' and 6= 'Excellent.'

Household smoking behavior is operationalized in terms of smoking recently having taken place inside the child's home. This is measured based on the following survey question: "At any time during the past 12 months, has anybody smoked inside your child's home?" Response options were yes/no; 'No' answers were coded as 0, while 'Yes' answers were coded as 1. BMI is calculated based on the child's height and weight, which were re-coded by survey questions asking "How tall is the child as of now?" and "How much does the child weigh as of now?" Children's heights were answered in either feet and inches or meters and centimeters, while children's weights were answered in pounds or kilograms. As in prior studies, BMI was calculated as weight/square of height (Kg/m^2) (Corbo et al. 2008; Mutius et al. 2001). In this study, I converted the answers coded as feet and inches to meters and centimeters and pounds to kilograms in order to calculate children's BMI using metric system equivalents.

Child's residential duration in El Paso is measured by a survey question "How long has this child lived in El Paso County?" Respondents answers were coded as 1= 'For less than 12 months,' 2= 'Since the child was in first grade, but for more than 12 month,' 3= 'Since the child was 2 years of age or older, but before the child started first grade,' 4= 'Since after the child's birth, but before the child was 2

years,’ and 5= ‘Since the child's birth.’ Primary caretakers were asked about their place of birth through a question “Where were you born?” Answers were coded as 1= ‘In the U.S.’ and 0= ‘Outside the U.S.’

3.3 Dependent Variable

The outcome variable of this study is children’s ‘current wheezing.’ The individual-level survey employed questions from the International Study of Asthma and Allergies in Childhood (ISAAC) to measure children’s symptoms and severity of diagnosed and undiagnosed asthma. In previous studies, current wheezing has typically been measured as a binary variable based on the ISAAC question “Have (has) you (your child) had wheezing or whistling in the chest in the last 12 months?” (Asher et al. 2001; Björkstén et al. 2011; Brunekreef et al. 2012; Ellwood et al. 2001; Pearce et al 2000). Therefore, I will use the same question to measure ‘current wheeze’ in this study. The answers are coded Yes=1 and No=0.

3.4 Analytic Strategy

Since this study is designed to assess the influence of the neighborhood context of residence on individual- level dependent variables, for accurate statistical inference, error terms of individuals should be considered by not assuming that individuals in a same neighborhood cluster (i.e., census tract) have the same characteristics. Using multi-level modeling, this study will address the research questions by examining the impact of neighborhood deprivation and co-ethnic composition on children’s wheezing after adjusting for individual-level co-variables, and by testing for significant cross-level interaction effects.

Hierarchical logistic models (HLM) put multi-level data in one regression. HLM is preferable for data analysis with different levels because ignoring the hierarchical structure of data causes aggregation bias which leads to incorrect inferences. Aggregation bias is the assumption that phenomena at one level

of analysis are the same as the phenomena at a higher level. In addition, heterogeneity of regression occurs when the relationship between individuals' characteristics and outcomes vary across neighborhoods. To address these technical problems, and to test theory about neighborhood effects on individual health outcomes, this study employs HLM as an analytic method.

Specifically, in the Level-1 equation this study includes the following variables: child's sex, poverty, affluence, child's health status, smoking behaviors in child's household, moldy odors, child's BMI, child's residential duration in El Paso, and primary caretaker's nativity. Covariates included in the Level-2 equation are: percent of families in poverty, GINI of income, and percent of foreign-born people. The first step of analysis is examining a model with only individual-level (level-1) control variables (Model 1). Then, the neighborhood-level percent of poverty, percent of foreign-born, and GINI are respectively added in Models 2 through 4. Next, Model 5 includes only the percent of poverty and the percent of foreign-born in level-2. Finally, the full model (Model 6) will simultaneously examine the effects of the neighborhood- and individual-level independent variables on children's wheezing. The final full model is represented by the following equations in hierarchical form:

Individual-Level Model (Level-1)

$$Prob(Y=1|B) = P$$

$$\begin{aligned} \text{Log} [P/(1-P)] = & B0 + B1*(Sex) + B2*(Poverty) + B3*(Affluence) + B4*(Health Status) + \\ & B5*(Smoking) + B6*(Moldy Odors) + B7*(BMI) + B8*(Length Res. E.P.) + B9*(PC Born U.S.) \end{aligned}$$

