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Racial/ethnic disparities in annual mammogram compliance among households in Little Haiti, Miami-Dade County, Florida

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Racial/ethnic disparities in annual mammogram compliance among households in Little Haiti, Miami-Dade County, Florida

An observational study

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Abstract

Introduction Breast cancer is the most commonly diagnosed cancer and the 2nd leading cause of cancer-related deaths among women in the U.S. Although routine screening via mammogram has been shown to increase survival through early detection and treatment of breast cancer, only 3 out of 5 women age ≥ 40 are compliant with annual mammogram within the U.S. and the state of Florida. A breadth of literature exists on racial/ethnic disparities in compliance with mammogram; however, few such studies include data on individual Black subgroups, such as Haitians. This study assessed the association between race/ethnicity and annual mammogram compliance among randomly selected households residing in the largely Haitian community of Little Haiti, Miami-Dade County (MDC), Florida.

Methods This study used cross-sectional, health data from a random-sample, population-based survey conducted within households residing in Little Haiti between November 2011 and December 2012 ($n=951$). Mammogram compliance was defined as completion of mammogram by all female household members within the 12 months prior to the survey. The association between mammogram compliance and race/ethnicity was assessed using binary logistic regression models. Potential confounders were identified as factors that were conservatively associated with both compliance and race/ethnicity ($P \leq 0.20$). Analyses were restricted to households containing at least 1 female member age ≥ 40 ($n=697$).

Results Overall compliance with annual mammogram was 62%. Race/ethnicity was significantly associated with mammogram compliance ($P=0.030$). Compliance was highest among non-Hispanic Black (NHB) households (75%), followed by Hispanic (62%), Haitian (59%), and non-Hispanic White (NHW) households (51%). After controlling for educational level, marital status, employment status, the presence of young children within the household, health insurance status, and regular doctor visits, a borderline significant disparity in mammogram compliance was observed between Haitian and NHB households (adjusted odds ratio = 1.63, $P=0.11$). No other racial/ethnic disparities were observed.

Discussion Compliance with annual mammogram was low among the surveyed households in Little Haiti. Haitian households underutilized screening by means of annual mammogram compared with NHB households, although this disparity was not significant. Compliance rates could be enhanced by conducting individualized, mammogram screening-based studies to identify the reasons behind low rate of compliance among households in this underserved, minority population.

Abbreviations: CBE = clinical breast examination, MDC = Miami-Dade County, NHB = non-Hispanic Black, NHW = non-Hispanic White, US = United States, VIF = variance inflation factor.

Keywords: breast cancer, Haitian, mammogram, minority, screening, underserved populations

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1. Introduction

Breast cancer is the most commonly diagnosed cancer and 2nd leading cause of cancer-related deaths among women.^[1] An estimated 234,190 new breast cancer cases and 40,4730 breast cancer deaths are expected in the United States (US) in 2015, with approximately 7% (15,470) of the incident cases and 7% (2,830) of the deaths occurring in the state of Florida.^[2] Breast cancer-related costs reached \$16.5 billion in the US in 2010, and is projected to increase to \$19 billion if recent trends in incidence and survival continue.^[3]

Prior to 2015, the American Cancer Society (ACS) recommended an annual mammogram starting at age 40 for women at average risk of breast cancer for early detection of the cancer.^[4] In October 2015, the ACS updated their guidelines to an annual mammogram for women ages 45 to 54 years and a biannual mammogram for women ages 55 and older, with women ages 40 to 44 having the option to begin annual screening.^[5] Although screening cannot prevent the development of breast cancer, routine use of mammogram has been shown to increase survival via early detection and treatment of the cancer.^[6–11] Despite

advanced and available screening methods, only 3 out of 5 women age 40 or older are compliant with annual mammogram at the national and state (Florida) level.^[12] In order to further reduce breast cancer-related mortality and healthcare costs, it is critical to identify populations within the state that underutilize screening and to develop culturally appropriate interventions aimed at increasing compliance with mammogram and clinical breast examination within these groups.

