Intergenerational differences in smoking among West Indian, Haitian, Latin American, and African blacks in the United States

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ABSTRACT

Due in large part to increased migration from Africa and the Caribbean, black immigrants and their descendants are drastically changing the contours of health disparities among blacks in the United States. While prior studies have examined health variation among black immigrants by region of birth, few have explored the degree of variation in health behaviors, particularly smoking patterns, among first- and second-generation black immigrants by ancestral heritage. Using data from the 1995–2011 waves of the Tobacco Use Supplements of the Current Population Survey (TUS-CPS), we examine variation in current smoking status among first-, second-, and third/higher-generation black immigrants. Specifically, we investigate these differences among all black immigrants and then provide separate analyses for individuals with ancestry from the English-speaking Caribbean (West Indies), Haiti, Latin America, and Africa—the primary sending regions of black immigrants to the United States. We also explore differences in smoking behavior by gender. The results show that, relative to those who migrated at or under age 13, disparities in smoking prevalence among the first-generation by age at migration are largest among black immigrants from Latin America. The results also suggest that second-generation immigrants with two foreign-born parents are generally less likely to smoke than the third/higher generation. We find no statistically significant difference in smoking between second-generation immigrants with mixed nativity parents and the third or higher generation. Among individuals with West Indian, Haitian, Latin American, and African ancestry, the probability of being a current smoker increases with each successive generation. The intergenerational increase in smoking, however, is slower among individuals with African ancestry. Finally, with few exceptions, our results suggest that intergenerational gaps in smoking behavior are larger among women compared to men. As additional sources of data for this population become available, researchers should investigate which ancestral subgroups are driving the favorable smoking patterns for the African origin population.

INTRODUCTION

Migration researchers have begun focusing on the health outcomes of black immigrants, a population of increasing importance for understanding the health trajectories of the U.S. black population as a whole. A growing body of research has found that black immigrants, like other immigrant subgroups, report better health and have lower rates of disability, obesity, and mortality than their U.S.-born counterparts (Bennett, Wolin, Askew, Fletcher & Emmons, 2007; Elo, Vang & Culhane, 2014; Hamilton, 2014; Hamilton & Hummer, 2011; Mehta, Elo, Ford & Siegel, 2015; Singh & Siahpush, 2002). These favorable health outcomes, however, tend to diminish across generations, with second-generation immigrants (U.S.-born individuals with at least one foreign-born parent) having worse health outcomes than first-generation (foreign-born) immigrants (Hendi, Mehta & Elo, 2015). Prior studies, which primarily focused on the Latino(a) population, have identified changes in health behaviors as one of the primary factors that negatively influence the health trajectories of immigrants as their tenure of U.S. residence increases and across generations (Acevedo-Garcia et al., 2010; Alcántara, Molina & Kawachi, 2014; Antecol & Bedard, 2006; Kimbro, 2009; Kondo, Rossi, Schwartz, Zamboanga & Salf, 2016; Lopez-Gonzalez, Aravena & Hummer, 2005; Pérez-Stable et al., 2001; Tong et al., 2012; Trinidad, Pérez-Stable, White, Emery & Messer, 2011). This study examines the association between generational status and one important health behavior among blacks: tobacco smoking.
Smoking is the primary cause of a number of illnesses, such as cancer and cardiovascular disease, and is the leading cause of preventable deaths in the United States (CDC, 2008; O’Malley, Wu, Mayne & Jatlow, 2014). Researchers have suggested that the lower incidence of smoking among the foreign-born is a primary determinant of immigrants’ mortality advantage over their U.S.-born counterparts (Blue & Fenelon, 2011; Fenelon, 2013). Prior studies have found that most immigrant subgroups, including black immigrants, are less likely to smoke than their native-born racial/ethnic counterparts upon arrival in the United States (Acevedo-Garcia, Pan, Jun, Osypuk & Emmons, 2005; King, Polednak, Bendel & Hovey, 1999; Singh & Siahpush, 2002; Siahpush, Singh, Jones, & Timsina, 2009). Smoking rates among immigrants, however, tend to increase as their tenure of U.S. residence increases (Acevedo-Garcia et al., 2010a; Alcántara et al., 2015; Kuerban, 2016; Leung, Ang, Thumboo, Wang, Yuan & Koh, 2014; Pérez-Stable et al., 2001; Singh & Siahpush 2002), a factor often thought to produce a convergence in health outcomes between immigrants and the U.S.-born. While a number of studies have investigated changes in smoking behavior among first-generation immigrants, several gaps exist in the extant literature on smoking, particularly among blacks in the United States.

First, few studies have examined smoking differences among foreign-born blacks who migrated to the United States as teens or adults (first generation) and those who migrated as children (known as the 1.5 generation). Relative to individuals who migrated later in life, those who came to the United States as children have spent their formative years in the United States. Thus, they might be more likely to adopt the host country’s smoking norms rather than those of their origin countries. Consequently, it is important to understand the ways in which age at migration shape smoking behavior among first-generation blacks in the United States.

Second, due in large part to data limitations, few studies have investigated ancestral health disparities among second-generation black immigrants, which conceals the increasing heterogeneity of the second-generation black immigrant population. Immigrants from the Caribbean have historically comprised the overwhelming majority of the flow (and stock) of black immigrants to the United States. Since the year 2000, however, the number of black immigrants arriving from Africa has surpassed the number of arrivals from the Caribbean (Anderson, 2015), suggesting that the fraction of second-generation black immigrants of African ancestry is likely to increase significantly in the coming decades. Among first-generation immigrants, pre-migration smoking norms vary considerably across the primary source countries (Bilano et al., 2015; Zhao, Palipudi, Ramanandraibe & Asma, 2016). Thus, the process of social adaptation into U.S. smoking behavior might vary considerably among second-generation immigrants depending on their parents’ place of birth (Leung, 2014). Understanding how smoking patterns vary by generational status among blacks by regions of origin/ancestry could also provide valuable insights into how the health behaviors and health outcomes of the black population are likely to evolve in the coming decades.

The current study investigates intergenerational patterns in current smoking behavior among blacks in the United States. Specifically, using data from the 1995–2011 waves of the Tobacco Use Supplements of the Current Population Survey (TUS-CPS), we examine intergenerational variation in smoking patterns among first-, 1.5, second-, and third/higher- generation black immigrant men and women. We also explore whether intergenerational smoking patterns vary among blacks by ancestral heritage, including the English-speaking Caribbean (West Indies), Haiti, Latin America, and Africa.