Neighborhood-Level Model (Level-2)

$$B0 = G00 + G01*(\%Poverty) + G02*(GINI) + G03*(\% Foreign Born) + U0$$

$$B1 = G10$$

$$B2 = G20$$

$$B3 = G30$$

$$B4 = G40$$

$$B5 = G50$$

$$B6 = G60$$

$$B7 = G70$$

$$B8 = G80$$

$$B9 = G90$$

In order to comprehensively examine neighborhood effects of on children's wheezing, it is necessary to analyze not only the major effects, but also cross-level interactions. In the interests of parsimony, poverty, affluence, and child's health status at the individual-level and percent foreign-born at the neighborhood level are included in the cross-level interaction model reported here, because those are variables that exhibited statistical significance and which support theoretically-relevant inferences. In exploratory cross-level interaction modeling, I ran models with all three neighborhood variables and those individual-level variables. While there is no significant mediating effect of percent of poverty and the GINI on the impacts of those individual-level variables on Hispanic children's current wheezing, some of cross-level interaction terms with percent of foreign-born show significant results. Moreover, in their study of asthma/breathing problems, Cagney et al. (2005) employed cross-level interaction between individual-level Latino foreign born status and the neighborhood-level percent foreign-born status. They found that high percent of foreign-born in neighborhood-level confers an additional protective advantage for Latinos born outside the U.S. Thus, this study examines cross level interactions between several individual level variables and percent of foreign-born at the neighborhood level. The cross-level interaction model is represented by the following equations in hierarchical form:

Individual-Level Model (Level-1)

$$Prob(Y=1|B) = P$$

$$\begin{aligned} \text{Log} [P/(1-P)] = & B0 + B1*(Sex) + B2*(Poverty) + B3*(Affluence) + B4*(Health Status) + \\ & B5*(Smoking) + B6*(Moldy Odors) + B7*(BMI) + B8*(Length Res. E.P.) + B9*(PC Born U.S.) \end{aligned}$$

Neighborhood-Level Model (Level-2)

$$B0 = G00 + G01*(\%Poverty) + G02*(GINI) + G03*(\% Foreign Born) + U0$$

$$B1 = G10$$

$$B2 = G20 + G21*(\% Foreign Born) + U2$$

$$B3 = G30 + G31*(\% Foreign Born) + U3$$

$$B4 = G40 + G41*(\% Foreign Born) + U4$$

$$B5 = G50$$

$$B6 = G60$$

$$B7 = G70$$

$$B8 = G80 + G81*(\% Foreign Born) + U8$$

$$B9 = G90 + G91*(\% Foreign Born) + U9$$

Chapter 4: Results

Table 1 presents descriptive statistics of all included variables in individual- and neighborhood-level. The numbers of cases included are different by each variable. This is because of options addressing missing values in HLM. There are two different options to handle missing values: 1) Deletion using listwise at the MDM creation which is a process of a HLM data analysis conjoining different files in different levels; 2) Deletion when the analysis run. In order to employ multiple imputations, all cases should not be deleted before any HLM analyses. Therefore, this study chose the second method to handle the missing values and ran models with the multiply imputed dataset. Finally, in the hierarchical logistic regression models, 1322 are included as research cases.

Table 4.1: Descriptive Statistics

	N	Mean	S.D	Min	Max	% Missing
Individual						
Current Wheeze	1250	0.15	0.35	0.00	1.00	2.42
Sex	1241	0.49	0.50	0.00	1.00	3.15
Poverty	1117	0.44	0.50	0.00	1.00	12.46
Affluence	1155	0.16	0.36	0.00	1.00	9.46
Health Status	1273	4.98	0.93	2.00	6.00	0.59
Smoking	1227	0.08	0.27	0.00	1.00	4.25
Moldy Odor	1231	0.13	0.33	0.00	1.00	4.03
BMI	900	20.01	5.50	6.67	69.20	29.40
Length Res. E.P.	1136	4.24	1.24	1.00	5.00	11.44
PC Born U.S.	1256	0.44	0.50	0.00	1.00	1.98
Neighborhood						
% Poverty	63	23.27	17.32	0.70	69.30	
GINI	63	0.42	0.07	0.20	0.63	
% Foreign Born	63	26.22	10.69	3.46	51.17	

Approximately 15% of respondents reported that their children have had a wheezing in last 12 months. About 49% of the children in this study are male. While 16% of households are affluent, about 44% of households are in poverty. Also, just 8% and 13% of respondents reported that there were

smoking behaviors and moldy odors in their household in last 12 months. At the neighborhood level, 63 census tracts are included. The mean value of percent of families in poverty for neighborhoods is 23.39%, while the mean of percent of foreign-born people for neighborhoods is 26.58%; the mean of GINI is 0.42.