Although incidence of breast cancer is lower among Black women compared with White women, higher mortality rates are observed among Black women partly due to being diagnosed at later stages and to having lower stage-specific survival.^[2,12] Black women also generally experience a higher burden of poverty and lack of insurance compared to White women;^[13] however, elevated mortality among Black women still persists after controlling for socioeconomic factors and factors that affect diagnosis (presence of comorbidities, follow-up after screening, quality of treatment, aggressiveness of tumor, etc.).^[14–17] Despite the increased risk in incidence and mortality among Black women, screening rates for this group are no higher than that of White women at the national level (51% vs 52%, respectively).^[12,18–20] Research has shown that Black women have less knowledge of breast cancer, greater fear of mammogram and of being diagnosed with cancer, and increased cancer fatalism than White women.^[21–23] In addition, Black women who do not screen using mammogram report low self-efficacy,^[21] more perceived barriers to mammogram,^[21,23–25] fewer perceived benefits of mammogram,^[24] and lower perceived susceptibility to cancer^[24] compared with Black women who do complete mammogram.

Rates of breast cancer screening among Black subgroups, such as Haitians, remain unclear because national studies do not distinguish Haitians from other Black populations. Two population-based studies that investigated breast cancer screening among Haitian women suggest that screening rates among Haitian women are lower than that of White and Black women.^[26,27] A recent qualitative study conducted among 15 Haitian women living in Miami-Dade County (MDC), Florida found that Haitian women face multiple challenges when it comes to breast cancer screening, including misperceptions about screening guidelines, disease etiology, and risks.^[28] Haitians, like other immigrants, face a number of significant barriers to screening, including social-cultural factors (conflicting etiologic beliefs, viewing illnesses as symptomatic, and observable), structural barriers (lack of financial resources/insurance, language difficulties, and lack of information), and psychosocial barriers (fear of cancer diagnosis and medical treatment).^[29] Immigrants of lower socioeconomic status are also more likely to live in medically underserved areas, have multiple jobs, and lower levels of education-factors that hinder compliance with screening.^[13,30] On the other hand, increasing length of residence in the US is positively associated with receipt of preventive screening, with screening rates among immigrants approaching that of non-foreign-borne women over time.^[31] Previous history of breast cancer is also a strong predictor of compliance with screening guidelines.^[26]

The aim of this study is to assess the association between race/ethnicity and mammogram compliance among 697 randomly selected households residing in Little Haiti, MDC, Florida.

2. Methods

2.1. Data collection and participant recruitment

This study is a secondary analysis of data from the random-sample, population-based Little Haiti benchmark survey

conducted between November 2011 and December 2012. Details of the study are described elsewhere.^[32] Briefly, the aim of the survey was to collect household health and wellness indicators for families residing in the Little Haiti community of MDC, Florida. To approximate the geographic area of Little Haiti, 20 US census tracts with a Haitian population of 30% to 49% were selected. Addresses in these census tracts were obtained from MDC and were selected for participation in the household survey using simple random sampling. Sampled households were visited by trained staff. The face-to-face survey consisted of 156 questions, taking approximately 40 to 50 minutes to complete. It was administered via at-home interviews with a consenting adult (18 years or older) in English, Spanish, French, or Creole, depending on the respondent's preference. The adult respondent completed the interview on behalf of all members of the household. Of the 1798 households randomly selected for the survey, 951 (52.9%) responded, 634 (35.3%) refused participation, and 213 (11.8%) were unreachable after a minimum of 7 attempts to interview a household member. Response rates did not differ significantly by census tract. Although the data from this survey are not publicly available, Florida International University partners with members of the community to analyze the data as needed.

2.2. Ethical review

The present study received expedited ethical approval from the Florida International University Health Sciences Institutional Review Board.

2.3. Outcome and study variables

The outcome of the study is mammogram compliance. To best approximate the American Cancer Society's guidelines for breast cancer screening in effect at the time of the Little Haiti survey, compliance was defined as completion of mammogram within 12 months prior to the survey by all female household members age ≥ 40 years.^[4] The use of mammogram within the households was ascertained using the following survey question: "About how long ago, if ever, did anyone in the household have any of the following? [In the case that more than 1 person fits into one of the categories below, report the longest since anyone in the household had had any of the following] . . . A mammogram (females 40 and over only)."

