The Health of African Immigrants in the U.S.:

Explaining the Immigrant Health Advantage

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Abstract

We examine the health of African immigrants to the United States, a relatively understudied but rapidly growing population. Informed by research on immigrants' "health advantage," we utilize a pooled, six-year sample of the National Health Interview Survey (N=145,144) to compare African immigrants to Latin American immigrants and to native-born U.S. residents on three health outcomes: self-reported health status, any serious medical condition, and any functional limitation. In bivariate analysis, we find that Latin American-born and native-born residents have poorer health compared to African-born residents on all three measures. We test several theories to account for these differences, including migrant selectivity, acculturation, health care access, and health behaviors. Once we control for these intermediate mechanisms in multivariate analysis, the influence of nativity diminishes substantially, suggesting that each of these theories

contributes to the explanation of the African immigrant health advantage relative to Latin American immigrants and the native-born.

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African immigrants in the U.S. now number over one million, and this figure is projected to increase (Grieco 2004). Continued growth of the African immigrant population is expected for a variety of reasons, including family reunification; ongoing economic and social disruptions in Africa that create refugee flows; the U.S. diversity visa program, which gives preference to immigrants from underrepresented countries; and an increasing number of English-speaking, highly-educated Africans who are eligible for high-skilled worker visas (Kent 2007). As the number and diversity of the African-born population increases, greater attention must be paid to assessing African immigrants' health status in order to plan for their specific health care needs (Venters and Gany 2009).

There is a large literature on immigrant health which has identified an "immigrant health advantage"[1] whereby immigrants are healthier than their native-born counterparts (Hummer et al. 2007; Jasso et al. 2004; Palloni and Arias 2004). Most of this research has focused on Latin American immigrants, the largest immigrant population to the U.S. in recent decades. Several theories have been suggested as to why an immigrant health advantage exists, including migrant selectivity, acculturation, and differences in health behaviors or access to health care across immigrant and native-born populations. Emerging evidence suggests that African immigrants are healthier than their U.S.-born counterparts, but much of this work is limited to comparisons between black immigrants (from all regions) and native-born African Americans or between black African immigrants and native-born African Americans (Mason et al. 2010; Read and

Emerson 2005; Singh and Hiatt 2006; Singh and Miller 2004). Comparisons by race are useful to examine how differences in historical racial contexts or discrimination in the destination contribute to differences in health outcomes (Reed and Emerson 2005). However, the overwhelming majority of black immigrants to the U.S. in recent years do not originate in Africa but rather in the Caribbean, with minority immigrant flows from South America and Europe (Read and Emerson 2005). African immigrants are likely to have different characteristics and behaviors than black immigrants from other regions due to differences in visa status, historical migration flows, and human capital. Furthermore, the African immigrant population itself is racially and ethnically diverse, and includes both white northern Africans and white South Africans, for example. Recent research on the Latino epidemiological paradox has shown that nativity is a key explanatory factor in the health advantages of some Latino populations in the U.S. (Hummer et al. 2007; Palloni and Arias 2004). The native African population deserves attention in its totality as potentially important region of birth that could indicate distinct health outcomes and needs.

The emerging research on African immigrant health is also limited by the range of health outcomes considered. Multiple studies have examined overall mortality rates (Singh and Hiatt 2006; Singh and Miller 2004; Singh and Siahpush 2002). Other work focuses on specific conditions thought to be prevalent in the place of origin, such as female genital mutilation or infectious diseases, including tuberculosis, HIV, and schistosomiasis (Adair and Nwaneri 1999; Akinsete et al. 2007; Carranza-Rodriguez et al. 2008; CDC 2002; Kempainen et al. 2001; Posey et al. 2007; Rosenthal et al. 2003; Sachs, Adair and Kirchner 2000; Venters and Gany 2009). Given the ongoing epidemiologic transition in Africa, chronic diseases and disability are also likely to affect adult African immigrants (Venters and Gany 2009), and relatively few studies

have addressed these health conditions (for exceptions, see: Hicks et al. 2003; Hyman et al. 2000; Read and Emerson 2005; Read, Emerson and Tarlov 2005; and Read and Gorman 2006). To understand African immigrant health, which is changing as the demographic and health profile of Africa changes, it is important to study overall health status as well as chronic disease and disability.

We aim to contribute to the as-yet small body of research on African immigrant health by using the National Health Interview Survey (NHIS), a nationally-representative dataset that includes region of birth, to assess health measures among African immigrants, including self-reported health, chronic conditions, and activity limitation. We compare the health of African immigrants to that of the native-born as well as Latino immigrants to determine if a health advantage exists relative to both groups. Thus far we have not found any studies that compare across immigrant groups (of all races) rather than within ethnic or racial groups. This type of analysis will shed more light on the nativity hypothesis. In addition, we explore theories of immigrant health advantage, including selection, acculturation, health behavior, and access to health care, to see if these factors amplify or moderate the African immigrant health advantage. This study tests the existence of an African immigrant health advantage vis-à-vis the native-born and Latino immigrants, examines various theories to explain this advantage, and increases our understanding of the determinants of health among this rapidly growing immigrant group.

Background

One of the most prominent hypotheses about immigrant health, commonly known as the "immigrant health advantage," is that new immigrants tend to have better health outcomes than the native-born, particularly for the first generation (Antecol and Bedard 2006; Jasso et al. 2004;

Lara et al. 2005). The immigrant health advantage is particularly well-documented among Latino immigrants in the U.S. (Hummer et al. 2007; Palloni and Arias 2004; Palloni and Morenoff 2001), and we might expect this advantage among immigrants from Africa as well.

Several theories have been put forth to explain differences in immigrant and native-born health outcomes. First, the immigrant health advantage is often attributed to selection; those who choose to emigrate are a selective group in terms of characteristics that are linked to both the propensity to move as well as better health outcomes, such as age, education, and marital status (Abraido et al. 1999; Jasso et al. 2005; Palloni and Arias 2004). For example, African immigrants are better educated and more likely to speak English than other immigrants, which could make them healthier (Dodoo 1997). Africans' greater distance to the U.S. and newer migrant networks also increase immigration barriers for them, thus making them highly selected and healthier than other immigrant groups, including Latinos (Akresh and Frank 2008). On the other hand, African immigrants' socioeconomic status, including employment levels and income once in the U.S., indicate that they may be worse off than other immigrant groups (Dodoo 1997). We expect that African immigrants' superior educational status and their relative youthfulness, compared to both Latino immigrants and native-born Americans, will make them positively selected in terms of their health outcomes, before controlling for other factors.

Second, new immigrants tend to have healthier behaviors when they first arrive compared to U.S. natives. Several studies suggest that immigrants' origin cultures operate to lower stress levels and promote healthy lifestyles because of the protective cultural strength of family and social networks (Landale and Oropesa 2001; Scribner and Dwyer 1989). However, over time among the first generation, and later, among the second generation, a pattern of "negative acculturation" toward poorer health outcomes, as immigrant groups take on American cultural

values and behaviors, has been observed (Hummer et al. 2007). Acculturation may be measured by political or cultural integration, which are proxies for convergence to U.S. lifestyles and health behaviors, and includes measures such as English language acquisition and U.S. citizenship. Given that English is a primary language among many African immigrants, acculturation could be more rapid for them, with negative implications for their health compared to Latin American immigrants. Negative acculturation might result in the adoption of poor health behaviors such as smoking (Kimbo 2009; Page 2007). Many immigrant origin countries are at earlier stages of the tobacco epidemic compared to the U.S., where smoking rates are higher, and research has also shown that immigrant often families have anti-smoking attitudes (Acevedo-Garcia et al. 2005, Singh and Siahpush 2002). Therefore, new immigrants are less likely to smoke that the native-born population, although there is substantial uptake of smoking with longer duration in the U.S. (Singh and Siahpush 2002). We expect that any African immigrant health advantage will begin to erode as their duration in the U.S. increases.