**Background**

A large literature has documented that some immigrant subgroups have more favorable health and mortality profiles, particularly upon arrival in the country, than their U.S.-born counterparts (Elo, Mehta, & Huang, 2011; Hamilton, 2014; Hamilton & Hummer, 2011; Singh & Siahpush, 2002). Black immigrants’ mortality advantage is particularly striking.1 Singh and Siahpush (2002) showed that black immigrants have a lower risk of all-cause mortality compared to both U.S.-born blacks and non-blacks, regardless of nativity. These health and mortality advantages, however, tend to decline as immigrants’ tenure of U.S. residence increases; a process termed the “healthy immigrant effect” (HIE). Prior research has suggested that selective migration (e.g., individuals with the best health profiles in the origin country are more likely to move to the United States) and immigrant cultural practices that promote good health behaviors play a significant role in producing immigrants’ initial health advantage (Jasso, Massey, Rosenzweig & Smith, 2005). Researchers have argued that changes in health behaviors, particularly smoking patterns, are one of the primary factors that generate the decline in immigrants’ health as their tenure of U.S. residence increases (Gorman, Lariscy, & Kaushik, 2014; Kuerban, 2016; Siahpush et al., 2009). Singh and Siahpush (2002) showed that while newly arrived immigrants were 52 percent less likely to smoke compared to their U.S.-born counterparts, these nativity advantages decreased to 32 and 18 percent, respectively, for those residing in the United States for 10–15 and more than 15 years.

**Age at time of arrival**

Another important but less studied source of variation in smoking behavior among foreign-born blacks is age at the time of immigration. Research has suggested that individuals who immigrated to the United States as children played a limited role in the migration decision. Consequently, if the decision to move among immigrants is strongly correlated with both good health and favorable health behaviors, those who came to the United States at younger ages might be less favorably selected on good health behaviors than those who migrated as adults. Moreover, studies have also shown that smoking habits tend to form at relatively early ages and are heavily influenced by family- and community-level contexts (Harrell, Bangdiwala, Deng, Webb & Bradley, 1998; Lipperman-Kreda, Grube & Friend, 2014). A number of studies have also found that children who migrate prior to becoming teenagers are at an increased risk of substance abuse or having psychiatric disorders (Breslau et al., 2007a; Breslau, Aguilar-Gaxiola, Borges, Kendler, Su & Kessler, 2007b). Consequently, first-generation immigrants who arrive in the United States during childhood might be more likely to smoke relative to those who migrate during adulthood.

To our knowledge, no prior studies have examined smoking behavior among black immigrants who arrived in childhood, also known as the 1.5 generation. Studies of Latino and Asian immigrants, however, have found that age at migration is significantly associated with smoking behavior (Kimbro, 2009; Wilkinson et al., 2005). For example, Kimbro (2009) investigated differences in smoking and binge drinking among U.S.- and foreign-born Latinos, with a focus on the role of age of migration. She found that foreign-born Latinos were less likely to smoke or binge drink than their U.S.-born counterparts. Moreover, relative to individuals who migrated earlier in life, foreign-born individuals who migrated later in life were less likely to engage in poor health behaviors. These patterns were especially pronounced among women.

**Generational differences in smoking**

Research has found that smoking patterns also change across immigrant generations (Acevedo-Garcia et al., 2005; Kopak, 2013; Singh & Siahpush, 2002). There are a number of potential explanations. First, studies have shown that parents transmit social norms

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1 One important exception is mental health. For black immigrants from majority black countries, the stress of migration has been shown to be associated with schizophrenia, depression and other mental health outcomes (Bourque et al., 2011; Cantor-Graae et al., 2005).
surrounding smoking to their offspring (Melchior, Chastang, Mackinnon, Galéra & Fombonne, 2010; White, Johnson & Buyse, 2000). Immigrant parents who come to the United States with healthier behaviors (e.g., lower smoking rates) may transmit social norms around smoking that are more common to their countries of origin. However, these effects may weaken from the second to the third generation, resulting in increased smoking rates across immigrant generations (Kopak, 2013; Singh & Siahpush, 2002; Vega, Gil & Kolody, 2002).

Segmented assimilation theory posits that some subgroups of nonwhite immigrants, particularly black and Mexican immigrants, are at risk of experiencing downward assimilation into U.S. society, which could result in the adoption of cultural practices found among U.S.-born Mexicans and blacks (Portes & Zhou, 1993), including suboptimal behaviors such as smoking. Similarly, studies have suggested that Mexican and black immigrants, in particular, experience high levels of discrimination. The stressors associated with discrimination might also lead to the use of tobacco smoking as a coping mechanism for discrimination (Tran, Lee & Burgess, 2010).

Kopak (2013), one of the only studies to our knowledge that has examined the relationship between generational status and smoking behavior using longitudinal data (National Longitudinal Survey of Adolescent Health), found that relative to the first generation, second- and third- generation Mexican youth showed significant increases in smoking levels from adolescence to early adulthood. Similarly, using cross-sectional data from the 1995–1996 Tobacco Use Supplements of the Current Population Survey, Acevedo-Garcia et al. (2005) showed that smoking rates were lower among first- and second- generation immigrants compared to the third/higher generation. These associations, however, varied across racial/ethnic groups. For black adults, the researchers found that while first-generation black immigrants had a lower probability of being a current smoker than third/higher generation blacks, only second-generation black immigrants with a U.S.-born mother and a foreign-born father had a lower probability of being a daily smoker than third/higher generation blacks. Acevedo-Garcia et al., however, were unable to distinguish differences in smoking patterns by region of ancestry.

Region (country) of origin

Smoking rates differ significantly across countries of origin (Baluja, Park & Myers, 2003). Moreover, social norms surrounding smoking in countries or regions of origin can influence immigrants' receptiveness to smoking (Leung, 2014). Currently, the primary sending regions for black immigrants are experiencing different stages of the tobacco epidemic. For example, smoking prevalence in Africa is currently low. However, because of declining smoking rates in many high-income countries, tobacco companies are increasing marketing efforts in African countries (Zhao et al., 2015). Consequently, most of the countries with increased smoking rates over the past 15 years are located in sub-Saharan Africa (Bilano et al., 2015). In contrast, researchers have projected that Latin American countries will continue to experience declines in smoking prevalence (Bilano et al., 2015). Panama, an important sending country for Latin American blacks (Kent, 2007), has implemented increasingly stringent tobacco control policies since 2005 (Sebrié et al., 2012; Sebrié & Glantz, 2007). It has also seen some of the largest declines in smoking prevalence over the past decade (Bilano et al., 2015). These trends suggest that there might be important variation in first-generation immigrants' attitudes toward smoking (and subsequent variation in second-generation smoking behaviors) over time.

