Can health system engagement facilitate greater utilization of genetic tests to predict cancer risk? A health disparities exploration of national survey data

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Abstract

Funding: Susan G. Komen ® GTDR16376189 Objective: To estimate the effect health system engagement on a woman's awareness of and decision to complete a genetic test to predict cancer risk. Background: Young African American women face a higher risk of breast cancer mortality than white women. To mitigate this disparity, clinicians have developed predictive risk assessment and stratified screening protocols based on genetic tests. However, African American women have historically been under represented in genetic test utilization. If the trend of low genetic test participation continues, potential health gains from precision medicine will be limited or unrealized, further expanding the Black/White breast cancer mortality disparity. Significance: While previous investigators have made numerous attempts to better understand the Black/White disparity in genetic testing, this study directly analyzes racial disparities in genetic test exposure and utilization through health system engagement using the latest population-level survey dataset. Methods: Data was obtained from the nationally representative, cross-sectional National Health Interview Surveys for years 2000, 2005, 2010, and 2015. Outcomes included: 1) awareness of a genetic test; 2) genetic test utilization, conditional on awareness; 3) discussing a genetic test with a medical provider; and 4) unconditional genetic test utilization. Weighted odds ratios were calculated by a series of multivariate logistic regression models. Independent variables included various socioeconomic and demographic indicators, as well as health system factors. Results: White women with a usual place of medical care held significantly higher odds of genetic test awareness and of discussing a genetic test with a medical provider (OR = 2.16, $p < .001$; OR = 5.34, $p < .05$). Conversely, a usual place of medical care was not found to heighten awareness or facilitate greater discussion with a medical provider for African American women. Consistent with this trend, only among white women did a consistent place of medical care yield a positive effect on genetic test utilization (OR = 2.53, $p <.001$). No such protective factor existed for black women at a significant level. Conclusion: There still exists a stark disparity in genetic test awareness and utilization between black and white women. But this study identified another disparity, that white women were more likely to discuss genetic tests with a medical provider than black women. These results support the idea that health system engagement promotes greater awareness of genetic tests to predict cancer risk. However, the limited impact a usual place of medical care had on actual utilization warrants further exploration into the drivers of genetic test decision making both across and within racial groups. The continued commitment to addressing cancer disparities requires not only policy-makers and oncologists, but explicit engagement from genetic counselors and providers across the care continuum.

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Background

Introduction

African American women with breast cancer die more frequently than white women (DeSantis et al. 2017). This disparity is exceptionally pronounced in premenopausal women (Chollet-Hinton et al. 2017). Premenopausal women of African ancestry in America not only face higher death rates than women of European ancestry, but are also diagnosed with more lethal forms of breast cancer more often. One prognostic for lethality is the cancer's hormone receptivity: An especially poor prognosis follows a woman with Triple Negative Breast Cancer (TNBC), a highly lethal cancer of the breast without any hormone receptivity. Regarding the black/white disparity in breast cancer, African American women between the ages of 30-50 experience significantly higher rates of TNBC than white women (Sturtz et al. 2014). It is this young group of African American women that bears the highest burden of the racial breast cancer disparity. And while the overall disparity in breast cancer mortality can be attributed to a variety of genetic, societal, and behavioral conditions, the TNBC disparity between young black and white women is highly driven by epigenetic factors (Daly and Olopade 2015).

Thirty years of genomic research has highlighted minute, but significant epigenetic differences between women of African ancestry and women of European ancestry (Olopade 2003). While the stark mortality disparity between the two groups has continued since the Human Genome Project, by integrating clinical outcomes and genomics, investigators were able to more precisely identify where the black/white breast cancer mortality gap was widest (Joslyn and West 2000). Post-genome analyses have shown that, along with higher mortality rates than white women, African American women were diagnosed with TNBC at younger ages and with more evolved cancer stages. But, far from fatalistic, these genome studies highlighted future opportunities to predict, mitigate, and potentially prevent the most lethal types of breast cancer through genetic expression data, or more commonly referred to as a genetic test.

One modern approach to address the current disparity in breast cancer mortality is the development of predictive risk assessment and screening protocols for high-risk women (Bryan et al. 2018; Lecarpentier et al. 2017; Kuchenbaecker et al. 2017; Khoury, Janssens, and Ransohoff 2013; Huo et al. 2017; Chowdhury et al. 2013; Bradbury and Olopade 2007). Unfortunately, women of African ancestry have been under represented in genetic tests (Barrington et al. 2018; Butow 2003). If the trend of low genetic testing participation continues, potential health gains from precision medicine will be limited or unrealized, further expanding the Black:/White breast cancer mortality disparity (Peters, Rose, and Armstrong 2004; Armstrong et al. 2005).

Significance

Recent research has attempted to better understand the Black/White disparity in genetic testing, which does not appear to be explained by differences in risk factors, socioeconomic status, perceptions and attitudes toward risks, or primary care recommendations (Hann et al. 2017; Jones et al. 2017). Encouragingly, recent evidence has identified a patient's expected benefits and costs of participating in a genetic test as a potential predictor of utilization (Hann et al. 2017). However, an individual's expected costs and benefits of completing a genetic test may be highly dependent on that patient's engagement with her health system.