A third explanation for an African immigrant health advantage focuses on access to and utilization of health care in the destination. Contrary to the immigrant health advantage literature, many immigrants who lack access to care are also more likely to have poorer health. In a comprehensive review of the literature, DeRose et al. (2009) found that noncitizens and their children were less likely to have health insurance and a regular source of health care and had lower health care utilization rates than the U.S.-born. However, a large proportion of African immigrants are refugees, and may therefore have greater access to government health insurance, which may, in turn, positively affect their health in comparison to U.S. natives and Latin American immigrants. Other non-refugee African immigrants may have less access and health insurance, so their health may be negatively affected. We expect lower levels of insurance

coverage and thus poorer access to health care for Africans overall, which will reduce their health advantage. Acculturation, however, may operate through insurance to improve access to care, as studies have found that longer-term immigrants may be more likely than recent immigrants to have health insurance or to regularly visit the doctor (Antecol and Bedard 2004).

Data and Methods

We use the National Health Interview Survey (NHIS) for this analysis. The NHIS is conducted annually by the National Center for Health Statistics (NCHS). The NHIS is one of the most important sources of representative, population-based information on the health of the U.S. population. When weighted, the survey is representative of the civilian, non-institutionalized U.S. population. The NHIS includes topics such as general health status, the distribution of chronic and acute illness, functional limitations, access to and use of medical services, health behaviors, and insurance coverage. The NHIS includes approximately 100,000 persons in 45,000 households each year (Integrated Health Interview Series 2010). Specifically, we used a six-year (2005-2010) pooled file from the Integrated Health Interview Survey (IHIS), a project at the Minnesota Population Center, which harmonized NHIS data and documentation (University of Minnesota 2011).

The NHIS data include both a core questionnaire, with socioeconomic and health information for all members of each sampled household, as well as a sub-sample of one randomly-selected adult per household with much more detailed health information (e.g., questions about specific medical conditions and health behaviors). Our main independent variable of interest is nativity, which stems from information on region of birth. We create three categories of nativity: African-born, Latin American-born (born in Latin America or the

Caribbean) and native U.S.-born.[2] Immigrants from other geographical areas, which number about 30,000 (or 8% of our full adult pooled sample), were excluded from analysis. Among the remaining cases, we limit our sample to adults (age 18+). We use the full sample for our analysis of self-reported health status (unweighted N=336,531), but because these questions were asked of the sub-sample only, we restrict our analysis of medical conditions and functional limitations to the sub-sample (unweighted N=145,144).

Dependent Measures

We examine three important health outcomes in our analyses. The first is a measure of self-reported health status (SRHS). This is a subjective measure asked of all people in the NHIS. Respondents rated their general health on a five-point Likert scale: excellent, very good, good, fair, poor. Self reported health is a widely used measure of health status, shown to have high reliability and validity, and highly predictive of mortality (Antecol and Bedard 2006; Ferraro and Farmer 1999; Idler and Angel 1990; Jasso et al. 2004; Read et al. 2005). We recoded the ordinal scale to be a dichotomous outcome variable measuring poor health, coded 1 if the respondent reported fair or poor health and coded 0 if the respondent reported excellent, very good, or good health.

Our second health outcome is any chronic medical condition. We examine whether respondents have ever been diagnosed by a doctor or health professional with any of six serious medical conditions: high blood pressure/hypertension; heart disease (coronary heart disease, heart attack, angina pectoris, or any other heart condition); stroke; emphysema; diabetes/borderline diabetes; or cancer. Using these six questions, we created a dichotomous variable coded 1 if respondents reported *any* (one or more) of the six conditions, and 0 otherwise.

Our third health outcome is any self-reported functional limitation, a measure of disability. NHIS respondents were asked about the amount of difficulty they had "due to a health problem" performing 12 specific tasks: pushing or pulling large objects; going out to things like shopping, movies, or sporting events; participating in social activities such as visiting friends, etc.; relaxing at home or for leisure (reading, watching television, etc.); walking a quarter of a mile (about 3 city blocks); walking up 10 steps without resting; standing or being on one's feet for about 2 hours; stooping, bending, or kneeling; reaching up over one's head; using one's fingers to grasp or handle small objects; and lifting or carrying 10 pounds. We use an IHIS summary measure of any functional limitation, coded 1 if a respondent reports difficulty with one or more of the 12 specific tasks, and 0 otherwise.

Independent Measures

Our primary interest is in the association between nativity and health outcomes. We also control for race, which, in the NHIS, is a self-reported measure of "main racial background." In addition, we include a number of demographic and socioeconomic characteristics that correspond to our hypotheses about the influence of selection, acculturation, health care access and health behavior on health outcomes. Our *selection* variables include: *age* (continuous), *sex* (male=1, female=0), *marital status* (currently married=1, currently unmarried=0), *education* (less than high school is the reference category; high school graduate/GED, some college, and bachelor's degree or more are the remaining category values), *employment* (currently unemployed=1; currently employed or not in the labor force, NILF, [e.g., students, housewives, retirees, etc.]=0), and *poverty status* (household income at or above the poverty line is the reference category; below the poverty threshold and unknown poverty status [a substantial proportion of cases, about 20% of the sample] are the other category variables).

Our measures of *acculturation* include: *citizenship status* (U.S. citizen=1, non citizen=0); *years in the U.S.* (an ordinal variable in the original NHIS data; we use less than 5 years as the reference category; other values are five years to less than 15 years, and 15 years or more [including native born]; and *English language ability* (measured by language of interview because language generally used, our preferred measure, is only available for 2005, just one of the six years of our pooled file; non-English interview=1, English interview=0).

To measure *health care access* in the NHIS, we use an indicator of *health insurance coverage* (lacks public or private health insurance [uninsured] =1, has public or private health insurance=0). While there are other measures of health care access in the NHIS (e.g., whether the respondent has a usual place for medical care, recent doctor or hospital visits, etc.), we prefer this measure of health insurance coverage because it is asked of the full sample and for all the years in our pooled dataset (2005-2010), and thus available for our analysis of self-reported health. Finally we included smoking as a measure of *health behavior*. Those who have *ever smoked cigarettes* (currently or formerly) are coded as 1 (and those who have never smoked are coded as 0) in our models of self-reported health, any medical condition and any functional limitation. There are no health behavior variables asked of the full sample in the NHIS, and thus we must limit our model of self-reported health that incorporates our health behavior variable (smoking) to the sub-sample (Model 5 in our Table 3).