With a few notable exceptions, due primarily to data limitations, most prior studies have been unable to examine sending region heterogeneity among first- and second- generation black immigrants. Bennett et al. (2008) found that African- and Caribbean-born blacks were less likely to be current smokers than U.S.-born blacks. The authors did not, however, detect significant smoking differences between African- and Caribbean-born blacks, but noted that the number of African-born individuals in the sample was very small. Another important limitation of Bennett et al. (2008) is that the authors do not distinguish between second- and third/higher generation blacks. Another notable study is Lacey, Sears, Govia, Forsythe-Brown, Matusko, and Jackson (2015). These authors showed that substance use and mental/physical health differs among first-generation immigrants from the Caribbean (Jamaica and Guyana) and that second- and third/higher- generation Caribbean adults experienced increased odds of substance abuse relative to the first-generation (Lacey et al., 2015).

Gender

Research indicates that the associations between duration of U.S. residence and health behaviors such as smoking vary significantly by gender (Gorman et al., 2014; Kimbro, 2009; Leung, 2014; Lopez-Gonzalez et al., 2005). Lopez-Gonzalez, Aravena, and Hummer (2005) found that while both male and female immigrants generally tend to have lower smoking rates relative to the U.S-born, the initial nativity advantage is strongest among women.

Similarly, Acevedo-Garcia et al. (2005) found gender differences in smoking across immigrant generations. For example, relative to third/ higher generation women, second-generation immigrant women with two foreign-born parents had lower odds of being a daily smoker. Although a similar association was found for men, the association was more pronounced among women. This result might be explained by gender differences in smoking between immigrants' countries of origin compared to the United States. The latest available data for U.S.-born blacks suggests that approximately 21 percent of males are current smokers compared to 13 percent of females. For black immigrants, the overall numbers are lower but the gap is similar (approximately 11 percent of males and 1 percent of females report smoking). However, differences in male and female current cigarette smoking rates are far larger among adults in key Caribbean sending countries such as Jamaica (22.9 vs. 7.5 percent) and Trinidad and Tobago (33.5 vs. 9.4 percent) (WHO Report on the Global Tobacco Epidemic, 2013). In contrast, while overall smoking rates are lower among prominent African sending countries, the gender gap, in absolute terms, is somewhat closer to that found among U.S.-born blacks. For example, in Nigeria, a primary African sending country for black immigrants, about 9 percent of adult males report being current cigarette smokers compared to only 0.2 percent of women (WHO Report on the Global Tobacco Epidemic, 2013).

Taken together, existing evidence suggests that it is critical to evaluate the complex and potentially unique intergenerational patterns in smoking behavior among foreign-born black men and women and their descendants. Based on the extant literature, we make four conjectures regarding intergenerational patterns in smoking among blacks in the United States: 1) relative to immigrants who migrated during early childhood (age 13 or younger), first-generation immigrants who migrated after age 13 will have a lower probability of being current smokers; 2) the probability of smoking will increase across immigrant generations; 3) compared to second-generation immigrants with one foreign-born parent, second-generation immigrants with mixed nativity parents (one foreign-born parent, one U.S.-born parent) will have a higher probability of being current smokers; 4) first-
immigrant women will have lower smoking rates than first-generation men; however, the intergenerational increase in smoking rates will be more rapid for immigrant women.

Data, measures, and methods

Data

The Current Population Survey (CPS) is a monthly survey conducted in the United States designed primarily to study labor market dynamics. Certain months of the CPS, however, include a supplement that asks respondents a range of questions pertaining to tobacco use. The analytic sample for this study comes from the 1995–2011 waves of the Tobacco Use Supplements of the Current Population Survey (TUS-CPS) obtained from the Integrated Public Use Micro Series (IPUMS) at the Minnesota Population Center (Ruggles et al., 2004). Although the TUS-CPS began in 1992, early years were excluded because the TUS-CPS did not start collecting data on place of birth until 1995.\(^5\)

For uniformity, we restrict the sample to individuals who are 18 years or older. The study is restricted to individuals who self-reported their race as black. The analytic sample also excludes individuals born abroad to American parents and individuals born in U.S.-outlying areas or territories to avoid including people in the immigrant sample who are more similar to the U.S.-born than to immigrants.

The CPS is one of the few nationally representative surveys that collects data on the nativity status of respondents’ parents, allowing us to examine smoking disparities among first-, second-, and third/higher generation blacks. For our analyses, immigrants, also referred to as the first-generation, are defined as individuals born outside of the United States. Prior research has suggested that the process of social assimilation varies considerably between immigrants who migrated as young children and those who arrived as adolescents or as adults (Portes &

\(^3\)For detailed information regarding survey response rates see http://cancercontrol-cancer.gov/brp/brb/tus-cps/
Similarly, second-generation immigrants are assigned to a place of birth, including Haiti, the West Indies, Latin America, or immigrants are assigned to a country/region of origin based on their place of birth. We divide second-generation immigrants into two groups: immigrants from the West Indies (English-speaking Caribbean), Haiti, Latin America, and Africa. All first-generation immigrants are assigned to a country/region of origin based on their place of birth, including Haiti, the West Indies, Latin America, or Africa. Second-generation immigrants are assigned to a region of ancestry based on parental birthplace. For the subgroup analyses, the second generation is defined as individuals who have two parents who were born in the same region (or Haiti) or individuals with one parent born in one of the defined places and one parent born in the United States. Because of the inability to categorize individuals who have two foreign-born parents who were born in different regions of the world into a unique ancestral grouping, we exclude these individuals (approximately 9 percent of the second-generation with two foreign-born parents) from the subgroup analysis but include them in the aggregate analysis. The final analytic sample contains information on 104,812 individuals who are third/higher generation, 1395 individuals with one foreign-born parent, 1388 individuals with two foreign-born parents, 1633 individuals who immigrated at or prior to age 13, and 8838 individuals who immigrated after age 13.