The current study builds upon this finding by exploring how variation in health system engagement influences a woman's decision to complete a genetic test to predict breast cancer risk. Specifically, this study aims to 1) improve our understanding of low genetic test participation for women of African ancestry; and 2) identify health system factors influencing the variation in genetic test participation between, and within, Black and White American women. This project hypothesizes that women who have limited engagement to the health care system are less likely to be aware or offered the opportunity to complete this potentially life-saving genetic test. While previous research has focused heavily on socioeconomic status and health behavior, this research will focus more on patient-provider engagement and continuity of care.

Epidemiological studies of nationally representative samples allow us to understand how an individual's access to the health care system may impact her willingness or exposure to the genetic testing for breast cancer risk. Racial differences in this relationship can then help partially illuminate potential pathways for ameliorating the disparities in the use of diagnostic genetic testing. This analysis can then be used as a guide for policy makers to identify factors that may increase genetic test participation or mitigate negative factors influencing uptake of potentially beneficial tests.

Survey Methodology

Dataset Description

This study analyzed public-use data from the National Health Interview Health Survey (NHIS), which contains responses on both an individual's experience with genetic tests to predict breast cancer, as well as historical health system engagement (Blewett 2018). Four NHIS datasets included questions on genetic testing to predict cancer risk (2000, 2005, 2010, 2015). Engagement with the health system was operationalized through a series of questions regarding an individual's usual source of care of care and delays or trouble accessing care. Along with the indicators described above, the NHIS dataset contains variables on family history of cancer.

Sample Design and Survey Description

The National Health Interview Survey (NHIS) population represents civilian, noninstitutionalized men and women in America. The target population of the current proposal will include only adult, non-Medicare eligible (age 18-64) female respondents who identify as non-Hispanic White or non-Hispanic Black. NHIS interviews respondents through complex stratified random sampling in order to represent the United States population. Geographic areas are clustered by social and demographic features unique to each region. Within each cluster, primary sampling units (PSU) were selected into a sample based on that PSU's probability of selection (proportional to population size within the cluster). Next, within each PSU, clusters were formed by geography and sampled from which contained sample housing units. Individual

respondents are then weighted by their probability of selection and representativeness of the general population. The average response NHIS interviews are approximately 70% (Center for Disease Control 2019).

Data Imputation and Recoding

NHIS makes no attempt to recode respondent refusal or uncertainty. For example, if in response to the question about employment, the respondent said "I do not know" or outright refused to answer, that response was left unchanged in the final survey dataset. To mitigate any potential issue with these missing data, the following steps were taken.

Using the R statistical environment, all non-response codes were changed to NA. Next, missing values were imputed through multivariate, iterative chained equations (Schnekcer & Taylor 1996). The multivariate imputation chained equation (MICE) algorithm utilizes features from both hotdeck encoding and regression principles, minimizing potential error by creating multiple imputations before fitting a final model. The resulting dataset contains no missing values on demographic or independent variables. However, missing information on the dependent variables related to genetic testing were left unchanged.

After imputation, dummy variables were created to represent the following concepts: "Any Marital History", "Any Reproductive History", "Employed" (unconditional of labor force status), "Educated" (defined as holding a college degree or higher), "Insured", "Privately Insured", "Has Usual Place of Care", "Has Experienced Delay in Care Due to Cost", "Has Experienced Delay in Care for Reasons Not Related to Cost", "Respondent has been exposed to a Genetic Test to Predict Cancer", "Respondent has completed a Genetic Test to Predict Cancer", and "Respondent has Discussed Genetic Tests to Predict Cancer with a Medical Provider".

Upon construction of these new binary variables, the data was subset into two samples. The first sample included responses from the 2000, 2005, and 2010 surveys. The surveys from these three years asked the question about exposure to a genetic test. Exposure will serve as the dependent variable for this

sample, along with genetic test completion conditional on having been exposed. The second sample will include only responses from the 2015 survey. This survey did not ask about exposure, but did ask about discussions with a medical provider. The second dataset will use genetic test completion and genetic test discussion as the dependent variables. For each sample, unweighted descriptive statistics were reported (Table 1 and 2).

Analytical Methodology

First, treating socioeconomic and health system variables as the exposure, unweighted Odds Ratios (OR) were calculated for each dependent variable: Genetic Test Exposure, Genetic Test Completion | Exposure, Discussing Genetic Tests with a Medical Provider, and Genetic Test Completion (Schratz 2017). These crude OR were reported to show the various determinants of positive genetic test outcomes for both racial groups (see Tables 7-10).

Using the R-Package "Survey Set", responses were weighted to incorporate the survey design into estimating standard errors (Lunley 2004, Lunley 2019). Setting the survey required only a single line of code for the 2015 sample, utilizing the PSU, Sample Weights, and Strata provided by the NHIS. However, in order to accurately interpret the results of the pooled 2000-2010 sample, the weights were recalibrated by normalizing to reflect 1/3 of the total sample (Moriarty 2008).. Weighted summary statistics were then calculated and reported (see Tables 1 and 2).

Next, a series of Logistic and Poisson Regression Models were constructed for each dependent variable in the respective sample. While the Logistic Regression model provides the desired statistic of interest: odds ratio of a positive genetic test outcome, the Poisson model is used as a sensitivity measure and reports a similar incidence ratio statistic.