Analysis

We run binary logistic regression models for each of our three health outcomes. Nativity is included as a categorical variable with African-born as the reference/omitted category, and Latin American-born and U.S. native-born as the comparison groups. We first examine the influence of nativity on all three health outcomes controlling for race and ethnicity (see Model 1

in Tables 3-5). Then we add selection characteristics in Model 2 in Tables 3-5. Next, we add acculturation measures, shown in Model 3. Health insurance is added in Model 4, and finally, in Model 5 in Tables 3-5, we include smoking. With this gradual building of a complete model, we are able to see the attenuation of nativity effect in sequential manner.

We use the full sample for our model of self-reported Poor Health (Table 3), except in Model 5, which, as described above, is limited to the sub-sample because smoking is asked of only the sub-sample. We also use the sub-sample for our models of Any Chronic Medical Condition (Table 4) and Any Functional Limitation (Table 5), N=144,264 (when excluding cases with missing values on control variables). We conducted the analysis with Stata 11, using the "svy" commands in Stata to correct for sampling design effects. Weighted results are presented in all tables, and we show odds ratios, linearized standard errors, and significance in Tables 3-5.

Results

Descriptive Results

Table 1 shows weighted socio-demographic characteristics of our pooled six-year adult sample. We show characteristics for African born, Latin American born, as well as U.S. native-born, with bivariate tests of significance (svy F-tests and t-tests) comparing the African born to the Latin American born, as well as to the U.S.-born separately. The results indicate that African immigrants differ significantly from both comparison groups on a range of characteristics, including those likely to influence health outcomes.

[Table 1 about here]

We see in Table 1 that African immigrants are significantly different from both Latin American immigrants and the native-born on all characteristics we measured, with the exception

of marital status. Table 1 reveals that a greater share of Africans – over half – are male than among the native-born, and Africans are younger than the native-born (with a mean age of 40.1 compared to 46.3 among the native-born). Notably, over 60 percent of both immigrant groups are under age 45, in the prime working ages and with the lowest risks for disability and chronic disease. The majority of all three groups are currently married, and as one might expect, average family size is higher for both African and Latino immigrants (at 3.4 and 3.8 persons, respectively) compared to the native-born (2.8).

With respect to race, we see that Latino immigrants are similar to the native-born, with over 80% of each group reporting that they are white, while among Africans, 27% are white and 69% are black. The NHIS only has data on the language that respondents generally speak for the year 2005, just one of our six years of data (2005-2010), and only for the sub-sample of respondents. In the 2005 NHIS data (results not shown), African immigrants were much more likely to speak English only or mostly than their Latino counterparts (71% vs. 36%), while about 60% of Latino immigrants speak only or mostly Spanish. Twenty-nine percent of African immigrants generally speak a language other than English or Spanish.

One of the most noteworthy characteristics of African immigrants is their remarkably high level of education, which is, of course, itself related to health. Table 1 shows that over 40% of African immigrants have a four year college degree, compared to just 26% among the native-born and only 11% among Latinos. Likewise, only 12% of Africans have less than high school education, similar to 14% among native but much less than 51% among Latinos. African immigrants are clearly a highly selected immigrant group, at least with respect to education.

African immigrants also differ from Latin American immigrants and the U.S.-born on employment. A slightly higher proportion of African immigrants reported being employed (70%)

compared to both Latin American immigrants (67%) and the U.S.-born (63%). However, a higher proportion of African immigrants (and Latinos) were also *unemployed* (about 5% for both groups) compared to the native-born (4%). A lower proportion of Africans are not in the labor force (NILF, including categories such as students, housewives or retirees, 23%) compared to Latin-American immigrants (27%) and the U.S.-born (32%).

Finally, the proportion of African immigrants living in poverty (14%) is significantly lower than that of Latin-American immigrants (19%), yet also, despite their higher educational attainment, higher than that of the native-born (9%). Our results are consistent with other research demonstrating the higher educational attainment yet lower SES among Africans immigrants in the U.S. (Dodoo 1997.) (Note that a substantial percentage of NHIS respondents' income status is unknown, as shown in Table 1.)

Citizenship status and years in the U.S. are only reported for immigrants. Africans are significantly more likely than Latinos to be citizens (48% vs. 38%). This is somewhat surprising, given that Latino migration flows have been larger and of longer duration compared to those of African immigrants. However, if more Africans are documented legal immigrants, then they may be more likely to have a quicker route to citizenship. Over half (54%) of the Latin American-born have been in the U.S. for 15 years or more, compared to only 38% among the African-born. However, although we do not have this information directly in the NHIS data, there are likely to be more undocumented immigrants among the Latin Americans.[3]

Turning to health measures, **Table 2** shows a number of health outcomes and health-related covariates, again by nativity status. All differences are significant between African immigrants and both Latin American immigrants and the native-born unless otherwise noted. Based on these weighted descriptive statistics and bivariate tests between Africans and Latinos

as well as Africans and natives, the African-born appear to be healthier overall relative to their Latin American-born and native U.S.-born counterparts. Thus, Africans exhibit a health advantage on all measures not only in comparison to natives, but in comparison to Latin American immigrants as well, who themselves have been documented to have a health advantage. In terms of self-reported health status (SRHS), African immigrants reported significantly better overall health compared to both Latino immigrants and native-born Americans. Looking at our dichotomous self-reported health status outcome measure, which indicates fair or poor self-reported health, only about 7% of Africans reported fair/poor health, compared to 14% of Latin American immigrants and 13% of the native-born.

[Table 2 about here]

African immigrants also reported significantly lower prevalence than the native-born for all six chronic diseases analyzed. While the prevalence of all six chronic diseases was also lower among African immigrants compared to Latin American immigrants, this difference was only significant for emphysema (0.1% vs. 0.6%, respectively) and diabetes (6.6% versus 9.1% respectively). And, looking at the summary measure of having any chronic medical condition (of the six listed in Table 2), only 23% of Africans report having any major medical condition, compared to 26% of Latinos and 41% of the native-born.

With respect to our disability measure of having any functional limitation, a dichotomous outcome variable, once again we see that Africans appear to have significantly better health than both Latinos and the native-born. Only 18% of the African-born report any functional activity limitation, compared to almost 22% of the Latin American-born and 35% of the native-born. In addition, ever or current smoking, a known contributor to several chronic conditions, is significantly less common among the African-born (19%) compared to both Latin American

immigrants (24%) and the U.S.-born (44%). Finally, African immigrants are much more likely than Latin American immigrants to have health insurance (73% versus 53%, respectively), but less likely than the native-born (85%).

Multivariate Results

We used logistic regression models to analyze the dichotomous outcomes of: poor/fair self-reported health (Table 3), having any one of six chronic health conditions (Table 4), and having any functional limitation (Table 5). To summarize across the models, when additional explanatory factors are included – including measures of selection, acculturation, health care access and health behavior – the initially strong effect for nativity diminishes.

Self-Reported Health **Table 3** shows our logistic regression models predicting poor or fair Self-Reported Health. In Model 1, which includes nativity, race and ethnicity, we see that both Latin American immigrants and the native-born were much more likely than African immigrants (the reference category) to report poor health (OR=2.66 and OR=2.60, respectively). However, once we incorporate selection factors, shown in Model 2, we see the effect of nativity diminish. Model 2 accounts for age, sex, and marital status as well as key socioeconomic status indicators of education, employment, and poverty status. In this model the strength of the association between nativity and self-rated health is attenuated. Compared to the African-born, Latin American immigrants were 1.2 times as likely to report poor/fair health compared to African immigrants and the U.S.-born were 1.7 times as likely.