**Measures**

The dependent variable of interest is whether an individual is a self-reported current smoker. Using data from the smoker recode variable, which identifies individuals as either an “everyday smoker,” a “nondaily smoker,” a “former smoker,” or a “never smoker,” we generate a

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**Table 2**

Descriptive Statistics for U.S.-Born and Immigrant Black Adults by Generational Status and Ancestry, Men and Women Aged 18+

**Source:** See Table 1.

| Panel 1. | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| West Indian Ancestry | | | | | | | | |
| Arrived Age > 13 | Arrived <=13 | Both Parents Foreign-Born | One Parent Foreign-Born | | | | |
| Current Smoker | 0.070 | 0.068 | 0.091 | 0.168 | | | | |
| Social and Demographic Characteristics | | | | | | | | |
| Age | 46.377 | 30.313 | 31.408 | 34.480 | | | | |
| Female | 0.571 | 0.530 | 0.514 | 0.567 | | | | |
| Married | 0.478 | 0.248 | 0.176 | 0.236 | | | | |
| Family Size | 3.028 | 3.438 | 3.092 | 2.885 | | | | |
| Education | 12.767 | 13.398 | 13.570 | 13.499 | | | | |
| Resides in a Metropolitan Area | 0.985 | 0.992 | 0.981 | 0.946 | | | | |
| African Ancestry | | | | | | | | |
| Arrived Age > 13 | Arrived <=13 | Both Parents Foreign-Born | One Parent Foreign-Born | | | | |
| Current Smoker | 0.069 | 0.051 | 0.052 | 0.151 | | | | |
| Distribution of Family Income | | | | | | | | |
| Less than 5000 | 0.035 | 0.048 | 0.052 | 0.050 | | | | |
| 5000 to 7499 | 0.028 | 0.031 | 0.013 | 0.032 | | | | |
| 7500 to 9999 | 0.030 | 0.020 | 0.018 | 0.033 | | | | |
| 10,000 to 12,499 | 0.037 | 0.029 | 0.014 | 0.018 | | | | |
| 12,500 to 14,999 | 0.035 | 0.016 | 0.021 | 0.024 | | | | |
| 15,000 to 19,999 | 0.051 | 0.034 | 0.052 | 0.063 | | | | |
| 20,000 to 24,999 | 0.082 | 0.055 | 0.060 | 0.103 | | | | |
| 25,000 to 29,999 | 0.085 | 0.085 | 0.061 | 0.084 | | | | |
| 30,000 to 34,999 | 0.079 | 0.072 | 0.065 | 0.040 | | | | |
| 35,000 to 39,999 | 0.080 | 0.105 | 0.077 | 0.059 | | | | |
| 40,000 to 49,999 | 0.100 | 0.113 | 0.082 | 0.097 | | | | |
| 50,000 to 59,999 | 0.081 | 0.098 | 0.080 | 0.101 | | | | |
| 60,000 to 74,999 | 0.091 | 0.093 | 0.118 | 0.116 | | | | |
| More than 75,000 | 0.187 | 0.201 | 0.289 | 0.181 | | | | |
| Family Income | 41,120,511 | 43,348,564 | 47,429,970 | 41,676,473 | | | | |
| Observations | 3173 | 725 | 462 | 395 | | | | |

(continued on next page)
A dichotomous variable that identifies whether an individual is a current smoker, which equals 1 for individuals who are either non-daily smokers or everyday smokers, and is equal to 0 for individuals who report their smoking status as a never smoker or a former smoker. To control for demographic differences among respondents within the sample, our regressions include age, marital status, family size, and a dummy variable that indicates whether the respondent is male or female. To account for social and economic differences, regression models control for years of education, respondents’ occupation, and family income. Each of the demographic covariates above are based on self-report. Smoking patterns within the United States vary by place of residence. To account for this factor, regression models include state of current residence fixed effects and a dummy variable that captures whether a respondent resides in a metropolitan area. Models also include survey year fixed effects to adjust for any period effect on current smoking status.

**Methods**

We present descriptive statistics and probit regression models for the entire sample and separately for each major ancestral subgroup. Regression results are shown as marginal effects for ease of interpretation. Robust standard errors are used to determine the significance of estimates. To account for differences in self-response as well as the CPS-TUS complex multistage sampling design, the survey’s non-self-response weights are used for both descriptive and regression estimates.

**Results**

Table 1 provides detailed descriptive statistics for the entire sample. Columns 1 and 2 present summary statistics for foreign-born blacks who either migrated after age 13 or up to age 13 (including age 13), respectively. Columns 3 and 4 show summary statistics for second-generation black immigrants with two or one foreign-born parent(s), respectively. Finally, Column 5 shows summary statistics for third/higher generation individuals.

As expected, Table 1 indicates that third/higher generation blacks (Column 5) have the highest proportion of current smokers (0.212). First-generation immigrants (those born outside of the United States)
have the lowest proportion of current smokers, with little difference between those who migrated at or prior to age 13 (0.080) and those who migrated after age 13 (0.074). Column 3 shows that the proportion of second-generation black immigrants with two foreign-born parents who report being a current smoker (0.135) is higher than the proportion of foreign-born individuals by age at arrival. Perhaps the most striking pattern that emerges from Table 2 is the difference in smoking patterns among members of the second generation by the number of foreign-born parents. For every subgroup, U.S.-born individuals with one foreign-born parent report far higher smoking rates than those with two foreign-born parents. This gap in smoking status is largest among individuals whose parents were born in Africa (0.151 versus 0.052) and the West Indies (0.168 versus 0.091), respectively. The gap is smallest among members of the second generation by the number of foreign-born parents. For every subgroup, U.S.-born individuals with one foreign-born parent report far higher smoking rates than those with two foreign-born parents. This gap in smoking status is largest among individuals whose parents were born in Africa (0.151 versus 0.052) and the West Indies (0.168 versus 0.091), respectively. The gap is smallest among individuals from Haiti and Latin America.

Table 3 shows estimates from probit regression models examining the associations between generational status and smoking for the entire sample. As we noted earlier, the results are shown as marginal effects of probit regression models of current smoking by generational status, adults aged 18+. Source: These data are taken from the 1995–2011 Tobacco Use Supplements of the Current Population Surveys for blacks aged 18 or older. Notes: The nonresponse weights from the Tobacco Use Supplements are used for all calculations. 95% confidence intervals are shown in parenthesis. All models include controls for survey year. The fully adjusted model also controls for state of current residence.