Based on the literature and the variables available in the survey, 13 sociodemographic and health-related variables with potential to influence compliance with mammogram were selected: race/ethnicity; primary language; educational level, marital status, and employment status of the head of the household; poverty; presence of children under age 6 within the household; health insurance; source of health insurance; language barrier with provider; provider visits; regular provider; and household history of cancer. All variables were self-reported by the respondents. Race/ethnicity was categorized as Haitian versus the following non-Haitian groups: non-Hispanic White (NHW), non-Hispanic Black (NHB), Hispanic, and other. Marital status was categorized as single or other versus married/living with someone, with the former comprising the responses "single," "separated," "divorced," and "widowed." Poverty was calculated based on annual household income, household size, and number of children under age 18 residing in the household, and using thresholds established by the US Department of Health and Human Services.^[33] The presence of children under age 6 within the household was included in the study to examine the effect of

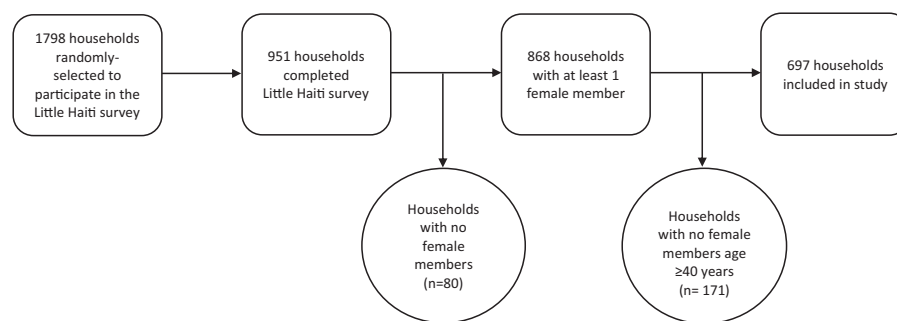


Figure 1. Inclusion criteria for study of mammogram compliance among Little Haiti households with at least one female member ≥ 40 years ($n=697$) – Little Haiti, Miami-Dade County, Florida, 2011 to 2012.

having at least 1 nonschool aged child on compliance with mammogram.^[34] Lack of health insurance was defined as having at least 1 household member who lacked health insurance at any point within the 12 months prior to the survey. Sources of health insurance examined in this study included work-sponsored insurance, Medicare, and Medicaid. Language barrier with provider was defined as having at least 1 household member that experienced communication issues with his/her provider due to speaking different languages within the 12 months prior to the survey. Provider visit was defined as having at least 1 household member who visited a provider within the 12 months prior to the survey. Household history of cancer was defined as having at least 1 household member who was diagnosed by a physician with any type of cancer within the 5 years prior to the survey.

2.4. Statistical analysis

Of the 951 households that completed the Little Haiti survey, 697 (73.3%) households contained at least 1 female member age 40 years or older (Fig. 1). These households comprised the study sample. Secondary data analysis was conducted to assess the association between race/ethnicity and mammogram compliance. Owing to the nature of the survey, the unit of analysis was the household. Pearson Chi-square tests were used to identify factors associated with race/ethnicity and with mammogram compliance. Binary logistic regression was performed to obtain unadjusted and adjusted odds ratios with 95% confidence intervals. To examine possible clustering at the census tract level, we also ran the binary logistic regression models utilizing Stata survey design command and compared variance estimates to the standard model. Since the variance estimates were nearly identical, we concluded that a clustering effect was not likely to be present, and therefore utilized the standard logistic regression models. Factors conservatively associated with both race/ethnicity and mammogram compliance (Chi-squared P -value ≤ 0.20) and those of clinical importance were selected a priori as independent variables for the binary logistic regression models. Variables were excluded from the model if the percentage of missing values was large (i.e., 10% or greater), low variability was observed within the response categories overall or when stratified by the outcome (i.e., if approximately 90% or more of the values were contained within a single response category), if they were highly correlated with other independent variables, or if multicollinearity was present. Correlation between variables was assessed with Pearson correlation coefficients; multicollinearity was assessed using variance inflation factors.^[35] All

analyses were conducted using Stata 14 (StataCorp, College Station, TX) and using a significance level of $\alpha = 0.05$.