[Table 3 about here]

With respect to the control variables, we find that whites and married people were less likely to report poor health overall. In terms of education, all education levels were less likely to report poor health compared to the reference group of those with less than high school

completed. Furthermore, as education level increased, the likelihood of reporting poor health decreased compared to those with less than high school.

When we incorporate acculturation factors, namely citizenship, years in the U.S., and language of interview, shown in Model 3, we see the significant differences between Latinos and Africans disappear completely. The native-born, however, are still more likely than Africans to report fair/poor health (although this effect is only marginally significant).

With respect to control variables, U.S. citizens of any nativity were over 30% more likely to report fair/poor health than non-citizens (OR=1.32), and this value changed little in subsequent models. In addition, with respect to our duration of residence covariates, we see that longer term immigrants—those of 15 years or more—are about 55% more likely to report fair/poor health than very recent arrivals—those with durations of less than 5 years (the reference category, OR = 1.55). Finally, we see that those with a non-English NHIS interview were about 24% more likely to report fair/poor health than those with an English interview (our reference category). As with citizenship, the duration and language effects changed little with the addition of new variables in subsequent models.

The addition of health insurance status in Model 4 attenuated the difference between the U.S.-born and African born even further, with the U.S.-born being about 21% more likely to report fair/poor health, although, as with Model 3, this effect is only marginally significant. Those without health insurance were nearly 12% more likely than the insured to report poor health.

In Model 5, current or former smoking accounted for any remaining association between nativity and poor health. Overall, as expected, smokers (those who currently or formerly smoked cigarettes) were significantly more likely than never-smokers to report poor health (OR=1.610).

Finally, men and the unemployed emerged as significantly less likely to report poor health in the final model, likely because of the disproportionate rate at which smoking is prevalent in each group.

Any Chronic Medical Condition **Table 4** shows the results of our logistic regression models predicting any chronic medical condition – having any (one or more) of the six medical conditions shown in Table 2, including: cancer, diabetes, hypertension/high blood pressure, heart disease/angina/heart attack/other heart condition, emphysema, and stroke. As with our models of self-reported health status, the initially strong health advantage of African immigrants is attenuated once selection, acculturation, health care access, and health behavior variables are incorporated into the models. Nevertheless, the differences between Africans and the U.S.-born persist even in the full model (Model 5), after controlling for the hypothesized influences of selection, acculturation, health care access, and health behavior. Yet selection factors alone explain the entire difference in likelihood of having a chronic condition between Latin American and African immigrants.

[Table 4 about here]

In Model 1 we see that both Latin American immigrants and the native-born are more likely to have a chronic disease compared to African immigrants (OR=1.94 and OR= 2.35, respectively). Yet in Model 2, the inclusion of socio-economic selection factors – including age, sex, marital status, education, employment and poverty status – explains all the difference between Latin American and African immigrants. The U.S.-born remain more likely to report a chronic health condition in Model 2, but the likelihood decreases to an odds ratio of 1.75 from more than 2.3 in Model 1. Whites and Hispanics are less likely to report a medical condition compared to Blacks and non-Hispanics. Those living in poverty, the unemployed, and men are

all more likely to report a medical condition than their respective reference groups. Like our self-reported health model, greater education is strongly associated with decreasing likelihood of having any condition compared to the reference category of less than high school.

After incorporating acculturation factors (citizen status, duration in the U.S., and language) in Model 3, the U.S.-born remain more likely to report any condition compared to African immigrants (OR=1.35), but the effect is weakened. Once again, we see evidence of the negative effect of duration of U.S. residence on health: compared to recent arrivals (the reference group), those living in the U.S. for fifteen years or more are significantly more likely to report having a medical condition (OR=1.38). (As with self-rated health, medium-term migrants, those with five to less than 15 years in the U.S. did not differ significantly from recent immigrants.) U.S. citizens are also more likely to report having any chronic health condition (OR=1.31). Of course these results could mean that recent immigrants are simply less likely to have been *diagnosed* with a medical condition due to inadequate access to health care, and not indicate true differences in the underlying prevalence of medical conditions. Nevertheless, the effects of duration of residence and citizenship are consistent across our two models of health thus far, pointing to a decline in immigrant health status over time, even when controlling for other important influences such as age, education, and income.

Controlling for health insurance status in Model 4 had little effect on the likelihood of the native-born reporting a health condition compared to African immigrants. Natives remain more likely to report a medical condition than Africans (OR=1.36), but there is no significant difference between Latin American immigrants and Africans. The uninsured, however, are almost 20% less likely to report ever being diagnosed with chronic condition (OR=0.81); again

this could be due to the fact that without health insurance, seeing a health care provider who can make a chronic disease diagnosis is much more difficult.

After including ever/current smoking in Model 5, smokers are 31% more likely to report a health condition compared to non-smokers, and sex is no longer significant. In this model, the U.S.-born remain about 32% more likely to report having a medical condition than Africans. Though this difference remains significant, this U.S.-born odds ratio is less than half of what it is in Model 2 (1.32 versus 1.75), suggesting that these additional factors explain some proportion of the difference in our any chronic condition outcome between the African-born and the U.S.-born. With respect to Latin American and African immigrants, selection factors alone in Model 2 explained the entire difference in likelihood of having a chronic condition.

Any Functional Limitation **Table 5** shows the results from a series of models predicting the likelihood of reporting having at least one functional activity limitation due to a health problem. As with our analyses of fair/poor self-reported health and any chronic condition, Model 1 (controlling only for race and ethnicity) shows that both the U.S.-born and Latin American-born are significantly more likely to report a limitation (OR=2.37 and 1.66, respectively). These strong nativity effects dissipate (and become non-significant) by Model 5. Similar to our model of poor self-reported health, the likelihood of any functional limitation among African immigrants did not significantly differ from either the native U.S.-born or Latin American immigrants in our final Model 5, when all selection, acculturation, health care access, and health behavior variables are incorporated.

[Table 5 about here]

In Model 2, Latin American immigrants are no more likely than African immigrants to report a limitation after controlling for socio-economic selection factors. For the U.S.-born, their

disadvantage relative to Africans is attenuated (OR=1.63). Men, married people, and blacks are all healthier with regard to functional limitations. Blacks were actually more likely to report poor health or any chronic condition, so it is interesting that they are less likely to report a functional limitation. In terms of socioeconomic status, reporting a functional limitation is more likely among the unemployed (OR=1.20), the poor (OR=1.74), and the least educated (Bachelor's or more versus less than high school: OR=0.42).

The inclusion of acculturation factors in Model 3 weakens the difference between the U.S.-born and African-born further with regards to any limitation (OR=1.22). Like the odds of fair/poor health and any health condition, which increase with U.S. citizenship and with 15 or more years of U.S. residence, these factors are also associated with having a functional activity limitation. Those who have been in the U.S. longest (15 or more years) (OR=1.35) and citizens (OR=1.33) are more likely to report having a limitation than recent immigrants and non-citizens, respectively.

In Model 4, the inclusion of health insurance status does little to account for the continued (albeit marginally-significant) African-born advantage over the U.S.-born in reporting any functional limitation. Indeed, insurance status is not significant. However, once we include smoking status in Model 5, the U.S.-born are no more likely than African immigrants to report any limitation. Here, current or former smokers are 47% more likely (OR=1.47) than non-smokers to report any limitation.