Table 2 illustrates the correlations among neighborhood-level independent variables. Percent of poverty is highly correlated with percent of foreign-born people at the neighborhood level. Generally speaking, this correlation is not surprising (although the strength is notable), since several foreign-born immigrants tend to have lower socio-economic status. According to the poverty rates calculated using 2010 American Community Survey (ACS) 5 year estimates statistics, the percent of poverty among Hispanic people who are born in the US in El Paso was about 26.7%, while that of the foreign born was about 32.7%.

Table 4.2: Correlations among Neighborhood-level Variables		
N=63	% Poverty	% Foreign-born
% Foreign-born	.771**	
GINI	.272*	.409**

**p<.01, *p<.05

The high correlation between percent in poverty and foreign-born is found in Figure 2 which presents maps of neighborhood-level variables across 63 census tracts. The five categorized colors of quartiles show the different distribution of each neighborhood-level variable in El Paso. Figure 2 graphically depicts the connection between percent of families in poverty and percent of foreign-born people by showing geographically similar spatial patterns. The high correlation raised concerns about the problem of multi-collinearity; in response, I checked the variance inflation factors (VIF) of the all of neighborhood covariates.

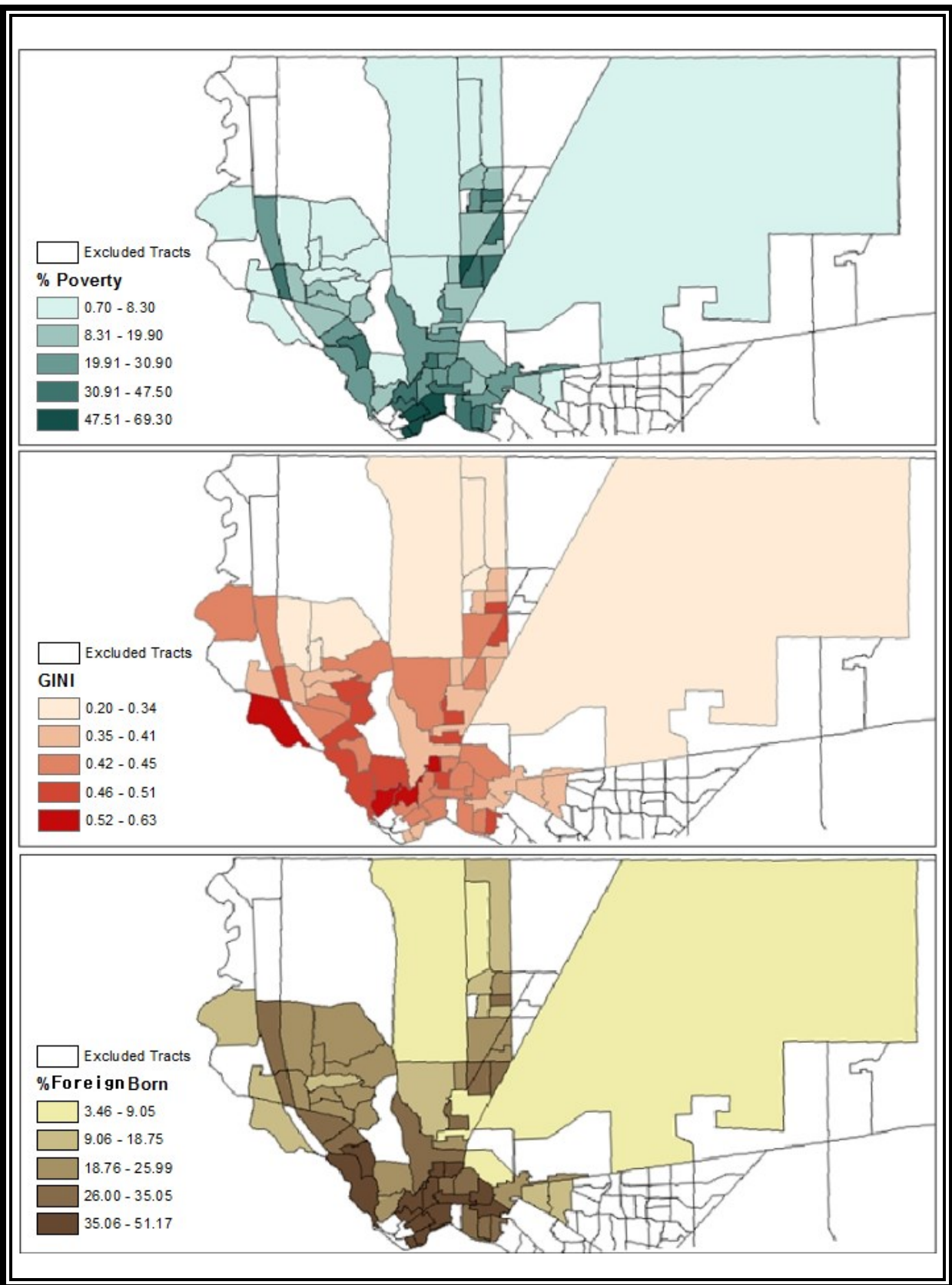


Figure 4.1: Maps of Neighborhood-Level Variables

VIF is an index which measures how much the variance of an estimated regression coefficient is increased because of multi-collinearity of other independent variables by regressing each of the independent variables on all of the other independent variables. A generally accepted rule-of-thumb is that there is multi-collinearity if the largest VIF is greater than 10 or the mean of all the VIFs is greater than 1. According to Montgomery (2001), if any of the VIF values exceeds 5 or 10, it implies that the associated regression coefficients are poorly estimated because of multi-collinearity. The VIFs among all independent variables at neighborhood-level do not exceed 3.0. That is, there is no multi-collinearity problem among them, even though they exhibit correlations. Therefore, the full model for this study, which analyzes all three neighborhood variables simultaneously, does not appear to be affected by multi-collinearity problems.