3. Results

3.1. Characteristics of the sample

Nearly half of the households reported being of Haitian descent (53%); the remaining households self-reported as Hispanic (21.9%), NHB (18.0%), and NHW (7.3%). The majority of Haitian households spoke primarily Creole; the majority of Hispanic households spoke primarily Spanish; and the majority of NHW and NHB households spoke English (Table 1). A greater proportion of Hispanic and Haitian households had a head of the household with less than high school degree and who was married or living with someone compared with NHW and NHB households. Nearly half of the NHB, Hispanic, and Haitian households had a head of the household who was employed full time, whereas only one-third of NHW households had a head who was employed full time. The proportion of NHW households with a retired head of the household was twice that of the other racial/ethnic groups. Poverty was twice as prevalent among Haitian households compared with NHW, NHB, and Hispanic households. Few households included at least 1 child under the age of 6; however, the proportion of NHB and Haitian households that contained a young child was 7 times that of NHW households.

Three out of 5 Hispanic and Haitian households reported having at least 1 uninsured member within the prior 12 months; this is nearly 50% greater than that of NHB households and twice that of NHW households (Table 1). More than twice as many NHW households had at least 1 member insured by Medicare compared with NHB, Hispanic, and Haitian households ($P < 0.001$). Nearly 50% more Haitian households had at least 1 member covered by Medicaid compared with NHB and Hispanic households; Medicaid coverage was twice as prevalent among Haitian households compared with NHW households ($P = 0.037$). Most households reported having at least 1 member that visited a provider within the 12 months prior to the survey and at least 1 member that had a regular provider. Few households reported having experienced a language barrier with their provider (11%); however, such language barriers were twice as common among Haitian households compared with Hispanic households. History of any cancer within NHW households was twice that of NHB households, and nearly 4 times that of Hispanic and Haitian households.

Table 1
Sociodemographic characteristics of Little Haiti households with at least one female member ≥40 years (n = 697) – Little Haiti, Miami-Dade County, Florida, 2011 to 2012.

Characteristic	Race/ethnicity					P
	NHW N = 51 (col %)	NHB N = 125 (col %)	Hispanic N = 152 (col %)	Haitian N = 325 (col %)	Other N = 42 (col %)	
Language						<0.001
Creole	0.0	1.6	0.7	78.5	4.9	
English	98.0	96.8	28.9	19.4	90.2	
Spanish or other	2.0	1.6	70.4	2.2	4.9	
Educational level [†]						<0.001
Less than high school	6.0	7.3	23.0	27.3	10.0	
High school or equivalent	24.0	26.6	25.0	31.0	32.5	
Vocational/technical/some college	38.0	32.3	33.1	21.0	27.5	
Bachelor degree or above	32.0	33.9	18.9	19.3	30.0	
Marital status – single or other*	56.9	54.0	42.1	43.8	31.7	0.032
Employment status [‡]						0.001
Full time	31.4	53.2	56.3	45.3	47.6	
Part time	9.8	10.5	7.9	12.8	4.8	
Not employed	21.6	19.4	21.2	25.9	11.9	
Retired	37.3	16.9	14.6	15.9	35.7	
Below U.S. poverty threshold	25.6	20.0	30.3	50.7	25.7	<0.001
At least 1 child <6 years in household	2.0	14.4	9.2	13.2	2.4	0.027
Health insurance: ≥1 member uninsured	25.2	40.8	58.9	56.3	30.0	<0.001
Source of health insurance [†]						
Work-sponsored	35.3	62.4	39.7	42.8	52.4	<0.001
Medicare	51.0	22.4	19.9	21.2	38.1	<0.001
Medicaid	17.6	24.0	21.2	32.0	21.4	0.037
Provider visit: no members visited doctor	9.8	8.0	14.5	8.0	7.1	0.22
Regular provider [‡]	93.5	91.5	90.1	87.5	90.2	0.63
Experienced language barrier with provider	3.9	2.5	7.9	16.5	11.9	<0.001
Household history of cancer	20.4	9.8	6.6	4.0	14.3	<0.001