The first model uses the pooled 2000-2010 sample, treating exposure to the genetic test as the dependent variable. Binary demographic, socioeconomic, and health system indicators were used as the independent variables. Each model predicts the marginal effect of the independent variable on the odds

(or incidence) ratio of being aware of a genetic test. Within each Logistic and Poisson Model, were three specifications. The first specification included both racial groups. This specification used a binary Race variable as a standalone independent variable and as an interaction variable with each independent variable. The second and third specifications removed the Race variable and reported the stratified results within each racial group. In all, there were 6 specification models for the dependent variable of interest. The results were tabulated and reported as a single output using the "J-Tools" package (Long 2019). This process was repeated for each subsequent dependent variable. Standard errors were calculated using the Taylor Series approach. Odds Ratios and Incidence Ratios were reported with 95% confidence intervals. Confidence intervals which did not cross 1 were considered significant ($p < .05$). R2 and Mean Square Errors of each regression model were reported along with the coefficient results.

Results:

Ever Having Heard of a Genetic Test to Predict Cancer Risk

The first test used "Ever having heard of a genetic test to predict cancer risk" as the dependent variable (Table 3). In the logistic model with both racial groups, each independent variable significantly impacted the odds of a White woman's awareness of a genetic test to predict cancer risk. The strongest contributor was having ever been screened for cancer ($OR = 36.83$, $p < .001$). Other factors influencing a higher likelihood of exposure were being insured, educated, employed, having previously given birth (or currently being pregnant), NOT living in poverty, and NOT having ever been married.

Supporting this study's hypothesis, one health system indicator was shown to positively influence the odds of exposure to a genetic test. The results indicate that women with a usual place of medical care have significantly higher odds of exposure to a potentially beneficial predictive test than women who do not have any consistent place of care ($OR = 2.16$, $p < .001$). Contrary to expectation, however, women who had not faced any delays (for non-monetary reasons) in medical care had worse odds of exposure.

The results for white women were not sensitive to model specification, as the coefficients did not change significance under the Poisson regression or racial stratification models.

The results for African American women were less promising in the full logistical model. Simply identifying as black led to significantly lower odds of exposure to a genetic test (OR = .65, $p < .05$). Also, rather than being a protective factor, as was the case in white women, black women with insurance also faced significantly lower odds (OR = .82, $p < .05$). Most troubling was the result for black women with a family history of cancer, as these are the very women who would receive the most benefit from a predictive genetic assessment (OR = .82, p <. 05). No health system indicators significantly impacted exposure in the full logistical regression model. However, when stratifying by race, a usual place of medical care did serve as a protective factor for black women (OR = 1.7, $p < .001$).

Genetic Test Utilization, Conditional on Exposure

Concerning actual utilization conditional on awareness, the results were less substantial. Only two demographic variables were considered significant for determining the odds of utilization for white women (Employed: OR = .69, $p < .05$; Family History of Cancer: OR = 1.98, $p < .001$). Once again, these results were not sensitive to model construction. Meanwhile, no variable significantly contributed to utilization for African American women. But, after stratifying for race, employment became a negative factor for African American women, similar to that of white women (OR = .37, $p < .05$).

Discussing with a Medical Provider about a Genetic Test to Predict Cancer Risk

In 2015, the NHIS sample replaced the question about having ever heard of genetic tests to predict cancer risk with a question about having ever talked to a doctor about genetic test to predict cancer risk. Using this response as the dependent variable highlights significant protective factors for white women. Having insurance (OR = 2.26, $p < .01$), being educated (OR = 1.98, $p < .001$), and having a family history of cancer (OR = 3.82, $p < .001$) all increase the odds of having spoken with a medical provider about predictive genetic tests. More so, white women with a consistent place for medical care

experienced the largest benefit to their likelihood of having this discussion with their doctor (OR = 5.43, $p < .05$).

These effects were lost among African American women, who only had one significant determinant of talking with a doctor about the genetic test, employment (OR = 1.68, $p < .05$). In the stratified model, however, reproductive history and a family history of cancer did yield higher odds of holding the discussion with a medical provider (OR = 2.14, $p < .001$; OR = 1.77, $p < .001$). In this test, the models proved slightly more sensitive to specification, as marital history and reproductive history became significant determinants under Poisson and stratification, while a usual place of medical care lost its significant effect in the white population.

Genetic Test Utilization

The final test uses the entire 2015 sample to identify any significant determinants of unconditional genetic test utilization. Only three such determinants significantly contributed to the odds of a white woman completing a genetic test: being educated with a college degree or higher (OR = 1.79, $p < .05$), having a family history of cancer (OR = 2.6, $p < .001$), and having previously received been screened for cancer (OR = 70.88, $p < .001$). For black women, education was the only significant indicator. However, converse to that of white women, having a college degree negatively affected the odds of genetic test completion (OR = .13, $p < .001$). These results were more sensitive to model specification, with employment becoming a negatively significant contributor for black women under stratification. Finally, in the stratified models, a usual place of medical care contributed to increased odds of utilization (White: 2.53, $p <.001$; Black: 3.17, $p > .1$).