My multi-level analyses of children's current wheezing using HLM focus on the neighborhood effects of deprivation and nativity composition. Table 3 displays the results of the series of hierarchical logistic models, which illustrate the multi-level determinants of children's wheezing status accounting for individual level control variables and the deprivation and foreign-born composition variables at the neighborhood level.

Model 1 reports the effects of individual-level variables on children's current wheezing. In this model, individual-level poverty and child's overall health status significantly predict children's wheezing. Specifically, better health status predicts less wheezing, while children in poor households have less wheezing. Moreover, child's residential duration in El Paso and primary caretaker's U.S.-birth are significantly and positively associated with children's current wheezing. That is, longer residential duration in El Paso predicts more wheezing, and US-born caretakers reported more wheezing among their children. Moldy odor in household also shows significance in this model ($p < .10$).

Table 4.3: HLM Estimates of Predictors of ‘Current Wheeze’

Variables	Model 1			Model 2		
	Coef.	OR	95% CI	Coef.	OR	95% CI
<u>Intercept</u>	-0.010	0.989	(0.222,4.407)	0.406	1.502	(0.319,7.073)
<u>Individual</u>						
Sex (Male)	0.214	1.239	(0.920,1.671)	0.197	1.218	(0.904,1.643)
Poverty	-0.466**	0.627	(0.437,0.899)	-0.322	0.724	(0.488,1.074)
Affluence	0.257	1.293	(0.851,1.968)	0.142	1.152	(0.756,1.759)
Health Status	-0.737***	0.478	(0.394,0.580)	-0.769***	0.463	(0.379,0.567)
Smoking	-0.220	0.802	(0.415,1.553)	-0.169	0.843	(0.440,1.618)
Moldy Odor	0.402*	1.495	(0.925,2.415)	0.427*	1.533	(0.948,2.479)
BMI	0.007	1.007	(0.982,1.033)	0.009	1.009	(0.984,1.036)
Length Res. E.P.	0.287***	1.332	(1.115,1.593)	0.292***	1.339	(1.119,1.603)
PC Born U.S.	0.780***	2.181	(1.629,2.922)	0.743***	2.103	(1.573,2.813)
<u>Neighborhood</u>						
% Poverty	...	...	...	-0.015***	0.984	(0.975,0.995)
GINI	...	...	...	...	...	...
% Foreign-born	...	...	...	...	...	...