Language: "Spanish and other" includes Spanish, French, and Hebrew. Educational level: "Bachelor degree or above" includes bachelor's degree, master's degree, doctoral degree, and professional degree. Marital status: "Single or other" includes single, divorced, separated, and widowed; compared to "married/living with someone." Below U.S. poverty threshold: Calculation based on annual household income, household size, and number of children under age 18. Source: U.S. Department of Health and Human Services. Health insurance: Defined as at least 1 household member being uninsured within the 12 months prior to the survey. Provider visit: Defined as at least 1 household member having visited a provider within the 12 months prior to the survey. Language barrier with provider: Defined as at least 1 household member having had a hard time speaking with or understanding a health provider due to speaking different languages. Household history of cancer: Defined as at least 1 household member having been diagnosed by a physician with any cancer within the 5 years prior to the survey. NHB = non-Hispanic Black, NHW = non-Hispanic White.

* Reported for the head of the household.

† Response categories are not mutually exclusive. Households were allowed to select multiple sources of health insurance if the source differed by individual household members.

‡ Filtered for households that reported visiting a provider within the 12 months prior to the survey.

3.2. Compliance with annual mammogram

Overall compliance with annual mammogram was 62% (Table 2). Mammogram compliance was significantly associated with race/ethnicity ($P=0.030$) (Table 3). Compliance was lower among Haitian households compared with NHB and Hispanic households (22% and 5% lower, respectively). Conversely, compliance was 14% higher among Haitian households

Table 2
Compliance with annual mammogram among Little Haiti households with at least one female member ≥40 years (n = 697) – Little Haiti, Miami-Dade County, Florida, 2011 to 2012.

Race/ethnicity	Compliance with annual mammogram % (95% CI)
Haitian	58.5 (52.4–64.6)
Non-Haitian	
Non-Hispanic White	51.1 (35.6–66.7)
Non-Hispanic Black	74.7 (65.8–83.6)
Hispanic	61.9 (53.0–70.8)
Other	68.4 (52.9–83.9)
Total	62.2 (58.1–66.3)

CI = confidence interval.

compared with NHW households. As expected, compliance increased with increasing educational level of the head of the household ($P=0.084$). Compliance with mammogram differed by employment status ($P=0.001$); rate of compliance was greater among households whose head was retired or employed full time compared with those whose head was unemployed or employed part time. Compliance was also greater among households that spoke English compared with other languages ($P=0.032$); greater among households that were above poverty thresholds compared with those below poverty thresholds ($P<0.001$); greater among households with at least 1 child under age 6 compared to those with no young children ($P=0.074$); greater among households in which all members were continuously insured within the 12 months prior to the survey compared with those that had at least 1 uninsured member ($P<0.001$); greater among households with at least 1 member insured through work compared with those insured by other sources ($P<0.001$); greater among households with at least 1 member insured through Medicare compared with those insured by other sources ($P=0.01$); greater among households with at least 1 member insured through Medicaid compared with those insured by other sources ($P<0.001$); greater among households in which at least 1 member visited a provider within the 12 months prior to the

Table 3

Mammogram compliance among Little Haiti households with at least one female member ≥40 years (n = 697) – Little Haiti, Miami-Dade County, Florida, 2011 to 2012.

Characteristic	Compliance with annual mammogram, %	P
Race/ethnicity		0.030
Haitian	58.5	
NHW	51.2	
NHB	74.7	
Hispanic	61.9	
Other	68.4	
Language		0.032
Creole	55.7	
English	67.6	
Spanish or other*	62.9	
Educational level†		0.084
Less than high school	52.8	
High school or equivalent	60.4	
Vocational/technical/some college	65.7	
Bachelor degree or above	67.7	
Marital status		0.20
Single or other	59.1	
Married/living with someone	64.5	
Employment status‡		0.001
Full time	68.6	
Part time	57.4	
Unemployed	48.4	
Retired	67.0	
Below U.S. poverty threshold		<0.001
Yes	51.8	
No	70.0	
At least 1 child <6 years in household		0.074
Yes	72.9	
No	60.9	
Health insurance		<0.001
≥1 member uninsured	50.0	
All members insured	74.7	
Source of health insurance‡		
Work-sponsored		<0.001
Yes	73.8	
No	53.4	
Medicare		0.010
Yes	71.2	
No	59.1	
Medicaid		<0.001
Yes	74.3	
No	57.7	
Provider visit		<0.001
≥1 member visited provider	65.7	
No members visited provider	26.5	
Regular provider‡		<0.001
Yes	68.0	
No	42.6	
Experienced language barrier with provider		0.59
Sometimes-always	65.5	
Never	61.9	
Household history of cancer		0.43
Yes	68.4	
No	61.9	