### Table 3
Marginal Effects of Probit Regression Models of Current Smoking by Generational Status, Adults Aged 18+.

| Generational Status: (Reference Group: Third/Higher Generation) | Entire Sample | Entire Sample |
|---------------------------------------------------------------|---------------|---------------|
| Immigrated After Age 13                                      | -0.137***     | -0.131***     |
| Immigrated At or Prior to Age 13                             | -0.120***     | -0.104***     |
| Both Parents Foreign-born                                     | -0.064***     | -0.048***     |
| One Parent Foreign-born & One Parent U.S.-born                | 0.005 [0.018,0.029] | 0.018 [0.006,0.043] |

**Social and Demographic Characteristics**

| Age                                                       | 0.000*** [0.000,0.001] | 0.001*** [0.000,0.001] |
|-----------------------------------------------------------|------------------------|------------------------|
| Female                                                    | -0.078*** [-0.083,-0.073] | -0.074*** [-0.080,-0.069] |
| Married                                                   | -0.023*** [-0.029,-0.017] | -0.023*** [-0.029,-0.017] |
| Family Size                                               | -0.003*** [-0.005,-0.002] | -0.003*** [-0.005,-0.002] |
| Education                                                 | -0.012*** [-0.013,-0.011] | -0.012*** [-0.013,-0.011] |

**Occupation:** (Reference Group: Managerial and Professional)

| Technical                                                | 0.020*** [0.010,0.030] |
|----------------------------------------------------------|------------------------|
| Service                                                  | 0.062*** [0.050,0.074] |
| Agriculture                                              | 0.112*** [0.077,0.146] |
| Production                                               | 0.097*** [0.081,0.114] |
| Operators                                                | 0.084*** [0.071,0.097] |
| Unemployed                                               | -0.009 [-0.019,0.001] |
| Log(Family Income)                                        | -0.047*** [-0.050,-0.044] |
| Resides in a Metropolitan Area                            | 0.000 [-0.008,0.008] |

| Observation                                               | 118,266             | 118,266             |
|-----------------------------------------------------------|---------------------|---------------------|
| Pseudo R-Squared                                          | 0.026               | 0.063               |
| LR chi2                                                   | 2371.297            | 5591.852            |

***p < 0.001.
**p < 0.01.
*p < 0.05.
Model 1 of Table 3 shows that after controlling for age and sex, relative to the third or higher generation, the proportion of current smokers is 0.137 (95% CI: -0.143, -0.130) points lower for immigrants who arrived after age 13 and 0.120 (95% CI: -0.134, -0.107) points lower for immigrants who arrived at or before age 13. The relationship between second-generation status and smoking behavior, however, differs depending on the number of foreign-born parents. Second-generation individuals with two foreign-born parents are less likely than the third/higher generation to report smoking (-0.064 points: (95% CI: -0.082, -0.046)). We find no statistically significant difference in smoking status between the third/higher generation and second-generation immigrants with one foreign-born parent. Taken together, results from Model 1 show a steady increase in the probability of being a current smoker moving from the first generation to the second generation with two foreign-born parents to second-generation members with mixed nativity parentage (one U.S.-born and one foreign-born parent). The confidence intervals shown in Table 3 confirm that differences across generational groups in the probability of being a current smoker are statistically significant across generations at conventional levels. Although the magnitude of these estimates changes somewhat after controlling for relevant demographic variables (Model 2), the qualitative significance of most of the results remains the same.

Table 4 shows results from models partitioned by sex. In contrast to the pooled results, Model 2 of Table 4, our fully adjusted model, shows no statistically significant difference in the probability of being a current smoker among the first generation males in the sample by age at migration. This table also shows that relative to the third/higher generation, the probability of being a current smoker is 7.6 percentage points lower for second-generation black males with two foreign-born parents. Among men, there is no statistically significant difference in the probability of being a current smoker among individuals with one foreign-born and one U.S.-born parent relative to the third/higher generation.

However, our findings suggest that among women, there is a more pronounced increase in current smoking across immigrant generations. For example, the marginal effect for immigrant women who arrived at or before age 13 is 4.6 points greater than the marginal effect for women who migrated after age 13 (Table 4, Model 2, Women). In contrast, there is no statistically significant difference between these two groups for men. Similarly, while there is a sizable second-generation advantage in current smoking among second-generation men with two foreign-born parents, this estimate for women is considerably smaller (-0.076 vs. -0.027) and marginally significant. Similar to men, there is no statistically significant difference in the probability of being a current smoker between third/higher generation women and second-generation women with one foreign-born parent.

Table 5 shows results for our fully specified model for each of the ancestral subgroups. Similar to the full-sample results (Table 3), first-generation immigrants from each of the ancestral subgroups are substantially less likely to report being current smokers relative to the third/higher generation. Among immigrants from Latin America, the magnitude of this association is stronger among first-generation immigrants who came to the United States after age 13 than for those who migrated at or before age 13. Age at migration does not appear to be associated with the probability of

### Table 4
Marginal Effects of Probit Regression Models of Current Smoking by Generational Status, Men and Women Aged 18+.

| Generational Status: (Reference Group: Third/Higher Generation) | Model 1 | Model 2 | Model 1 | Model 2 |
|---------------------------------------------------------------|--------|--------|--------|--------|
| Immigrated After Age 13                                       | -0.133*** [-0.145, -0.122] | -0.122*** [-0.136, -0.109] | -0.142*** [-0.148, -0.136] | -0.138*** [-0.144, -0.131] |
| Immigrated At or Prior to Age 13                              | -0.139*** [-0.163, -0.114] | -0.116*** [-0.143, -0.088] | -0.104*** [-0.120, -0.089] | -0.092*** [-0.109, -0.075] |
| Both Parents Foreign-born                                     | -0.099*** [-0.127, -0.070] | -0.076*** [-0.107, -0.045] | -0.036 [-0.055, -0.013] | -0.027 [-0.051, -0.003] |
| One Parent Foreign-born & One Parent U.S.-born                | -0.01 [-0.049, 0.028] | 0.009 [-0.031, 0.049] | 0.018 [-0.011, 0.047] | 0.025 [-0.004, 0.055] |