***p<.01, **p<.05, *p<.10

Table 4.3: Continued

Variables	Model 3			Model 4		
	Coef.	OR	95% CI	Coef.	OR	95% CI
<u>Intercept</u>	0.486	1.626	(0.327,8.086)	0.782	2.187	(0.379,12.644)
<u>Individual</u>						
Sex (Male)	0.201	1.223	(0.909,1.647)	0.214	1.238	(0.920,1.668)
Poverty	-0.386***	0.679	(0.464,0.994)	-0.302*	0.738	(0.533,1.024)
Affluence	0.211	1.235	(0.816,1.873)	0.404**	1.499	(1.021,2.201)
Health Status	-0.756***	0.469	(0.386,0.572)	-0.746***	0.474	(0.387,0.581)
Smoking	-0.200	0.818	(0.423,1.583)	-0.068	0.933	(0.483,1.804)
Moldy Odor	0.424*	1.528	(0.942,2.480)	0.447*	1.564	(0.974,2.513)
BMI	0.008	1.008	(0.983,1.034)	0.0004	1.000	(0.979,1.023)
Length Res. E.P.	0.290***	1.336	(1.118,1.598)	0.294***	1.341	(1.127,1.597)
PC Born U.S.	0.746***	2.110	(1.577,2.823)	0.821***	2.274	(1.639,3.158)
<u>Neighborhood</u>						
% Poverty	...	...	...	...	...	...
GINI	...	...	...	-1.962	0.140	(0.017,1.156)
% Foreign-born	-0.016***	0.983	(0.969,0.998)	...	...	...

***p<.01, **p<.05, *p<.10

Table 4.3: Continued

Variables	Model 5		
	Coef.	OR	95% CI
<u>Intercept</u>	0.592	1.808	(0.298,10.986)
<u>Individual</u>			
Sex (Male)	0.202	1.224	(0.909,1.649)
Poverty	-0.328	0.720	(0.486,1.068)
Affluence	0.142	1.153	(0.756,1.760)
Health Status	-0.769***	0.463	(0.378,0.567)
Smoking	-0.161	0.851	(0.442,1.638)
Moldy Odor	0.428*	1.534	(0.946,2.490)
BMI	0.009	1.009	(0.984,1.036)
Length Res. E.P.	0.292***	1.339	(1.119,1.603)
PC Born U.S.	0.752***	2.121	(1.584,2.843)
<u>Neighborhood</u>			
% Poverty	-0.017**	0.982	(0.969,0.997)
GINI	-0.859	0.423	(0.047,3.803)
% Foreign-born	0.008	1.008	(0.987,1.030)

***p<.01, **p<.05, * p<.10

Model 2 adds only percent in poverty at the neighborhood level. The coefficient for child's health status, residential duration in El Paso and primary caretaker's nativity remain significant in Model 2. Moldy odor in household is also significant in this model ($p < .10$). Percent in poverty has a negative relationship with children's wheezing. This implies the more prevalent family poverty is at the neighborhood level, the less prevalent children's wheezing is at the individual-level, adjusting for the effects of other variables. Specifically, one standard deviation increase in the percent of families in poverty at the neighborhood level is associated with a 1.6% decrease in the probability of a child experiencing current wheezing ($O.R=0.984918$). Individual level poverty is not significant in Model 2.

Model 3 adds only percent of foreign-born people at the neighborhood-level. Percent of foreign-born significantly and negatively predicts children's wheezing ($O.R= 0.983365$). This means that a one standard deviation increase in the percent of foreign-born people in neighborhoods is associated with a 1.6% decrease in the probability of a child experiencing current wheezing. In addition, the poverty

variable at the individual-level exhibits a similar significant and negative relationship with that of individual-poverty in Model 1.

Model 4 includes only the GINI of income as a measure of income inequality at the neighborhood-level, but it relates to wheeze in the negative direction. In contrast to the literature review and hypothesis 2, GINI as a measure of income inequality (neighborhood relative deprivation) has no significant effect on children's current wheezing at the individual-level. The coefficients for the individual-level variables including individual-level poverty and affluence remain stable in terms of their direction in comparison to the previous models. Notably, the direction of the effect of individual affluence on children's wheezing is positive and significant in this model, meaning that when neighborhood inequality is accounted for, individual affluence is a significant risk factor. Poverty at the individual-level shows a significantly negative relationship with children's wheezing consistent with previous models (except Model 2).

Finally, Model 5 includes all three components at the neighborhood level. Controlling for all individual attributes as well as neighborhood nativity and income inequality (which were not statistically significant), a one standard deviation increase in the percentage of families in poverty is associated with a 1.6% decrease in the odds of children's wheezing (O.R= 0.982738). All individual-level variables with significance in previous models (i.e., health status, moldy odors, duration of residence in El Paso and primary caretaker born in US) show same direction and significance as in Model 5 and most other models.