Discussion

The results of this study lead to two important conclusions. The first being, that while health system engagement and a consistent place of medical care improve the odds of knowing about and discussing a potentially beneficial genetic test to predict cancer risk, those factors do not actually lead to

greater utilization at the population level. Future research must attempt to identify this discontinuity. But, the primary finding is the inequity of benefit a usual place of care provides white and black women. There is a clear increase in likelihood of awareness, discussion, and utilization of genetic tests for white women who have a usual place of medical care. This benefit is all but absent for black women. Perhaps future research could stratify by type of usual place to perform a more granular analysis. However, there may be certain underlying mechanisms which may be preventing black women from gaining access to knowledge, conversations, and shared-decision making around the topic of precision medicine, even within their trusted medical communities.

The findings of this research build upon previous work attempting to explain the variation between black and white utilization rates in genetic testing. Most of these studies have been primary investigation, but recent publications have usd NHIS data to answer questions related to genetic tests as well. The first study from 2014 attempted to estimate changes in genetic testing awareness from 2005 to 2010 (Mai et al. 2014). Two other studies only used an NHIS sample which compromised of only women who had been previously diagnosed with breast or ovarian cancer (Childers et al. 2017; Han and Jemal 2017). A final study did incorporate a broader population and comprehensive analysis of which to analyze engagement with genetic counselors (Stamp et al. n.d.). All this to highlight, since the release of the 2015 NHIS dataset, no study has explicitly identified health system factors as a significant contributor to the racial genetic test disparity. Previously unaddressed by the research community, these results are both timely and exceedingly relevant for mitigating future cancer disparities.

Limitations

This study is not without limitation. Most notably, the dataset, while representative of the target population, did not allow for a fully robust analysis. Simply by sitting in a minority position, the weighted responses of African American women were considerably lower than that of white women. This unbalance only became a problem when it was discovered that no African American woman who had never received preventative cancer screening had ever taken a genetic test to predict cancer risk. This led

to the suppression of potentially critical variables. For example, in the second study (Genetic Test Utilization Conditional on Exposure) the black binary variable reported a 0 coefficient and the coefficient for black women who had previously been screened for cancer approached infinite. Ultimately there was not a single black woman who had never been screened for cancer who heard of genetic tests to predict cancer and then utilized the test

Arguably less of a limitation, readers may, at first glance, dismiss the low R2 values of the specification models for genetic test utilization. While a low R2 value does highlight a lack of goodness of fit and explained variance, the goal of this study was not to fully explain the racial variation in genetic test utilization. This task could not be completed with the given dataset, as there are likely unobservable, sociocultural and trust variables influencing the decision to complete the test. Rather the aim of this study was not to explain greater variation, but attempt to identify small, but significant effects a health system contributes to the genetic test spectrum: from awareness, to discussion, and finally, utilization.

The NHIS is a cross-sectional survey completed every year, with nearly 85,000 annual respondents. The geography covers the entire United States, but is only aggregated and reported by region (NE, S, MW, W) to prevent identifying respondents. To analyze any geographic variation, the NHIS requires an arduous process to obtain data at the census tract level, which remained outside the scope of this investigation.

Conclusion

Since the NHIS began asking questions about genetic tests, critical disparity remains between black and white women for both awareness and utilization. Further, there also appears to be a significant disparity between black and white women who speak to their medical provider about potentially beneficial genetic tests. This is especially problematic for women with a usual place of medical care, as there appears to be no increased likelihood of discussing avenues for utilizing precision medicine to prevent cancer.

The results of the study support the idea that health system engagement leads to greater awareness and provider discussion of genetic tests to predict cancer risk in white women. More research is needed to understand how influence of health system factors facilitate a benefit in white women, while also exploring why a consistent place of medical care fails to benefit African American women.

Finally, while this study did identify health system factors leading to increased awareness and discussion, health system factors only marginally impacted genetic test utilization (and only in white women). This warrants investigation on the links between sociocultural and health system actors as influencing women who do complete a genetic test, and more importantly, continued commitment to identifying a causal mechanism to increase genetic testing across the population.

Policy makers will benefit from the methodology of this study, as large-scale, publicly available survey data can be a major asset in redesigning equitable health systems. More so genetic test counselors and medical providers can begin working in their own medical communities to facilitate greater awareness and access to predictive genetic tests. And in our age of precision medicine, we all must ensure that its reach does not discriminate and instead, extends its benefits to all.

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Table 1 - Summary Statistics – Pooled Responses for Years 2000, 2005, 2010