Overall, we see in our models of any functional activity limitation the same general pattern as with our other two health outcomes. Initially-strong nativity effects – such that African immigrants demonstrated better health (across all three measures) than both Latin American

immigrants and the native-born – are attenuated when covariates for selection, acculturation, health care access, and health behavior were included.

Discussion

In this paper we sought to examine adult health broadly, across a number of measures, and compare African immigrants to Latin American immigrants as well as native-born U.S. residents. In line with the literature on the immigrant "health advantage" and immigrant selection, we theorized that African immigrants will, on average, exhibit better health than native-born Americans. Moreover, given the generally substantial barriers to immigration from Africa as well as the young migrant stream of Africans (relative to other groups, notably Latin Americans), we posited that Africans would exhibit substantial migrant selectivity, perhaps even more than Latin Americans, and thus exhibit a health advantage relative to Latino immigrants as well as the native-born.

In the bivariate analysis, Africans demonstrate overall better health, across all three of our measures, than both comparison groups, but particularly compared to the U.S. native-born. In our multivariate models, in which we controlled for other important influences on health, including socio-demographic selectivity, acculturation, health care access, and health behavior, we found that African immigrants are less likely to report having any chronic health condition than the native-born, evidence of a health advantage among African immigrants. However, in multivariate models, Africans do not significantly differ from the native-born with respect to poor self-reported health and having any functional activity limitation, once all control variables are included. The results point to an African immigrant health advantage vis-à-vis the native-born, with respect to chronic conditions. It is important to recognize, however, that if African

immigrants have lower levels of access to health care or less frequent doctor visits compared to native-born Americans, they might be less likely to be diagnosed with a chronic condition by a doctor or other health professional, and therefore less likely to report this in the NHIS survey; health insurance coverage was included as a measure of access to care in our models, and those who were uninsured were significantly less likely to report having any chronic condition.

The differences between African and Latin American immigrants, or more specifically, the initial bivariate differences that disappear after socio-economic and acculturation variables are included in multivariate models, are also important findings. Such direct comparison of African-born and Latin American-born immigrant groups is quite novel, as most analyses tend to compare immigrant groups only with the native-born and not with each other. After the socio-economic selectivity variables are included in our models of any chronic condition and activity limitation (Tables 4 and 5, Model 2), Africans no longer differ from Latin Americans. And once acculturation variables (i.e., time in the U.S., citizenship and language) are included in the model of poor health (Table 3, Model 3), the differences between Africans and Latinos disappear. In other words, socio-economic selectivity and acculturation processes alone explain the bivariate differences in health between African and Latino immigrants. Moreover, time in the U.S. and citizenship – a proxy for acculturation – contribute to a worsening of health. Across all our models, we find that duration in the U.S. and U.S. citizenship are both significantly associated with poorer health outcomes, a finding which is consistent with the "negative acculturation" or "downward assimilation" literature.

What does this analysis tell us about African immigrant health? First, Africans, like other immigrant groups, appear to demonstrate an "immigrant health advantage" compared to the U.S. native born, at least in terms of chronic disease, despite their higher rates of poverty than the

native-born. Although this finding could be explained by lack of access to care and therefore lack of diagnosis, recall that African immigrants overall are also highly educated and highly selective in socioeconomic terms relative to the native born. African immigrants do not seem to have much of a health advantage over their Latin American counterparts, but there are many nuanced immigration processes that cannot be measured with the NHIS data, including country of origin and type of visa, which might point to diversity between different types of immigrants (e.g., refugees vs. highly-skilled migrants). We also find consistent evidence of negative acculturation over time; in other words, the immigrant health advantage does appear to erode over time as years living in the U.S. increases and as immigrants become citizens. Finally, our results also demonstrate that research on health status should ideally look across a number of dimensions, as nativity (and related selection and acculturation variables) affects health differently for different health outcomes. Overall, this analysis, which, it is worth noting, is relatively unique (for African immigrant health study designs) in that it uses a nationally-representative dataset, contributes to the as-yet small literature on African immigrant health. In addition, this research helps to situate African immigrants in the much larger literature on immigrant, particularly Latino immigrant, health. And finally, this research explicitly compares two immigrant groups: a widely-studied, relatively old and multi-racial immigrant group – Latinos – with a relatively new, also multi-racial, understudied – but rapidly growing – immigrant group – Africans.

This study, although it has advantages in that it utilizes a pooled, nationally-representative sample across several years which has broad and deep measures of health status, disease, activity limitation, access to care, and health behaviors, does also have limitations, particularly for examining immigrant health. We cannot study in-depth socioeconomic factors

that may be unique to Africans living in the U.S., such as their small co-ethnic communities, potential racial discrimination that they experience, their immigration and visa status (e.g., refugee vs. high-skilled vs. diversity visas), and how these factors affect African immigrants' health.

African-born immigrants are likely to come to the U.S. through two main pathways: as recipients of a diversity visa, or as refugees. Africans made up 40% of diversity visas in fiscal year 2004 (Jeffreys 2005). And although refugee admission ceilings have remained relatively steady of late, Africa often has the largest allocation, with 20,000 each in 2006 and 2007 (Martin and Hoefer 2009). Despite the recent increase in refugees from the wars in Central and West Asia, African countries have contributed significantly to the total, particularly Somalia (14.5% of total refugees admitted in 2007), Burundi (9.4%), and Liberia (3.3%) (O'Donnell and Batalova 2007). Despite receiving assistance from the U.S. government, refugees are likely to fare the worst of all immigrants, potentially dealing with the effects of physical and/or mental trauma, and thus research on their health and well-being is particularly important. There is as yet very little research on differences in health by refugee status using nationally-representative data (Akresh and Frank 2008).

Africans at the other end of the spectrum have other challenges. Highly-educated Africans may arrive with relatively good health, but if education does not translate into good jobs, they may lack access to care and suffer physical and mental stress from manual labor or unemployment. Compared to other immigrant groups, African immigrant communities are relatively new and their social networks may be weak; community resources to address health needs are likely limited. Although we cannot control for country of origin, visa type, or refugee status using the NHIS data; we can control for many socioeconomic factors, such as education,

length of time in the U.S., and health insurance coverage, which can help to tease out some of these relationships. In future related work we aim to examine refugee status and country of origin as predictors of health.

Most survey data on health outcomes are also subject to biases in terms of self-reporting. It is possible that different cultural norms for health influence African immigrants to self-report their health status differently than Latino immigrants or the native-born, for example. Qualitative and/or mixed-methods research studies are needed to better understand African immigrants' perceptions of health status relative to that of other groups, as well as to understand the diversity of self-reported health status among different groups within the African immigrant community.

The majority of Africans are new arrivals (in the U.S. for fewer than ten years), so it is an opportune time to study their health trajectories as they adapt and assimilate. In this paper we focus on working-age adults, and on the first generation, because it is most important to understand their initial health profile and experiences, and the health profiles for children (second generation) and elderly African immigrants may be very different. However, in future work, understanding the health of the children of African immigrants may be of particular importance.

Overall, this paper suggests that African immigrants may have a health advantage at least at the beginning (like Latinos), but that it may quickly erode over time, with the exception of chronic disease. These findings provide baseline knowledge about how African immigrants' health is similar to and/or different from Latino immigrants and the native-born and suggest how particular characteristics of African immigrants (e.g., selection, acculturation, access to care, and health behaviors) serve to weaken the "healthy immigrant effect" among this population over

time. The findings could help to inform health policy toward preventing African immigrants, including the second generation, from undergoing negative acculturation with respect to health.