To assess model fit, I compared model results based on the Chi-square statistic and degrees of freedom (d.f.). Model 1 is significant at a level of $p < .001$ (Chi-square=114.92831, d.f. = 9) in comparison to the null model. Compared with Model 1, Model 2 (Chi-square=7.23522, d.f. = 1, p-value = 0.007) and Model 5 (Chi-square = 7.23522, d.f. = 3, p-value = 0.007) exhibit significantly improved fit, while Model 3 (Chi-square = 2.93791, d.f.=1) is significantly improved at the level of $p < .1$ (p-value

= 0.083). Model 4 does not have significantly improved model fit in comparison to Model 1 (Chi-square = 1.67339, d.f. = 1, p-value = 0.193).

Table 4.4: Cross-level Interactions (% Foreign-Born)

Variables	Coef.	OR	95% CI
<u>Intercept</u>	3.801	44.759	(2.993, 669.256)
<u>Individual</u>			
Sex (Male)	0.150	1.162	(0.938, 1.441)
Poverty	-1.219***	0.295	(0.145, 0.603)
Affluence	-0.119	0.886	(0.316, 2.489)
Health Status	-1.132***	0.322	(0.211, 0.492)
Smoking	-0.174	0.840	(0.542, 1.302)
Moldy Odor	0.304	1.356	(0.917, 2.005)
BMI	0.009	1.009	(0.990, 1.029)
Length Res. E.P.	0.126	1.135	(0.926, 1.392)
PC Born U.S.	0.195	1.215	(0.724, 2.041)
<u>Neighborhood</u>			
% Poverty	-0.018***	0.981	(0.971, 3.396)
GINI	-0.682	0.505	(0.075, 3.396)
% Foreign-born	-0.099**	0.905	(0.832, 0.986)
<u>Cross-level Interactions</u>			
Poverty*Foreign-born	0.032**	1.032	(1.006, 1.060)
Affluence*Foreign-born	0.004	1.004	(0.967, 1.044)
Health Status*Foreign-born	0.018**	1.018	(1.004, 1.034)
Length Res. E.P.*Foreign-born	0.0006	1.000	(0.993, 1.007)
PC Born US*Foreign-born	0.015*	1.015	(0.997, 1.034)

Table 4.4 reports the results of cross-level interactions between percent foreign-born at the neighborhood level and several variables at the individual level which have consistent significance in the HLM models. The cross-level interactions reveal that the relationships of individual-level poverty, children's general health status and primary caretaker's nativity with children's current wheezing vary depending on neighborhood foreign-born composition. One, children living in poverty exhibit significantly less wheezing as the percent of the neighborhood population that is foreign-born increases. Two, children with better (as opposed to worse) health exhibit less wheezing as the percentage of the neighborhood population that is foreign-born increases. Three, children of US-born primary caretakers

exhibit more wheezing as the percentage of the neighborhood foreign-born population increases.

Conversely, it is children with primary caretakers born out of the U.S. that have less wheezing as neighborhood percent of foreign-born increases.

Chapter 5: Conclusion & Discussion

This study attempted to verify contextual neighborhood effects of deprivation and foreign born composition on children's wheezing outcomes at the individual level. Moreover, this study explored functioning mechanisms in the neighborhood level which may explain the Hispanic health paradox and neighborhood deprivation. Overall, the results suggest that neighborhood-level variables are important factors that have significant effects on children's wheezing in El Paso, Texas. Specifically, poverty at the neighborhood-level (as a measure of objective deprivation) and foreign-born composition are significant predictors of children's wheezing at the individual-level (in the final model), yet the individual-level covariates have stronger effects.

In opposition to hypothesis 1 (i.e., higher levels of neighborhood poverty will predict more children's wheezing) and previous studies, this study found that neighborhood poverty has a negative relationship with children's wheezing (i.e., higher levels of poverty predict less wheezing). The effect of poverty at the neighborhood-level remained significant even after controlling for other neighborhood-level factors and individual-level socioeconomic, demographic and health-related factors. There are some studies that have found this flipped relationship between neighborhood deprivation and health outcomes. As I stated in chapter 2, Pearl et al. (2001) found that birthweight increased in neighborhood with high level of poverty (i.e., census tracts with percent of families in poverty above 25%) among foreign-born Latinas. Shankardass et al. (2007) found that community-level low socio-economic position (SEP) (i.e., unemployment, low household income, low education and poverty) has been associated inversely and positively with childhood diagnosed asthma. That is, there was a consistent inverse relationship that diagnosed asthma rates increase as community SEP increases. Especially, they found that the inverse effect of male unemployment as one measurement of SEP on asthma was stronger among Hispanics than non-Hispanics, and communities with a higher proportion of Hispanics tended to be communities with higher male unemployment. Consistent with the result of Shankardass et al.