	Unweighted				Weighted					
	Black		White		Black			White		
Total	13,958		51,765		10,998,431	-	1.9	60,387,109	-	0.8
	n	%	n	%	n	%	se %	n	%	se %
Region										
Midwest	2,647	19.0	14,658	28.3	2,085,469	19.0	3.65	17,133,659	28.4	1.60
Northeast	2,285	16.4	9,747	18.8	1,741,198	15.8	3.30	11,783,288	19.5	1.76
South	7,736	55.4	17,271	33.4	6,304,233	57.3	2.90	20,376,216	33.7	1.39
West	1,290	9.2	10,089	19.5	867,531	7.9	4.35	11,093,946	18.4	2.28
Insurance Status										
Insured, Private	7,686	55.1	39,904	77.1	6,178,490	56.2	2.23	46,686,082	77.3	0.90
Insured, Public	3,184	22.8	4,900	9.5	2,415,099	22.0	2.63	5,658,316	9.4	2.11
Uninsured	3,088	22.1	6,961	13.4	2,404,841	21.9	3.02	8,042,711	13.3	1.67
Employment Status									0.0	
Employed	9,248	66.3	36,242	70.0	7,357,788	66.9	2.02	42,373,700	70.2	0.89
Unemployed	963	6.9	1,475	2.8	766,526	7.0	4.13	1,807,207	3.0	3.05
Not in Labor Force	3,747	26.8	14,048	27.1	2,874,116	26.1	2.52	16,206,203	26.8	1.29
Highest Education Level Attained										
Some HS, No Degree	1,836	13.2	3,426	6.6	1,368,717	12.4	3.68	3,835,652	6.4	2.28
High School Degree	4,824	34.6	15,259	29.5	3,713,229	33.8	2.46	17,582,709	29.1	1.27
Some College, No Degree	4,667	33.4	16,727	32.3	3,729,328	33.9	2.30	19,497,534	32.3	1.20
College Degree	1,556	11.1	10,113	19.5	1,295,993	11.8	3.54	12,111,709	20.1	1.35
Post-Graduate	1,075	7.7	6,240	12.1	891,163	8.1	4.22	7,359,504	12.2	1.66
Poverty Status										
At, or Above Poverty Level	11,345	81.3	48,185	93.1	8,990,755	81.7	2.04	56,126,644	92.9	0.86
Below Poverty Level	2,613	18.7	3,580	6.9	2,007,675	18.3	3.20	4,260,465	7.1	2.55
Marital Status										
Never Married	5,983	42.9	10,602	20.5	4,766,772	43.3	2.15	1,255,543	2.1	14.77
Married	4,623	33.1	32,299	62.4	3,663,464	33.3	3.28	37,273,953	61.7	0.96
Divorced	1,959	14.0	6,446	12.5	1,537,382	14.0	2.82	7,554,103	12.5	1.59
Seperated	832	6.0	1,092	2.1	619,867	5.6	3.80	1,267,759	2.1	3.19
Widowed	561	4.0	1,326	2.6	410,946	3.7	4.87	1,535,750	2.5	2.99
Reproductive History		0.0		0.0						
Yes	4,881	35.0	15,557	30.1	3,785,951	34.4	2.18	17,802,505	29.5	1.13
No	9,077	65.0	36,208	69.9	7,212,480	65.6	1.15	42,584,604	70.5	0.43
History of Preventative Cancer Screening										
Yes	6,486	46.5	22,543	43.5	5,154,832	46.9	2.06	26,364,443	43.7	9.77
No	7,472	53.5	29,222	56.5	5,843,599	53.1	1.82	34,022,666	56.3	7.63
Family History of Cancer										
Yes	1,970	14.1	10,076	19.5	1,561,886	14.2	2.92	11,778,659	19.5	1.23
No	11,988	85.9	41,689	80.5	9,436,545	85.8	0.48	48,608,450	80.5	0.25
Has Usual Place of Medical Care										
Yes	5,948	42.6	21,039	40.6	4,718,887	42.9	2.04	24,611,084	40.8	1.00
No	8,010	57.4	30,726	59.4	6,279,544	57.1	1.53	35,776,025	59.2	0.68
Delayed Medical Care Due to Cost										
Yes	1,675	12.0	5,828	11.3	1,323,746	12.0	3.04	10,968,383	18.2	1.05
No	12,283	88.0	45,937	88.7	9,674,685	88.0	0.42	49,418,726	81.8	0.24
Anyone in Household Delayed Care Due to Cost										
Yes	2,989	21.4	9,260	17.9	2,348,828	21.4	2.84	10,968,383	18.2	1.49
No	10,969	78.6	42,505	82.1	8,649,603	78.6	0.78	49,418,726	81.8	0.37
Anyone in Household Delayed Care NOT Due to Cost										
Yes	914	6.5	2,805	5.4	749,052	6.8	3.86	3,290,797	5.4	2.13
No	13,044	93.5	48,960	94.6	10,249,379	93.2	0.32	57,096,312	94.6	0.11
Knows of a Genetic Test to Predict Cancer Risk										
Yes	2,257	16.2	12,614	24.4	1,827,141	16.6	2.72	14,874,834	24.6	1.26
No	11,701	83.8	39,151	75.6	9,171,290	83.4	0.54	45,512,275	75.4	1.45
Has Completed a Genetic Test to Predict Cancer Risk										
Yes	39	0.3	149	0.3	29,022	0.3	16.71	180,473	0.3	8.80
No	13,919	99.7	51,616	99.7	10,969,409	99.7	0.04	60,206,636	0.0	0.03

Weights were normalized to allow for concatenated responses from multiple years
Standard errors calculated by Taylor Series Calculation in R (package surveydesign)
Standard errors are reported as a % of n-subgroup population.