Language: "Spanish and other" includes Spanish, French, and Hebrew. Educational level: "Bachelor degree or above" includes bachelor's degree, master's degree, doctoral degree, and professional degree. Marital status: "Single or other" includes single, divorced, separated, and widowed; compared to "married/living with someone." Below U.S. poverty threshold: Calculation based on annual household income, household size, and number of children under age 18. Source: U.S. Department of Health and Human Services. Health insurance: Defined as at least 1 household member being uninsured within the 12 months prior to the survey. Provider visit: Defined as at least 1 household member having visited a provider within the 12 months prior to the survey. Language barrier with provider: Defined as at least 1 household member having had a hard time speaking with or understanding a health provider due to speaking different languages. Household history of cancer: Defined as at least 1 household member having been diagnosed by a physician with any cancer within the 5 years prior to the survey. NHW = non-Hispanic White, NHB = non-Hispanic Black.

* Reported for the head of the household.

† Response categories are not mutually exclusive. Households were allowed to select multiple sources of health insurance if the source differed by individual household members.

‡ Filtered for households that reported visiting a provider within the 12 months prior to the survey.

survey compared with those in which no member had visited a doctor ($P < 0.001$); and greater among households that had at least 1 member that had a regular provider ($P < 0.001$).

3.3. Nonresponse

One-fifth of the households had missing data for mammogram compliance (N=146); however, these households were comparable to those with valid responses on all socioeconomic factors, except education level. A greater proportion of households with missing data for mammogram had a head with vocational/technical school or some college (36% vs 65%), while a greater proportion of households with valid responses had a head with a bachelor's degree or above (68% vs 18%) ($P = 0.048$).

3.4. Variables selected for inclusion in the binary logistic regression model

The following variables meet the criteria for inclusion in the binary logistic regression model: race/ethnicity, educational level, marital status, employment status, having at least 1 child < 6 years within the household, health insurance status, and regular provider visit. Multicollinearity was present between race/ethnicity and primary language (variance inflation factor = 1.64 and 1.55, respectively), they were also highly correlated ($r = 0.757$). The latter was excluded from the model. Poverty was excluded due to a high percentage of the missing values (32%). Source of health insurance was excluded because households were allowed to select more than one source. Regular provider was excluded because it was not associated with race/ethnicity ($P = 0.63$). Language barriers with provider and household history of cancer were excluded because they were not associated with mammogram compliance ($P = 0.59$ and 0.43 , respectively).

3.5. Odds of mammogram compliance

No multicollinearity was observed in the adjusted model. After adjusting for potential confounders, the odds of complying with annual mammogram was 35% lower among NHW households compared with Haitian households; and 63% and 29% greater among NHB and Hispanic households, respectively, compared with Haitian households (Table 4). Although these disparities were not statistically significant, the disparity between Haitian and NHB households was borderline significant ($P = 0.11$). Of the covariates included in the model, significant disparities were observed by employment status, insurance status, and physician visit. Odds of complying with mammogram was 47% lower among households with an unemployed head compared with those with a head employed full time ($P = 0.014$); 61% lower among households with at least 1 member who was uninsured compared with those in which all member were insured over the 12 months prior to the survey ($P < 0.001$); and 78% lower among households in which no member had visited a provider compared with those in which at least 1 member visited a provider within the 12 months prior to the survey ($P < 0.001$).

4. Discussion

Overall compliance with mammogram was low among the surveyed households in Little Haiti. Compliance significantly differed by race/ethnicity. Compliance was lower among Haitian households compared with NHB and Hispanic households. Contrary to our expectations however, compliance was greater

Table 4

Odds of complying with annual mammogram among Little Haiti households with at least one female member ≥40 years (n=697) – Little Haiti, Miami-Dade County, Florida, 2011 to 2012.