(2007), the finding of neighborhood-level poverty in this study can be one evidence that communities of Hispanics have a collective advantage against asthma compared with communities of other racial–ethnic groups, in the context of low community-level SEP.

Considering these findings of Shankardass et al. (2007), Pearl et al. (2001), and the high correlation between neighborhood poverty and percent of foreign born people, the detrimental effect of neighborhood poverty may be eliminated by effects of not-included neighborhood measures, such as mutual support, collective efficacy, socio-cultural cohesion, and exchanges of resources and information of Hispanic communities, which may be driven by neighborhood-level foreign-born, immigrant composition. Indeed, emerging literatures support significant and positive effects of neighborhood level social ties, support, and collective efficacy from neighborhood foreign-born composition on health outcomes, including asthma (Cagney et al. 2007; Cagney et al. 2005), and suggest that neighborhood-level poverty measures may not adequately explain the contextual neighborhood mechanism of deprivation on health (Morenoff, 2003; Sampson et al. 1999). The result of neighborhood poverty in this study may contribute to the study of neighborhood deprivation and health by suggesting a role for poverty in explaining respiratory health outcome. The direction of the association still remains unclear which may result from different scales of analysis, characteristics of populations and research designs from previous studies.

Consistent with the expectation in hypothesis 3 (i.e., neighborhood foreign-born composition positively predicts less children's wheezing), this study found that neighborhood percent of foreign-born people showed a significant and positive effect on children's wheezing, but it was disappeared when it analyzed with neighborhood poverty because of its high correlation with percent of poverty. Findings in Model 3 imply that individual Hispanic children in neighborhoods with more foreign-born people have less wheezing, suggesting a protective effect for Hispanics living in immigrant enclaves. Similar findings have flowed from previous studies, which together provide a possible neighborhood

explanation for the Hispanic Health Paradox. Another possible explanation, contextually-relevant to the location of this study, is that foreign-born Mexican-origin Hispanics living in El Paso can easily cross the international border to Ciudad Juarez and get cheaper medical treatments than in the US.

Contrary to hypothesis 2 (i.e., neighborhood income inequality measured by GINI will predict more wheezing), income inequality had no significant effect on children's wheezing. Non-significant findings of the GINI as a measure of income inequality need to be thought through as well. Some studies have found the important effect of income inequality in larger geographic areas such as states. However, in this study, income inequality at the neighborhood-level had no effect on children's current wheezing. The insignificance of the GINI finding here contrasts with some previous studies; discrepancies between various study results may result from the dramatically different sizes of spatial units of analysis employed across studies, given that there are likely scale-dependencies in processes where income inequality affects health outcomes.

Most studies that have found statistically significant detrimental effects have examined the GINI at coarser scales (e.g., the U.S. state level, not the neighborhood level). For instance, Kennedy et al. (1998) found a statistically significant deleterious effect of state-level GINI on individual self-rated health. Kaplan et al. (1996) also revealed that that state-level income inequality was significantly linked to health within the United States. This study might have an important implication for future research by suggesting that the neighborhood (census tract here) is perhaps unsuitable unit of analysis to examine the contextual effects of income inequality on individual-level health outcomes, especially for children. Moreover, the non-finding for GINI may relate to the fact that this study is designed to assess children's physical illness. A child may be less likely than an adult to internalize a negative social comparison, and, even if they were to, it may not manifest itself in their respiratory health status.

Finally, the analysis of cross-level interaction revealed that children in poverty, with higher health status and with foreign-born primary caretakers enjoy respiratory health benefits from living in

neighborhoods with higher levels of foreign-born people in neighborhood. This finding implies that there is a protective respiratory health effect for children with foreign-born primary caretakers as the level of foreign-born neighborhood composition increases. This result is along the same line with the findings of a previous study (Cagney et al. 2007). Also this is consistent with the future research implication of Cagney et al. (2007), who stated that “analyses from other urban centers that have prominent Latino enclaves would allow for a richer understanding of the enclave experience and, depending upon availability of data, could address the independent mechanisms relevant for a host of respiratory conditions” (p. 924).