| Social and Demographic Characteristics                        | Model 1 | Model 2 | Model 1 | Model 2 |
|---------------------------------------------------------------|--------|--------|--------|--------|
| Age                                                           | 0.001*** [0.001, 0.001] | 0.001*** [0.001, 0.002] | 0.000 [-0.000, 0.000] | 0.000 [-0.000, 0.000] |
| Married                                                       | -0.029*** [-0.040, -0.019] | -0.022*** [-0.029, -0.015] | -0.022*** [-0.029, -0.015] | -0.022*** [-0.029, -0.015] |
| Family Size                                                   | -0.006*** [-0.009, -0.003] | -0.006*** [-0.009, -0.003] | -0.006*** [-0.009, -0.003] | -0.006*** [-0.009, -0.003] |
| Education                                                     | -0.014*** [-0.017, -0.012] | -0.010*** [-0.012, -0.008] | -0.010*** [-0.012, -0.008] | -0.010*** [-0.012, -0.008] |

| Occupation: (Reference Group: Managerial and Professional)    | Model 1 | Model 2 | Model 1 | Model 2 |
|---------------------------------------------------------------|--------|--------|--------|--------|
| Technical                                                    | 0.025 [0.006, 0.045] | 0.014 [0.003, 0.025] | 0.025 [0.006, 0.045] | 0.014 [0.003, 0.025] |
| Service                                                      | 0.074 [0.053, 0.095] | 0.059 [0.045, 0.072] | 0.074 [0.053, 0.095] | 0.059 [0.045, 0.072] |
| Agriculture                                                  | 0.121 [0.079, 0.163] | 0.087 [0.038, 0.167] | 0.121 [0.079, 0.163] | 0.087 [0.038, 0.167] |
| Production                                                   | 0.119 [0.096, 0.142] | 0.065 [0.031, 0.098] | 0.119 [0.096, 0.142] | 0.065 [0.031, 0.098] |
| Operators                                                    | 0.099 [0.080, 0.119] | 0.078 [0.059, 0.096] | 0.099 [0.080, 0.119] | 0.078 [0.059, 0.096] |
| Unemployed                                                    | 0.002 [-0.016, 0.021] | -0.013 [-0.024, -0.002] | 0.002 [-0.016, 0.021] | -0.013 [-0.024, -0.002] |
| Log(Family Income)                                           | -0.059 [-0.064, -0.054] | -0.036 [-0.040, -0.033] | -0.059 [-0.064, -0.054] | -0.036 [-0.040, -0.033] |
| Resides in a Metropolitan Area                               | -0.003 [-0.018, 0.011] | 0.002 [-0.008, 0.012] | -0.003 [-0.018, 0.011] | 0.002 [-0.008, 0.012] |

| Observation | Model 1 | Model 2 | Model 1 | Model 2 |
|-------------|--------|--------|--------|--------|
|             | 48,974 | 48,974 | 69,292 | 69,292 |
| Pseudo R-Squared | 0.017 | 0.057 | 0.022 | 0.061 |
| LR chi²     | 678,461 | 2312,364 | 903,855 | 2787,622 |

*, **, *** p < 0.05, 0.01, 0.001.
### Table 5
Marginal Effects of Probit Regression Models of Current Smoking by Generational Status, Men and Women Aged 18+.

Source and Notes: See Table 3.

| Generational Status: (Reference Group: Third Higher Generation) | West Indian | African | Haitian | Latin American |
|---------------------------------------------------------------|-------------|---------|---------|----------------|
| Immigrated After Age 13                                       | -0.133*** [-0.143,-0.122] | -0.135*** [-0.148,-0.121] | -0.157*** [-0.168,-0.146] | -0.132*** [-0.145,-0.119] |
| Immigrated At or Prior to Age 13                             | -0.122*** [-0.143,-0.102] | -0.145*** [-0.184,-0.106] | -0.156*** [-0.187,-0.126] | -0.078*** [-0.117,-0.040] |
| Both Parents Foreign-born                                     | -0.089 [-0.120,-0.057] | -0.135 [-0.192,-0.078] | -0.091 [-0.141,-0.040] | -0.050 [-0.098,-0.002] |
| One Parent Foreign-born & One Parent U.S.-born                | -0.013 [-0.056,0.031] | -0.026 [-0.130,0.078] | -0.044 [-0.176,0.087] | -0.009 [-0.055,0.037] |

#### Social and Demographic Characteristics

| Age                                                          | 0.001*** [0.000,0.001] | 0.001*** [0.000,0.001] | 0.001*** [0.000,0.001] | 0.001*** [0.000,0.001] |
| Family Size                                                  | -0.005 ** [-0.008,-0.002] | -0.005 ** [-0.008,-0.002] | -0.005 ** [-0.008,-0.002] | -0.006 *** [-0.009,-0.002] |
| Education                                                    | -0.016 *** [-0.018,-0.013] | -0.016 [-0.018,-0.013] | -0.016 [-0.018,-0.013] | -0.016 [-0.018,-0.013] |

#### Occupation: (Reference Group: Managerial and Professional)

| Technical                                                   | 0.020*** [0.010,0.031] | 0.022*** [0.011,0.034] | 0.022*** [0.011,0.033] | 0.022*** [0.011,0.033] |
| Agriculture                                                 | 0.121** [0.085,0.157] | 0.124 [0.087,0.161] | 0.127 [0.090,0.164] | 0.121** [0.085,0.157] |
| Production                                                  | 0.104 [0.086,0.122] | 0.106 [0.088,0.125] | 0.107 [0.089,0.125] | 0.107 [0.089,0.125] |
| Operators                                                   | 0.093 [0.079,0.106] | 0.093 [0.079,0.106] | 0.094 [0.080,0.107] | 0.093 [0.079,0.107] |
| Log(Family Income)                                          | -0.048*** [-0.051,-0.045] | -0.049** [-0.052,-0.046] | -0.049** [-0.052,-0.045] | -0.049** [-0.052,-0.045] |
| Resides in a Metropolitan Area                              | 0.000 [-0.009,0.009] | 0.001 [-0.008,0.009] | 0.001 [-0.008,0.009] | 0.000 [-0.009,0.009] |

Observation 109,567 107,344 106,723 107,321
Pseudo R-Squared 0.058 0.055 0.056 0.053
LR chi2 5075.938 4777.669 4838.498 4726.418