Table 2 - Summary Statistics – Responses from 2015

	Unweighted				Weighted					
	Black		White		Black			White		
Total	4,635		17,810		12,397,638		0.03	58,853,113	0.1	
	n	%	n	%	n	%	se %	n	%	se %
Region										
Midwest	729	15.7	4,549	25.5	2,221,041	17.9	5.85	16,014,107	27.2	3.16
Northeast	663	14.3	3,402	19.1	1,882,870	15.2	4.51	11,125,841	18.9	2.63
South	2,822	60.9	5,530	31.0	7,288,366	58.8	3.51	20,544,113	34.9	2.27
West	421	9.1	4,329	24.3	1,005,361	8.1	6.19	11,169,052	19.0	3.06
Insurance Status										
Insured, Private	2,572	55.5	13,506	75.8	7,090,538	57.2	2.95	45,412,091	77.2	1.49
Insured, Public	1,511	32.6	2,799	15.7	3,875,757	31.3	3.69	8,887,419	15.1	2.80
Uninsured	552	11.9	1,505	8.5	1,431,343	11.5	5.02	4,553,603	7.7	3.64
Employment Status										
Employed	2,955	63.8	12,446	69.9	8,116,940	65.5	2.76	40,905,516	69.5	1.54
Unemployed	375	8.1	619	3.5	930,376	7.5	6.66	1,970,857	3.3	5.38
Not in Labor Force	1,305	28.2	4,745	26.6	3,350,322	27.0	4.03	15,976,740	27.1	2.15
Highest Education Level Attained										
Some HS, No Degree	429	9.3	862	4.8	1,088,477	8.8	5.93	2,830,060	4.8	4.43
High School Degree	1,360	29.3	4,252	23.9	3,437,302	27.7	3.62	13,664,904	23.2	2.25
Some College, No Degree	1,742	37.6	6,078	34.1	4,696,169	37.9	3.31	19,520,205	33.2	2.15
College Degree	668	14.4	4,172	23.4	1,904,543	15.4	4.83	14,437,829	24.5	2.21
Post-Graduate	436	9.4	2,446	13.7	1,271,147	10.3	5.33	8,400,115	14.3	3.03
Poverty Status										
At, or Above Poverty Level	3,554	76.7	16,210	91.0	9,620,334	77.6	2.68	53,893,835	91.6	1.47
Below Poverty Level	1,081	23.3	1,600	9.0	2,777,304	22.4	4.40	4,959,278	8.4	4.37
Marital Status										
Never Married	2,210	47.7	4,082	22.9	5,950,016	48.0	3.22	13,819,581	23.5	2.50
Married	1,422	30.7	10,575	59.4	3,817,321	30.8	3.49	34,748,774	59.0	1.57
Divorced	631	13.6	2,353	13.2	1,642,122	13.2	4.73	7,628,050	13.0	3.12
Seperated	223	4.8	361	2.0	577,323	4.7	8.45	1,201,130	2.0	6.23
Widowed	149	3.2	439	2.5	410,856	3.3	8.13	1,455,578	2.5	6.22
Reproductive History		0.0		0.0						
Yes	1,462	31.5	5,057	28.4	3,804,975	30.7	3.55	15893559	27.0	2.08
No	3,173	68.5	12,753	71.6	8,592,663	69.3	1.57	42,959,554	73.0	0.77
History of Preventative Cancer Screening										
Yes	2,023	43.6	7,446	41.8	5,414,645	43.7	3.18	2425795	4.1	17.38
No	2,612	56.4	10,364	58.2	6,982,993	56.3	2.46	56,427,318	95.9	0.75
Family History of Cancer										
Yes	611	13.2	3,544	19.9	1,613,646	13.0	1.60	11490185	19.5	0.71
No	4,024	86.8	14,266	80.1	10,783,992	87.0	0.24	47,362,928	80.5	0.17
Has Usual Place of Medical Care										
Yes	1,919	41.4	6,998	39.3	5,158,051	41.6	3.29	22,760,482	38.7	1.75
No	2,716	58.6	10,812	60.7	7,239,587	58.4	2.35	36,092,631	61.3	1.10
Delayed Medical Care Due to Cost										
Yes	467	10.1	1,817	10.2	1,263,015	10.2	5.82	5,809,676	9.9	3.55
No	4,168	89.9	15,993	89.8	11,134,623	89.8	0.66	53,043,437	90.1	0.39
Anyone in Household Delayed Care Due to Cost										
Yes	838	18.1	2,880	16.2	2,227,402	18.0	4.89	8,994,145	15.3	3.03
No	3,797	81.9	14,930	83.8	10,170,236	82.0	1.07	49,858,968	84.7	0.55
Anyone in Household Delayed Care NOT Due to Cost										
Yes	328	7.1	993	5.6	902,883	7.3	6.60	3,234,218	5.5	4.35
No	4,307	92.9	16,817	94.4	11,494,755	92.7	0.52	55,618,895	94.5	0.25
Knows of a Genetic Test to Predict Cancer Risk										
Yes	1,164	25.1	4,550	25.5	3,152,091	25.4	4.13	14,665,287	24.9	2.07
No	3,471	74.9	13,260	74.5	9,245,547	74.6	1.41	44,187,826	75.1	0.69
Discussed Genetic Test to Predict Cancer Risk w/ Doctor										
Yes	86	1.9	418	2.3	149,584	1.2	16.14	829,403	1.4	8.52
No	4,549	98.1	17,392	97.7	12,248,054	98.8	0.20	58,023,710	98.6	0.12
Received Reccomendation from Doctor to Take Genetic Test to Predict Cancer Risk										
Yes	47	1.0	211	1.2	132,280	1.1	16.59	651,767	1.1	8.83
No	4,588	99.0	17,599	98.8	12,265,358	98.9	0.18	58,201,346	98.9	0.10
Has Completed a Genetic Test to Predict Cancer Risk										
Yes	31	0.7	145	0.8	82,379	0.7	20.54	411,416	0.7	9.72
No	4,604	99.3	17,665	99.2	12,315,259	99.3	0.14	58,441,697	99.3	0.07

Standard errors calculated by Taylor Series Calculation in R (package surveydesign)
Standard errors are reported as a % of n-subgroup population.