Notes

1. The immigrant health advantage is also often referred to as the "healthy immigrant effect," the "epidemiological paradox," or the "immigrant health paradox" in the literature. The literature that refers to a paradox is often referring only to Hispanic or Latino immigrant health relative to that of the native-born.

2. Note that specific country of birth is collected in the NHIS, but this variable is not available in the public use files. To protect respondents' confidentiality, country of origin is collapsed into region of origin in the NHIS dataset. The African region includes all countries in Africa, both sub-Saharan Africa and northern Africa.

3. Tellingly, more than twice as many Latinos as Africans (5% vs. 2%) reported that they did not know or refused to report how long they have lived in the U.S., which could imply that they are perhaps undocumented and thus unwilling to report time in the U.S.

4.

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Table 1. Socio-Demographic Characteristics of African Born, Latin American Born, and Native U.S. Born

Adults (age 18+), Descriptive Characteristics (weighted)[a]

Source: IHIS (NHIS 2005-2010)[b]

Characteristic	African Born	Latin American Born	Sig.[c]	U.S. Born	Sig.[d]
	Mean or %	Mean or %		Mean or %	
Unweighted N (Full Sample)	*2,378*	*53,089*		*281,064*	
Unweighted N (Sub-Sample)	*1,019*	*18,793*		*125,332*	
Sex					
Male	53.8	52.0	+	47.9	***
Female	46.2	48.0		52.1	
Age (mean and std. error)	40.1 (0.4)	41.7 (0.2)	***	46.3 (0.1)	***
Age Group			***		***
Age 18-24	14.4	11.6		13.4	
Age 25-34	24.9	25.6		16.8	
Age 35-44	25.3	24.9		17.6	
Age 45-54	20.0	18.3		19.6	
Age 55-64	9.0	10.3		15.3	
Age 65 +	6.4	9.3		17.3	
Marital Status					***
Not currently married[e]	40.4	38.7		45.3	
Currently married	59.6	61.3		54.7	
Family size (mean and std. error)	3.4 (0.1)	3.8 (0.0)	***	2.8 (0.0)	***
Education (highest level attained)			***		***
Less than high school (including unknown)	12.4	51.2		14.1	
High school grad or GED	17.4	22.8		29.9	
Some college (including Associates)	28.6	15.5		30.2	
Bachelors, Masters or more	41.7	10.5		25.8	
Employment			**		***
Employed	70.4	66.7		63.2	
Unemployed	5.2	4.9		4.0	
Not in the Labor Force	23.2	27.3		31.9	
Unknown (Refused/Not Ascertained/Don't Know)	1.2	1.1		1.0	
Poverty			***		***
At or above poverty threshold	68.7	59.0		72.4	
Below poverty threshold	14.4	19.4		8.5	
Unknown	17.0	21.6		19.2	
Race (self-reported main racial background)					
White	27.3	85.2	***	84.1	***
Black/African American	69.0	10.2		12.5	
Other (including multiple race, unknown)	3.6	4.6		3.3	

Table 1 (continued). Socio-Demographic Characteristics of African Born, Latin American Born, and Native U.S. Born

Adults (age 18+), Descriptive Characteristics (weighted)[a]

Source: IHIS (NHIS 2005-2010)[b]

Characteristic	African Born	Latin American Born	Sig.[c]	U.S. Born	Sig.[d]
	Mean or %	Mean or %		Mean or %	
Hispanic Ethnicity[f]			***		***
Not Hispanic	99.1	10.6		93.9	
Hispanic	0.9	89.4		6.1	
U.S. Citizenship			***		***
No, not a U.S. citizen (including unknown)	52.5	61.8		0.0	
Yes, a U.S. citizen	47.5	38.2		100.0	
Years in the U.S.			***		***
Less than 5 years	18.9	10.6		0.0	
5 years to less than 15 years	40.8	31.1		0.0	
15 years or more (including native born)	38.2	53.6		100.0	
Unknown	2.1	4.7		0.0	
Language of Interview[g]			***		***
English	97.7	47.9		98.9	
Spanish (including English and Spanish)	0.1	51.6		0.9	
Other/Unknown	2.2	0.6		0.3	

+ p<0.10, * p<0.05, ** p<0.01, ***p<0.001.

Notes:

[a] Linearized standard errors in parentheses.

[b] Minnesota Population Center and State Health Access Data Assistance Center, Integrated Health Interview Series: Version 4.0. Minneapolis: University of Minnesota, 2011. http://www.ihis.us

[c] Bivariate significance test indicating whether African immigrants differ significantly from Latin American immigrants.

[d] Bivariate significance test indicating whether African immigrants differ significantly from native U.S. born.

[e] Includes never married, widowed, divorced, separated and unknown/refused.

[f] Hispanic, Spanish or Latino origin.

[g] Language of NHIS interview. (Language generally speak not available for all years.)

Table 2. Health Outcomes among African Born, Latin American Born, and Native U.S. Born

Adults (age 18+), Descriptive Characteristics (weighted)[a]

Source: IHIS (NHIS 2005-2010)[b]

Characteristic	African Born	Latin American Born	Sig.[c]	U.S. Born	Sig.[d]
	Mean or %	Mean or %		Mean or %	
Unweighted N (Full Sample)	*2,378*	*53,089*		*281,064*	
Unweighted N (Sub-Sample)	*1,019*	*18,793*		*125,332*	
Self Reported Health Status (SRHS)			***		***
Poor	1.5	2.7		3.2	
Fair	5.1	10.9		9.3	
Good	22.8	32.6		26.2	
Very Good	28.9	27.3		32.1	
Excellent	41.3	26.4		29.1	
Unknown (Don't Know or Refused)	0.3	0.1		0.2	
Poor Health (poor or fair SRHS)[e]	6.6	13.7	***	12.5	***
Conditions (ever been diagnosed, sub-sample)					
High Blood Pressure/Hypertension	18.9	19.7		29.5	***
Heart Disease/Other Heart Condition	4.2	5.7		12.6	***
Stroke	0.9	1.5		2.8	**
Emphysema	0.1	0.6	*	2.1	***
Diabetes/Borderline Diabetes	6.6	9.1	*	9.4	*
Cancer	1.9	2.4		8.6	***
Any Condition (of the 6 conditions, sub-sample)	23.3	26.4	+	40.9	***
Total Number of Conditions (mean and std. error)	0.3 (0.0)	0.4 (0.0)	***	0.6 (0.0)	***
Any Functional Limitation (sub-sample)[f]	17.6	21.7	*	35.1	***
Health Insurance Coverage (public or private)			***		***
Not Covered	25.5	46.0		13.9	
Covered	72.8	53.1		85.3	
Unknown	1.8	0.9		0.9	
Health Behaviors (sub-sample)					
Smoke Cigarettes (currently or formerly)	19.0	24.4	**	44.4	***

+ p<0.10, * p<0.05, ** p<0.01, ***p<0.001.

Notes:

[a] Linearized standard errors in parentheses.

[b] Minnesota Population Center and State Health Access Data Assistance Center, Integrated Health Interview Series: Version 4.0. Minneapolis: University of Minnesota, 2011. http://www.ihis.us

[c] Bivariate significance test indicating whether African immigrants differ significantly from Latin American immigrants.