Characteristic	Unadjusted		Adjusted	
	OR (95% CI)	P	AOR (95% CI)	P
Race/ethnicity				
Haitian	Ref.	–	Ref.	–
NHW	0.743 (0.389–1.421)	0.37	0.648 (0.305–1.377)	0.26
NHB	2.099 (1.240–3.552)	0.006	1.629 (0.903–2.939)	0.11
Hispanic	1.151 (0.735–1.801)	0.54	1.286 (0.774–2.136)	0.33
Other	1.537 (0.742–3.184)	0.25	1.121 (0.494–2.543)	0.79
Educational level*				
Less than high school	0.534 (0.316–0.902)	0.019	0.687 (0.368–1.284)	0.24
High school or equivalent	0.728 (0.448–1.184)	0.20	0.991 (0.571–1.719)	0.97
Vocational/technical/some college	0.914 (0.549–1.521)	0.73	1.130 (0.639–1.998)	0.68
Bachelor degree or above	Ref.	–	Ref.	–
Marital status – single or other*	0.797 (0.562–1.129)	0.20	0.816 (0.542–1.228)	0.33
Employment status*				
Full time	Ref.	–	Ref.	–
Part time	0.616 (0.338–1.124)	0.11	0.716 (0.360–1.424)	0.34
Unemployed	0.429 (0.276–0.666)	<0.001	0.529 (0.319–0.879)	0.014
Retired	0.927 (0.574–1.496)	0.76	0.814 (0.464–1.430)	0.48
At least 1 child <6 years in household	1.723 (0.943–3.145)	0.077	1.752 (0.895–3.430)	0.10
Health insurance: ≥1 member uninsured	0.338 (0.234–0.488)	<0.001	0.392 (0.257–0.597)	<0.001
Provider visit: no members visited provider	0.188 (0.097–0.364)	<0.001	0.218 (0.105–0.452)	<0.001

Educational level: “Bachelor degree or above” includes bachelor’s degree, master’s degree, doctoral degree, and professional degree. Marital status: “Single or other” includes single, divorced, separated, and widowed; compared to “married/living with someone.” Health insurance: Defined as at least 1 household member being uninsured within the 12 months prior to the survey

Provider visit: Defined as at least 1 household member having visited a provider within the 12 months prior to the survey. Note: The following study variables were excluded from the model due to not meeting the criteria for inclusion, as presented in the text: primary language; poverty; source of health insurance; regular provider; language barriers with provider; and household history of cancer. AOR = adjusted odds ratio, CI = confidence interval, NHB = non-Hispanic Black, NHW = non-Hispanic White, OR = odds ratio.

* Reported for the head of the household.

among Haitian compared with NHW households. After adjusting for educational level, marital status, employment status, young children within the household, health insurance status, and provider visits, no significant disparities in mammogram compliance were observed by race/ethnicity. Although only borderline significant, the odds of complying with annual mammogram was 63% higher among NHB households compared with Haitian households.

Overall compliance was nearly 22% lower than the 2020 Healthy People target for breast cancer screening.^[36] However, compliance with annual mammogram in our study was comparable to that at the national and state levels (62% vs 59% vs 59%, respectively).^[12,37] Compliance among our NHW households was comparable to that of the NHW population at the national level (51% vs 52%, respectively), whereas compliance among our NHB and Hispanic households was notably higher than that of the Black and Hispanic populations at the national level (75% vs 51% and 62% vs 46%, respectively).^[12,18–20]

Surprisingly, compliance in our study was lowest among NHW households. Based on existing literature, we expected compliance among the NHW households to be comparable to that of the NHB households, and higher than that of the Hispanic households.^[12,19,20] This unexpected result may be due to the small NHW population in MDC, and subsequently the relatively small number of NHW households included in the study. These households may differ from the overall NHW population of the state and nation. Although they were at least comparable to, if not fared better than the other groups in terms of socioeconomic status (SES), the NHW households in our study may differ from the other households on unmeasured factors that influence mammogram compliance. In addition, Black women have been

found to over-report use of mammogram more often than NHW women.^[38] Thus, the observed disparity in mammogram compliance between NHW and NHB households and between NHW and Haitian households may be exaggerated. The 2nd lowest compliance rate was observed among Haitian households; compliance among Haitian households was 16% lower than that of NHB households and 5% lower than that of Hispanic households. Haitian and Hispanic households had lower levels of SES than the NHB households in our study. Compared with Haitian and Hispanic households, NHB households were generally more educated and fewer were below U.S. poverty thresholds, fewer had an uninsured member, and fewer had a member that experienced language barriers with a provider. After controlling for these and other available socioeconomic and health-related factors, all observed disparities in mammogram compliance by race/ethnicity disappeared.