Why neighborhood foreign-born composition appears to bring benefits of health to Hispanic children with foreign-born primary caretakers and in poorer households is not fully understood and something that needs further study. One possible explanation for these results are the mutual support, collective efficacy, socio-cultural cohesion, and exchanges of resources and information related to health with other (typically poor) Hispanic immigrants in neighborhoods, which may have protective effects for children with foreign-origin primary caretakers. Moreover, this result is important because it indirectly supports the acculturation hypothesis in which stronger attachment to cultural traditions in neighborhoods with higher ethnic concentrations might explain why foreign-born-Hispanics enjoy better respiratory health in spite of their lower socio-economic status and reduced access to the U.S. health care system. Several previous research results support this explanation. Wen et al. (2003) stated that “the prevalence of social resources mediates the impact of neighborhood affluence, indicating that neighborhood economic context might work through social resources to influence health status” (p. 856).

The geographical location of El Paso may be another significant reason for this paradox. Since El Paso is on the U.S-Mexico border, Mexican-origin-foreign-born Hispanics who are dominant in El Paso easily can cross the border and get medical treatment with much cheaper cost. This may imply an

explanation as to why children with foreign-born primary caretakers in neighborhoods with greater foreign-born composition have less wheezing, even though foreign-born people are less likely to have quality healthcare access and have lower socio-economic status in the U.S. More specific and detailed empirical work on this effect of neighborhood foreign-born neighborhood composition, poverty and the Hispanic health paradox are beyond the scope of this study. Further research is necessary to reveal the mechanisms at work and to explain how they operate in neighborhood social structural contexts.

This study is not free from some limitations. First, since this study is designed to be restricted in El Paso school districts, this may limit the generalizability of the findings in comparison to other urban neighborhoods elsewhere. Second, the measure of children's 'current wheeze' is not based on direct answers from children, but is an indirect secondary report from their primary caretakers. Moreover, the dependent variable is only "current wheeze." Diagnosed asthma, bronchitis, and other breathing disorders may have different albeit equally important relationships with neighborhood variables. Third, even though the literature review suggests possible protective effects from neighborhood foreign-born composition in terms of enhanced social capital, socio-cultural reciprocal exchanges, and collective efficacy, this study did not include those variables either at individual or neighborhood levels. In addition, this study used 2010 census tracts to operationally define neighborhoods, yet it is unclear how well census tracts capture and represent real contextual characteristics of neighborhoods and social communities.

This study examined effects of deprivation and the Hispanic Health Paradox in neighborhood context on current wheezing of Hispanic children living in El Paso, Texas. I employed a Hierarchical logistic modeling to estimate random effects at the neighborhood-level and the potential sociological importance of individual-level variables. The results reveal a consistent protective effect for neighborhood poverty even when accounting for many individual controls and other neighborhood-level variables. Although the result of neighborhood poverty do not fall into this general pattern, there are

some other research indicated a protective effect of lower socioeconomic status at neighborhood level. Further investigation into the links between neighborhood poverty and respiratory health outcomes is warranted. Further research exploration is necessary on those points. In conclusion, based on findings of this study, there are contextual neighborhood effects on children's wheezing in El Paso, Texas; some of those effects conform to the literature and others do not.

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Vita

Young-an Kim, a recipient of Korean Government Scholarship for Overseas Graduate Students and a member of Korean Academy of Government Supported Scholars, is a native Korean who was born in and grew up in the Busan metropolitan area in South Korea. He earned his B.A. in Sociology from University of Seoul (UOS) and a M.A. in Sociology from University of Texas at El Paso (UTEP). He is currently accepted to the criminology department of University of California, Irvine as a doctoral student.

For the past two years, Young-an's research has primarily focused on neighborhood effects, crime, juvenile delinquency and health. He is interested in continuing to research issues related to crime and neighborhood, including place-based interventions, crime and delinquency, and neighborhood level social inequality. He worked as a funded research assistant at the Criminal Justice Open Source Research Lab in UTEP, the Cyber-Share Lab of the Computer Science Department at UTEP, and as a graduate research participant of a National Institutes of Health project with Drs. Collins and Grineski of the Sociology and Anthropology Department while pursuing his M.A. degree.

In terms of teaching he worked as an undergraduate teaching assistant at the Statistical Social Survey Lab in University of Seoul teaching basic statistics and SPSS to graduate and undergraduate students. He has presented several of his studies in academic conferences such as 2012 annual meeting of American Society of Criminology, and the 2013 annual meetings of the Southwestern Social Science Association and Association of American Geographers. Previously he worked as an administrative assistant in a sociology department, assistant librarian in UOS, and served Korean Army for two years before being discharged as a sergeant.

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