*** p < 0.001.
** p < 0.01.
* p < 0.05.

### Table 6
Marginal Effects of Probit Regression Models of Current Smoking by Generational Status, Men Aged 18+.

Source and Notes: See Table 3

| Generational Status: (Reference Group: Third Higher Generation) | West Indian | African | Haitian | Latin American |
|---------------------------------------------------------------|-------------|---------|---------|----------------|
| Immigrated After Age 13                                       | -0.119*** [-0.141,-0.097] | -0.123*** [-0.149,-0.098] | -0.166*** [-0.189,-0.143] | -0.135*** [-0.160,-0.109] |
| Immigrated At or Prior to Age 13                              | -0.140*** [-0.178,-0.101] | -0.174** [-0.232,-0.116] | -0.175** [-0.243,-0.107] | -0.113** [-0.175,-0.050] |
| Both Parents Foreign-born                                     | -0.124*** [-0.176,-0.071] | -0.148*** [-0.246,-0.050] | -0.108*** [-0.186,-0.031] | -0.039*** [-0.152,0.046] |
| One Parent Foreign-born & One Parent U.S.-born                | -0.05 [-0.120,0.019] | -0.093 [-0.278,0.092] | -0.146 [-0.275,0.018] | -0.025 [-0.102,0.051] |

#### Social and Demographic Characteristics

| Age                                                          | 0.001*** [0.001,0.002] | 0.001*** [0.001,0.002] | 0.001*** [0.001,0.002] | 0.001*** [0.001,0.002] |
| Family Size                                                  | -0.005 [-0.008,-0.002] | -0.005 [-0.008,-0.002] | -0.005 [-0.009,-0.002] | -0.006 [-0.009,-0.002] |
| Education                                                    | -0.016*** [-0.018,-0.013] | -0.016 [-0.018,-0.013] | -0.016 [-0.018,-0.013] | -0.016 [-0.018,-0.013] |

#### Occupation: (Reference Group: Managerial and Professional)

| Technical                                                   | 0.023*** [0.003,0.044] | 0.027*** [0.005,0.048] | 0.026*** [0.005,0.047] | 0.026*** [0.005,0.048] |
| Service                                                     | 0.081*** [0.059,0.104] | 0.081*** [0.058,0.103] | 0.085*** [0.062,0.106] | 0.086*** [0.063,0.109] |
| Agriculture                                                 | 0.128*** [0.084,0.172] | 0.129*** [0.085,0.173] | 0.134*** [0.089,0.179] | 0.128*** [0.084,0.171] |
| Production                                                  | 0.127*** [0.103,0.152] | 0.131*** [0.106,0.156] | 0.132*** [0.107,0.158] | 0.132*** [0.107,0.157] |
| Operators                                                   | 0.109*** [0.088,0.130] | 0.108*** [0.087,0.129] | 0.110*** [0.089,0.132] | 0.110*** [0.089,0.131] |
| Log(Family Income)                                          | -0.061*** [-0.067,-0.056] | -0.062*** [-0.068,-0.056] | -0.062*** [-0.068,-0.056] | -0.062*** [-0.067,-0.056] |
| Resides in a Metropolitan Area                              | -0.003 [-0.017,0.002] | -0.004 [-0.019,0.001] | -0.004 [-0.018,0.001] | -0.004 [-0.019,0.001] |

Observations 44,869 44,223 43,761 43,985
Pseudo R-Squared 0.053 0.052 0.052 0.049
LR chi2 2115.848 2042.075 2039.283 2004.445

*** p < 0.001.
** p < 0.01.
* p < 0.05.
smoking among first-generation West Indian, African, and Haitian immigrants.

The second-generation immigrant advantage (relative to the third generation) is largest among individuals with two African-born parents [-0.135 (95% CI: -0.192, -0.078)]. Across each ancestral subgroup, we detect no statistically significant differences in current smoking status between the third/higher generation and second-generation immigrants with only one foreign-born parent. Tables 6 and 7 present these estimates separately for men and women, revealing a similar pattern of smoking as shown in Table 5. Because of the small sample sizes that generate these estimates, however, these results should be viewed with caution.

Discussion, limitations, and conclusion

Discussion

This study extends prior work on the relation between generational status and tobacco use among black immigrants and their descendants (Acevedo-Garcia et al., 2005). To our knowledge, this is the first study to examine the associations between generational status and smoking behavior among the major ancestral black immigrant subgroups. Four key findings emerge from our analyses. First, both in the full sample and across the four ancestral subgroups, we find that first-generation immigrants are far less likely to report being current smokers than those who migrated at or before age 13; this difference is particularly pronounced among blacks with Latin American ancestry. Second, while the results show that second-generation immigrants with two foreign-born parents are generally less likely to smoke than the third or higher generation, there is no statistically significant difference in smoking between second-generation immigrants with mixed nativity parents and the third or higher generation. Third, among individuals with West Indian, Haitian, and Latin American ancestry, the probability of being a current smoker increases with each successive generation. In contrast to these groups, smoking patterns are more stable among individuals with African ancestry. Finally, both the magnitude and significance of our results appear to differ by gender, particularly in the analyses not partitioned by ancestry (Table 5). These findings raise four important questions regarding generational differences in smoking among blacks in the United States.

1. What factors might explain the favorable smoking patterns of the first generation? Why does migrating at a later age negatively influence the probability of smoking?

The large and negative associations between first-generation immigrant status and smoking are consistent with prior research on smoking behavior and substance abuse among foreign-born blacks and their descendants (Acevedo-Garcia et al., 2005; Bromman, Neighbors, Delva, Torres & Jackson, 2008). In the context of the “healthy immigrant effect” (HIE) framework (Antecol & Bedard, 2006), researchers have argued that immigrants might be more likely to adhere to cultural practices that promote healthy eating and discourage detrimental health behaviors, such as alcohol, drug, and tobacco use (Abrado-Lanza et al., 2005; Amaro, Whitaker, Coffman & Heeren, 1990). Others have argued that selective migration is a more salient explanation for the HIE (Kennedy, Kidd, McDonald & Biddle, 2015). Although we are unable to disentangle the
relative importance of culture versus selective migration in explaining the favorable smoking patterns of the first generation relative to the third/higher generation, the lower levels of tobacco use among first-generation immigrants that we find are consistent with predictions based on the HIE.