[d] Bivariate significance test indicating whether African immigrants differ significantly from native U.S. born.

[e] Unknown values for SRHS (only 0.24% of total N) are excluded from dichotomous measure.

[f] Reports difficulty with one or more of 12 specific tasks due to a health problem. Tasks include: pushing or pulling large objects; going out to things like shopping, movies or sporting events; participating in social activities such as visiting friends, etc.; relaxing at home or for leisure (reading, watching tv, etc.); walking a quarter of a mile (about 3 city blocks); walking up 10 steps without resting; standing or being on your feet for about 2 hours; stooping, bending or kneeling; reaching up over your head; using your fingers to grasp or handle small objects; and lifting or carrying 10 pounds.

Table 3. Determinants of Self-Reported Health

Full Sample (except Model 5), Adults (age 18+), *Logistic Regression (1=Poor/Fair Health)*

Source: IHIS (NHIS 2005-2010)[a]

	Model 1 **Race, Ethnicity & Nativity**			***Model 2*** **+ Selection factors**			***Model 3*** **+ Acculturation**			***Model 4*** **+ Health Insurance**			***Model 5*** **(sub-sample)** **+ Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Nativity															
African (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
Latin American	2.655	0.273	***	1.239	0.133	*	1.069	0.113		1.061	0.112		0.848	0.130	
U.S. born	2.602	0.260	***	1.721	0.180	***	1.217	0.129	+	1.209	0.128	+	0.967	0.149	
Race															
Black/African American (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
White	0.621	0.014	***	0.665	0.015	***	0.669	0.016	***	0.669	0.016	***	0.618	0.018	***
Other[b]	0.742	0.031	***	0.930	0.038	+	0.934	0.038	+	0.931	0.038	+	0.864	0.050	*
Ethnicity															
Hispanic	1.131	0.027	***	1.269	0.033	***	1.224	0.033	***	1.220	0.033	***	1.324	0.053	***
Age				1.041	0.000	***	1.040	0.000	***	1.041	0.000	***	1.038	0.001	***
Sex															
Male				0.986	0.011		0.987	0.012		0.983	0.011		0.900	0.020	***
Marital Status															
Currently married				0.834	0.013	***	0.835	0.013	***	0.839	0.013	***	0.865	0.019	***
Education															
Less than High school (ref)				1.000		--	1.000		--	1.000		--	1.000		--
High school grad/GED				0.596	0.010	***	0.593	0.010	***	0.594	0.010	***	0.596	0.015	***
Some college (including Associate's)				0.451	0.009	***	0.447	0.009	***	0.450	0.009	***	0.454	0.014	***
Bachelor's degree or more				0.216	0.006	***	0.214	0.006	***	0.217	0.006	***	0.221	0.009	***
Employment															
Unemployed				0.990	0.031		0.989	0.031		0.961	0.030		0.865	0.044	**
Poverty Status															
At or above poverty threshold (ref)				1.000		--	1.000		--	1.000		--	1.000		--
Below poverty threshold				2.644	0.061	***	2.664	0.061	***	2.640	0.061	***	2.580	0.076	***
Unknown poverty status				1.016	0.020		1.017	0.020		1.015	0.020		1.088	0.031	**

Table 3 (continued). Determinants of Self-Reported Health

Full Sample (except Model 5), Adults (age 18+), *Logistic Regression (1=Poor/Fair Health)*

Source: IHIS (NHIS 2005-2010)[a]

	Model 1 **Race, Ethnicity & Nativity**			***Model 2*** **+ Selection factors**			***Model 3*** **+ Acculturation**			***Model 4*** **+ Health Insurance**			***Model 5*** **(sub-sample) + Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Citizenship															
U.S. citizen							1.320	0.056	***	1.353	0.058	***	1.374	0.083	***
Years in the U.S.															
Less than 5 years (ref)							1.000		--	1.000		--	1.000		--
5 years to less than 15 years							1.051	0.085		1.057	0.086		0.983	0.127	
15 years or more (including native born)							1.554	0.125	***	1.587	0.128	***	1.558	0.196	***
English ability															
Non-English interview							1.241	0.047	***	1.232	0.046	***	1.347	0.073	***
Health Insurance Coverage															
Uninsured										1.117	0.023	***	1.061	0.034	+
Health Behaviors															
Smoke Cigarettes (currently or formerly)													1.610	0.035	***
F statistic	*F (5, 635) = 103.04*			*F (14, 626) = 1323.84*			*F (18, 622) = 1028.64*			*F (19, 621) = 974.93*			*F (20, 620) = 480.85*		
p	*0.000*			*0.000*			*0.000*			*0.000*			*0.000*		
N	*328,819*			*328,819*			*328,819*			*328,819*			*144,264*		

+ p<0.10, * p<0.05, ** p<0.01, ***p<0.001.

Notes:

[a] Minnesota Population Center and State Health Access Data Assistance Center, Integrated Health Interview Series: Version 4.0. Minneapolis: University of

[b] "Other" self-reported race category includes Native American, Asian, multi, etc.

Table 4. Determinants of Any Chronic Medical Condition

Sub-Sampled Adults (age 18+), *Logistic Regression (1=Diagnosed with a serious medical condition [a])*

Source: IHIS (NHIS 2005-2010)[b]

	Model 1			***Model 2***			***Model 3***			***Model 4***			***Model 5*** (sub-sample)		
	Race, Ethnicity & Nativity			**+ Selection factors**			**+ Acculturation**			**+ Health Insurance**			**+ Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Nativity															
African (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
Latin American	1.942	0.191	***	1.078	0.111		1.032	0.112		1.043	0.112		1.034	0.111	
U.S. born	2.347	0.224	***	1.752	0.171	***	1.346	0.144	**	1.364	0.146	**	1.315	0.140	*
Race															
Black/African American (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
White	0.953	0.019	*	0.733	0.016	***	0.737	0.016	***	0.736	0.016	***	0.711	0.016	***
Other[c]	0.824	0.037	***	0.867	0.040	**	0.870	0.040	**	0.873	0.040	**	0.851	0.039	**
Ethnicity															
Hispanic	0.569	0.016	***	0.890	0.027	***	0.896	0.028	***	0.901	0.028	**	0.926	0.029	*
Age				1.073	0.001	***	1.073	0.001	***	1.072	0.001	***	1.071	0.001	***
Sex															
Male				1.046	0.016	**	1.048	0.016	**	1.054	0.016	**	1.023	0.016	
Marital Status															
Currently married				0.991	0.016		0.994	0.016		0.981	0.016		0.992	0.016	
Education															
Less than High school (ref)				1.000		--	1.000		--	1.000		--	1.000		--
High school grad/GED				0.853	0.022	***	0.841	0.022	***	0.834	0.022	***	0.843	0.022	***
Some college (including Associate's)				0.845	0.024	***	0.830	0.024	***	0.815	0.024	***	0.833	0.025	***
Bachelor's degree or more				0.614	0.018	***	0.605	0.018	***	0.588	0.017	***	0.624	0.019	***
Employment															
Unemployed				1.077	0.041	+	1.077	0.041	+	1.137	0.044	**	1.114	0.043	**
Poverty Status															
At or above poverty threshold (ref)				1.000		--	1.000		--	1.000		--	1.000		--
Below poverty threshold				1.392	0.034	***	1.409	0.035	***	1.435	0.035	***	1.419	0.035	***
Unknown poverty status				0.797	0.019	***	0.799	0.019	***	0.802	0.019	***	0.814	0.019	***