Table 3 – Regression Results

"Ever heard of Genetic Testing to Predict the Risk of Cancer"

	Logistic				Poisson				Logistic (White)				Logistic (Black)				Poisson (White)				Poisson (Black)			
R2	0.41				0.50				0.42				0.30				0.52				0.38			
MSE	0.79				0.61				0.77				0.89				0.59				0.73			
	OR	***CI (95%)***			**IR**	***CI (95%)***			**OR**	***CI (95%)***			**OR**	***CI (95%)***			**IR**	***CI (95%)***			**IR**	***CI (95%)***		
INSURED	1.15	*1.05*	*1.27*	**	1.08	*1.02*	*1.13*	**	1.15	*1.05*	*1.27*	**	0.95	*0.81*	*1.11*	*	1.08	*1.02*	*1.13*	**	0.96	*0.87*	*1.07*	*
EDUCATED	1.98	*1.86*	*2.12*	**	1.33	*1.30*	*1.37*	**	1.98	*1.86*	*2.12*	**	2.19	*1.89*	*2.53*	**	1.33	*1.30*	*1.37*	**	1.59	*1.46*	*1.72*	**
EMPL	1.17	*1.10*	*1.25*	**	1.07	*1.04*	*1.10*	**	1.17	*1.10*	*1.25*	**	1.29	*1.14*	*1.45*	**	1.07	*1.04*	*1.10*	**	1.18	*1.09*	*1.28*	**
INPOV	0.75	*0.66*	*0.84*	**	0.86	*0.81*	*0.92*	**	0.75	*0.66*	*0.84*	**	0.76	*0.65*	*0.89*	**	0.86	*0.81*	*0.92*	**	0.83	*0.74*	*0.93*	**
MAR	0.69	*0.64*	*0.76*	**	0.84	*0.81*	*0.88*	**	0.69	*0.64*	*0.76*	**	1.01	*0.90*	*1.13*		0.84	*0.81*	*0.88*	**	1.00	*0.93*	*1.08*	
REPRODHIST	1.52	*1.42*	*1.63*	**	1.21	*1.17*	*1.25*	**	1.52	*1.42*	*1.63*	**	1.25	*1.09*	*1.44*	**	1.21	*1.17*	*1.25*	**	1.15	*1.06*	*1.26*	**
SCREENED	36.83	*29.19*	*46.48*	**	27.01	*22.26*	*32.78*	**	36.83	*29.19*	*46.48*	**	35.16	*22.39*	*55.23*	**	27.01	*22.26*	*32.78*	**	27.08	*18.07*	*40.60*	**
FAMHISTCANCER	1.54	*1.45*	*1.63*	**	1.20	*1.17*	*1.23*	**	1.54	*1.45*	*1.63*	**	1.25	*1.10*	*1.42*	**	1.20	*1.17*	*1.23*	**	1.15	*1.06*	*1.24*	**
USUAL	2.16	*1.90*	*2.46*	**	1.51	*1.40*	*1.64*	**	2.16	*1.90*	*2.46*	**	1.70	*1.36*	*2.14*	**	1.51	*1.40*	*1.64*	**	1.45	*1.22*	*1.72*	**
HHDELAY_COST	1.08	*1.00*	*1.16*		1.04	*1.00*	*1.07*		1.08	*1.00*	*1.16*	*	0.99	*0.85*	*1.14*		1.04	*1.00*	*1.07*		0.99	*0.90*	*1.09*	
HHDELAY_NOTCOST	1.20	*1.10*	*1.32*	**	1.08	*1.04*	*1.12*	**	1.20	*1.10*	*1.32*	**	1.32	*1.12*	*1.57*	**	1.08	*1.04*	*1.12*	**	1.19	*1.07*	*1.31*	**
BLACK	0.65	*0.43*	*0.98*	*	0.64	*0.44*	*0.92*	*																
INSURED:BLACK	0.82	*0.69*	*0.98*	*	0.90	*0.80*	*1.00*																	
EDUCATED:BLACK	1.10	*0.94*	*1.29*		1.19	*1.10*	*1.30*	**																
EMPL:BLACK	1.10	*0.96*	*1.27*		1.10	*1.01*	*1.20*	*																
INPOV:BLACK	1.02	*0.83*	*1.25*		0.96	*0.84*	*1.09*																	
MAR:BLACK	1.45	*1.26*	*1.67*	**	1.19	*1.10*	*1.30*	**																
REPRODHIST:BLACK	0.82	*0.70*	*0.96*	*	0.95	*0.87*	*1.04*																	
SCREENED:BLACK	0.95	*0.58*	*1.58*		1.00	*0.64*	*1.56*																	
FAMHISTCANCER:BLACK	0.81	*0.71*	*0.94*	**	0.96	*0.88*	*1.04*																	
USUAL:BLACK	0.79	*0.60*	*1.03*		0.96	*0.79*	*1.16*																	
HHDELAY_COST:BLACK	0.91	*0.78*	*1.07*		0.96	*0.87*	*1.06*																	
HHDELAY_NOTCOST:BLACK	1.10	*0.91*	*1.33*		1.10	*0.99*	*1.22*																	