Compliance with mammogram among the Haitian households in our study was comparable to the rate observed in a recent study of Haitian women,^[39] but higher than the rates reported in two older studies.^[26,27] In a 2011 survey of 96 Haitian women from Little Haiti, Seay et al found that 58% of the Haitian women in their study complied with biannual mammogram – a rate comparable not only to that of the Haitian households in our study, but also to that of the 138 Hispanic women from Hialeah, Florida included in the same Seay et al study (57%).^[39] A similar rate, albeit slightly higher, was observed among the Hispanic households in our study (62%). Limitations of the Seay et al^[39] study included the use of a convenience sample; controlling for only site, health insurance coverage, and usual place of care in their multivariate analysis; and the non-inclusion of NHW and NHB women in the study. A 2007 study conducted by Kobetz et al^[26] in Little Haiti found that only 42% of the Haitian women

in the study (age 40 years or older) underwent mammogram within the prior 2 years. However, although the sample in the Kobetz et al study was large ($n=940$), a convenience sample was utilized and socioeconomic data were not collected in the study. It is likely that our sample of Haitian households differs in characteristics from the Haitian women included in the Kobetz et al study.^[26] An older study by Mandelblatt et al^[27] reporting results of a telephone survey conducted in New York City in 1992 found a similar low rate of compliance with biannual mammogram among Haitian women (42%). The main aims of this study however was to assess the effect of age and health status on compliance with mammogram, clinical breast examination, and Pap smear. Although the study controlled for race/ethnicity in its multivariate analyses, the adjusted associations between the screening tests and race/ethnicity were not presented nor discussed. In addition, characteristics of the study women were not presented by race/ethnicity and therefore we cannot determine if the Haitian women included in the study were comparable to the Haitian households in our study.^[27]

Our study was the first, to our knowledge, to assess the independent association between race/ethnicity and mammogram compliance in Little Haiti, MDC. The main strength of our study is that it utilized a large, random-sample and included a large sample of Haitian households. Our main limitations were that the survey was conducted at the household-level and was not specifically designed to study breast cancer screening. It is important to note that compliance with mammogram was based on the longest time since last mammogram for any female age 40 or older within the household. Thus, compliant households in this study were defined as households in which all females age 40 or older completed a mammogram within the year prior to the survey. Noncompliant households were defined as households in which at least 1 female age 40 or older had not completed an annual mammogram; it is possible that these households may have contained at least 1 female who had completed an annual mammogram. Owing to the nature of the survey, a number of variables that could potentially influence compliance with mammogram were not available for analysis, such as personal and family history of breast cancer, knowledge of breast cancer and its screening methods, physician recommendation for screening, and factors relating to acculturation. In addition, we could not control for age because the unit of analysis was the household and we did not know the specific age(s) of the female(s) within the household that completed mammogram. As a result, we cannot rule out the possibility of residual confounding. Although we could not control for poverty due to a large percentage of missing values, we were able to control for multiple other socioeconomic variables. Last, the data were self-reported and not validated through medical records. The survey was completed by any household member age 18 or older, and thus not necessarily completed by the female member that is recommended for screening. It is possible that the respondent of the survey is unsure of the frequency of use of mammogram by women within the household. This may be reflected in the high percentage of missing data on mammogram use. Although nonresponse was high, households that provided a valid response for mammogram use were comparable to the study sample. In addition, it is unclear if the women within these households completed mammogram for preventive or diagnostic reasons.

The findings from this study will provide basis for developing an intervention aimed at increasing breast cancer screening in Little Haiti, MDC, Florida. Similar to other studies, we observed that mammogram compliance was low among our Haitian

population. Surprisingly, we found compliance was lowest among NHW households and that having young children within the household was a predictor of complying with annual mammogram. These unexpected findings call for further exploration.

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