At least two important potential factors could explain why smoking patterns differ among the first generation based on their age at arrival. First, because individuals who migrate as children play a limited role in the decision to migrate, these individuals might not be as favorably selected on health behaviors as those who migrated as adults. Second, most adult smokers begin smoking before the age of 18 (Riordan, 2009). First-generation immigrants who migrate at older ages might spend their formative years in countries with relatively stronger anti-smoking norms and might be less likely to take up smoking in adulthood than individuals who migrated earlier in life (Kopak, 2013). Although not addressed in our analyses, studies have also suggested that friendship networks might be an important means of understanding intergenerational changes in smoking behavior. For example, one study from Canada on adolescents suggested that first-generation immigrants are the least likely to have friends who smoke, followed by the second- and the third/higher-generation (Georgiades, Boyle, Duku & Racine, 2006).

2. Why do second-generation immigrants with one foreign-born parent show a higher probability of smoking than those with two foreign-born parents?

In general, children are more likely to smoke if their parents smoke; the risk is elevated further if both parents smoke (Gilman et al., 2009). In both the United States and the United Kingdom, black immigrant mothers are less likely to smoke relative to native-born women (Elo & Culhane, 2010; Elo et al., 2014; Green, 2014; Jackson, McLanahan & Kiernan, 2012), which is potentially a reflection of the social norms surrounding smoking in their respective countries of origin. Differences within the second-generation by the number of foreign-born parents may reflect the intensity of and variation in attitudes toward smoking among black immigrant families, though further research is needed in this area (Acevedo-Garcia et al., 2005; Thomas, 2009).

3. What explains the variation (or lack thereof) across black immigrants from the West Indies, Africa, Haiti, and Latin America?

We generally find that the gap in smoking between the first- and 1.5-generation is similar across ethnic groups, with an important exception. Among Latin American black women, there seems to be a much larger smoking advantage among those who immigrated after age 13 compared to those who came to the United States at or before age 13. This finding is consistent with prior research among Latinos that suggests that age at migration is associated with smoking (Kimbro, 2009). Kimbro (2009) found that the impact of age at migration is positively correlated with smoking and binge drinking. Given that immigrants who arrived prior to adolescence might be more acculturated than immigrants who arrived later in life, the higher smoking rates among Latin American immigrants who migrated prior to age 13 are in line with prior research. Additional research, however, is needed to explain why this pattern only exists for black immigrants, particularly black women, with Latin American ancestry.

Relative to third/higher generation, second-generation individuals with two immigrant parents are less likely to smoke. These results are most pronounced among African immigrants, which might suggest that African parents—many of whom come from countries with lower smoking rates than Caribbean and Latin American countries (WHO Report on the Global Tobacco Epidemic, 2015) —might place particular emphasis on anti-smoking behavior.

4. Why are intergenerational differences in smoking generally larger among women compared to men?

Prior research among Hispanics has found that, relative to male immigrants, the health behaviors of female immigrants converge more rapidly to U.S. norms (Kimbro, 2009, Lopez-Gonzalez, Aravena & Hummer, 2005). Our results extend these findings and generally suggest that intergenerational gaps in smoking behavior are larger among women compared to men in both relative and absolute terms. Specifically, we show that while there is virtually no difference in the likelihood of smoking among the first- and 1.5-generation among men, there is a more meaningful first generation advantage among women. Similarly, the intergenerational decline in the immigrant smoking advantage (moving from the first- to the second-generation) is more pronounced among women relative to men.

Limitations

Our study has a few important limitations. First, we rely on self-reported smoking, rather than biological measures of tobacco consumption, such as serum cotinine levels (Perezstable, Benowitz & Marin, 1995). To the extent that survey participants might underreport smoking, this might bias our observed estimates. We have no evidence, however, that individuals self-report differently based on generational status or region of ancestry. Second, while our study explores the role of region of origin, data limitations prevent us from exploring generational differences in smoking for specific countries in the West Indies, Africa, and Latin America. Consequently, we are not able to determine which ancestral subgroups are driving the regional results. Third, our cross-sectional data do not allow us to investigate how smoking behaviors evolve over time among first- and second-generation immigrants from the same family. Finally, we are unable to explore the role of specific stressors (i.e. discrimination) on gender-specific intergenerational smoking trajectories among black immigrants (Tran, Lee & Burgess, 2010).

Conclusion

Our findings suggest the importance of accounting for variation in smoking within and across generations of black immigrants and their descendants. We also show that both gender and region of ancestry/origin shape intergenerational changes in current smoking. These results have important implications for a broader research agenda investigating the health behaviors and health outcomes of black immigrants. We believe that future research should consider the potential links between gender, household structure and smoking behavior among the children of black immigrants, including immigrant parents’ smoking behavior during children’s formative periods (Acevedo-Garcia et al., 2005). In addition, understanding differences in contextual factors such as gender-specific smoking norms during critical periods of development can help clarify why women who migrate after adolescence are much more likely to report better health behaviors compared to those who migrate prior to this period. Future research should also explore the roles of stress and exposure to discrimination in explaining variation in smoking among black immigrants in the United States (Slopen et al., 2012; Tran, Lee & Burgess, 2010; Ladrine & Klohoff, 1999). Finally, further qualitative and quantitative studies should consider how and why intergenerational smoking patterns differ by ancestry. Answers to these questions will better equip public health decision makers with the information needed to better target scarce resources toward smoking cessation and prevention efforts to the subgroups most at risk.
## Appendix A1. Countries that comprise each ancestral subgroup

| Latin America | West Indies | Sub-Saharan Africa |
|---------------|-------------|-------------------|
| Mexico        | Jamaica     | Ghana             |
| Belize/British Honduras | Bahamas   | Nigeria           |
| Costa Rica   | Barbados    | Cameroon          |
| El Salvador  | Dominica    | Cape Verde        |
| Guatemala    | Grenada     | Liberia           |
| Honduras     | Trinidad and Tobago | Senegal |
| Nicaragua    | Antigua and Barbuda | Sierra Leone |
| Panama       | St. Kitts–Nevis | Eritrea          |
| Central America, n.s. | St. Lucia | Ethiopia         |
| Cuba         | Vincent and the Grenadines | Kenya          |
| Dominican Republic | Caribbean, n.s. | Somalia         |
| Argentina    | Guyana/British Guiana | Tanzania       |
| Brazil       |            | Uganda            |
| Chile        |            | Zimbabwe          |
| Colombia     |            | South Africa (Union of) |
| Ecuador      |            | Africa, n.s./n.e.c. |
| Peru         |            |                   |
| Uruguay      |            |                   |
| Venezuela    |            |                   |
| South America, n.s. |        |                   |

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