Table 4 (continued). Determinants of Any Chronic Medical Condition

Sub-Sampled Adults (age 18+), *Logistic Regression (1=Diagnosed with a serious medical condition [a])*

Source: IHIS (NHIS 2005-2010)[b]

	Model 1 **Race, Ethnicity & Nativity**			***Model 2*** **+ Selection factors**			***Model 3*** **+ Acculturation**			***Model 4*** **+ Health Insurance**			***Model 5*** **(sub-sample) + Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Citizenship															
U.S. citizen							1.306	0.069	***	1.254	0.067	***	1.242	0.067	***
Years in the U.S.															
Less than 5 years (ref)							1.000		--	1.000		--	1.000		--
5 years to less than 15 years							1.106	0.120		1.095	0.119		1.100	0.119	
15 years or more (including native born)							1.382	0.133	**	1.335	0.129	**	1.330	0.128	**
English ability															
Non-English interview							0.989	0.047		1.007	0.048		1.031	0.050	
Health Insurance Coverage															
Uninsured										0.813	0.021	***	0.796	0.021	***
Health Behaviors															
Smoke Cigarettes (currently or formerly)													1.305	0.022	***
F statistic	*F (5, 635) = 254.35*			*F (14, 626) = 1494.85*			*F (18, 622) = 1171.60*			*F (19, 621) = 1123.09*			*F (20, 620) = 1076.00*		
p	*0.000*			*0.000*			*0.000*			*0.000*			*0.000*		
N	*144,264*			*144,264*			*144,264*			*144,264*			*144,264*		

+ p<0.10, * p<0.05, ** p<0.01, ***p<0.001.

Notes:

[a] Diagnosed with one or more of six serious medical conditions: high blood pressure/hypertension; heart disease (coronary heart disease, heart attack, angina pectoris, or any other heart condition); stroke; emphysema; diabetes/borderline diabetes; and cancer.

[b] Minnesota Population Center and State Health Access Data Assistance Center, Integrated Health Interview Series: Version 4.0. Minneapolis: University of

[c] "Other" self-reported race category includes Native American, Asian, multi, etc.

Table 5. Determinants of Functional Activity Limitation

Sub-Sampled Adults (age 18+), *Logistic Regression (1=Reports any functional limitation [a])*

Source: IHIS (NHIS 2005-2010)[b]

	Model 1			***Model 2***			***Model 3***			***Model 4***			***Model 5*** (sub-sample)		
	Race, Ethnicity & Nativity			**+ Selection factors**			**+ Acculturation**			**+ Health Insurance**			**+ Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Nativity															
African (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
Latin American	1.662	0.178	***	0.862	0.097		0.852	0.099		0.851	0.099		0.834	0.097	
U.S. born	2.374	0.239	***	1.626	0.173	***	1.218	0.139	+	1.217	0.139	+	1.146	0.131	
Race															
Black/African American (ref)	1.000		--	1.000		--	1.000		--	1.000		--	1.000		--
White	1.132	0.024	***	1.151	0.026	***	1.161	0.027	***	1.161	0.027	***	1.109	0.025	***
Other[c]	1.106	0.050	*	1.353	0.066	***	1.360	0.066	***	1.360	0.066	***	1.318	0.063	***
Ethnicity															
Hispanic	0.690	0.019	***	0.874	0.028	***	0.890	0.030	***	0.890	0.030	***	0.928	0.031	*
Age				1.051	0.001	***	1.050	0.001	***	1.050	0.001	***	1.049	0.001	***
Sex															
Male				0.685	0.011	***	0.686	0.011	***	0.686	0.011	***	0.653	0.011	***
Marital Status															
Currently married				0.823	0.013	***	0.826	0.013	***	0.826	0.013	***	0.835	0.014	***
Education															
Less than High school (ref)				1.000		--	1.000		--	1.000		--	1.000		--
High school grad/GED				0.746	0.018	***	0.734	0.018	***	0.734	0.018	***	0.745	0.018	***
Some college (including Associate's)				0.696	0.019	***	0.682	0.018	***	0.682	0.018	***	0.703	0.019	***
Bachelor's degree or more				0.425	0.013	***	0.417	0.012	***	0.418	0.012	***	0.452	0.013	***
Employment															
Unemployed				1.201	0.047	***	1.201	0.047	***	1.200	0.047	***	1.165	0.046	***
Poverty Status															
At or above poverty threshold (ref)				1.000		--	1.000		--	1.000		--	1.000		--
Below poverty threshold				1.739	0.045	***	1.764	0.047	***	1.764	0.047	***	1.743	0.045	***
Unknown poverty status				0.737	0.017	***	0.740	0.017	***	0.740	0.017	***	0.757	0.017	***

Table 5 (continued). Determinants of Functional Activity Limitation

Sub-Sampled Adults (age 18+), *Logistic Regression (1=Reports any functional limitation [a])*

Source: IHIS (NHIS 2005-2010)[b]

	Model 1 **Race, Ethnicity & Nativity**			***Model 2*** **+ Selection factors**			***Model 3*** **+ Acculturation**			***Model 4*** **+ Health Insurance**			***Model 5*** **(sub-sample) + Health Behavior**		
Independent Variables	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.	Odds Ratio	Lin. Std. Err.	Sig.
Citizenship															
U.S. citizen							1.332	0.072	***	1.333	0.072	***	1.314	0.071	***
Years in the U.S.															
Less than 5 years (ref)							1.000		--	1.000		--	1.000		--
5 years to less than 15 years							1.032	0.109		1.032	0.109		1.040	0.108	
15 years or more (including native born)							1.352	0.135	**	1.353	0.135	**	1.341	0.132	**
English ability															
Non-English interview							0.909	0.047	+	0.909	0.047	+	0.940	0.050	
Health Insurance Coverage															
Uninsured										1.004	0.022		0.973	0.021	
Health Behaviors															
Smoke Cigarettes (currently or formerly)													1.465	0.023	***
F statistic	*F (5, 635) = 160.04*			*F (14, 626) = 887.83*			*F (18, 622) = 683.19*			*F (19, 621) = 647.38*			*F (20, 620) = 664.82*		
p	*0.000*			*0.000*			*0.000*			*0.000*			*0.000*		
N	*144,264*			*144,264*			*144,264*			*144,264*			*144,264*		

+ p<0.10, * p<0.05, ** p<0.01, ***p<0.001.

Notes:

[a] Reports difficulty with one or more of 12 specific tasks due to a health problem. Tasks include: pushing or pulling large objects; going out to things like shopping, movies or sporting events; participating in social activities such as visiting friends, etc.; relaxing at home or for leisure (reading, watching tv, etc.); walking a quarter of a mile (about 3 city blocks); walking up 10 steps without resting; standing or being on your feet for about 2 hours; stooping, bending or kneeling; reaching up over your head; using your fingers to grasp or handle small objects; and lifting or carrying 10 pounds.

[b] Minnesota Population Center and State Health Access Data Assistance Center, Integrated Health Interview Series: Version 4.0. Minneapolis: University of

[c] "Other" self-reported race category includes Native American, Asian, multi, etc.