**p-value < .05*

*** p-value <. 001*

OR = Odds Ratio

IR = Incidence Ratio

Sample: 2000, 2005, 2010

Table 4 – Regression Results

"Completed a Genetic Test", Conditional of Having Heard of a Genetic Test to Predict Cancer Risk

	Logistic				Poisson				Logistic (White)				Logistic (Black)				Poisson (White)				Poisson (Black)			
R2	0.03				0.04				0.02				0.07				0.02				0.08			
MSE	1.01				1				1.01				1.02				1				1.02			
	OR	***CI (95%)***			**IR**	***CI (95%)***			**OR**	***CI (95%)***			**OR**	***CI (95%)***			**IR**	***CI (95%)***			**IR**	***CI (95%)***		
INSURED	0.72	*0.40*	*1.32*		0.73	*0.40*	*1.32*		0.72	*0.40*	*1.32*		1.39	*0.50*	*3.88*		0.73	*0.40*	*1.32*		1.38	*0.51*	*3.74*	
EDUCATED	0.92	*0.63*	*1.33*		0.92	*0.64*	*1.32*		0.92	*0.63*	*1.33*		0.74	*0.31*	*1.79*		0.92	*0.64*	*1.32*		0.74	*0.31*	*1.77*	
EMPL	0.69	*0.48*	*0.98*	*	0.69	*0.49*	*0.98*	*	0.69	*0.48*	*0.98*	*	0.37	*0.18*	*0.75*	*	0.69	*0.49*	*0.98*	*	0.38	*0.19*	*0.76*	*
INPOV	1.32	*0.73*	*2.37*		1.31	*0.74*	*2.33*		1.32	*0.73*	*2.37*		1.38	*0.63*	*3.03*		1.31	*0.74*	*2.33*		1.37	*0.64*	*2.92*	
MAR	1.08	*0.62*	*1.89*		1.08	*0.62*	*1.87*		1.08	*0.62*	*1.89*		0.96	*0.48*	*1.91*		1.08	*0.62*	*1.87*		0.96	*0.49*	*1.88*	
REPRODHIST	1.15	*0.72*	*1.82*		1.14	*0.72*	*1.81*		1.15	*0.72*	*1.82*		1.58	*0.51*	*4.92*		1.14	*0.72*	*1.81*		1.57	*0.51*	*4.78*	
SCREENED	5.44	*0.74*	*40.13*		5.39	*0.73*	*39.53*		5.44	*0.74*	*40.13*		*SUPPRESSED*				*5.39*	*0.73*	*39.53*		*SUPPRESSED*			
FAMHISTCANCER	1.98	*1.37*	*2.87*	**	1.96	*1.36*	*2.83*	**	1.98	*1.37*	*2.87*	**	2.01	*0.94*	*4.33*		1.96	*1.36*	*2.83*	**	1.97	*0.94*	*4.16*	
USUAL	2.23	*0.91*	*5.47*		2.21	*0.91*	*5.35*		2.23	*0.91*	*5.47*		2.96	*0.61*	*14.24*		2.21	*0.91*	*5.35*		2.91	*0.61*	*13.76*	
HHDELAY_COST	1.28	*0.84*	*1.93*		1.27	*0.84*	*1.91*		1.28	*0.84*	*1.93*		0.86	*0.34*	*2.17*		1.27	*0.84*	*1.91*		0.86	*0.35*	*2.12*	
HHDELAY_NOTCOST	1.20	*0.74*	*1.95*		1.19	*0.74*	*1.93*		1.20	*0.74*	*1.95*		1.18	*0.49*	*2.83*		1.19	*0.74*	*1.93*		1.17	*0.50*	*2.72*	
BLACK	*SUPPRESSED*																							
INSURED:BLACK	1.92	*0.58*	*6.32*		1.89	*0.59*	*6.04*																	
EDUCATED:BLACK	0.81	*0.31*	*2.07*		0.81	*0.32*	*2.05*																	
EMPL:BLACK	0.54	*0.24*	*1.21*		0.55	*0.25*	*1.21*																	
INPOV:BLACK	1.05	*0.41*	*2.66*		1.04	*0.42*	*2.57*																	
MAR:BLACK	0.89	*0.37*	*2.14*		0.89	*0.38*	*2.11*																	
REPRODHIST:BLACK	1.38	*0.4*	*4.72*		1.37	*0.41*	*4.59*																	
SCREENED:BLACK	*SUPPRESSED*																							
FAMHISTCANCER:BLACK	1.02	*0.43*	*2.39*		1.01	*0.44*	*2.31*																	
USUAL:BLACK	1.32	*0.22*	*8.09*		1.32	*0.22*	*7.88*																	
HHDELAY_COST:BLACK	0.67	*0.24*	*1.84*		0.68	*0.25*	*1.8*																	
HHDELAY_NOTCOST:BLACK	0.98	*0.36*	*2.66*		0.98	*0.37*	*2.57*																	

**p-value < .05*

*** p-value <. 001*

OR = Odds Ratio

IR = Incidence Ratio

Sample: 2000, 2005, 2010

Table 5 – Regression Results

"Ever Discussed Genetic Tests to Predict Cancer Risk with a Medical Provider"

	Logistic				Poisson				Logistic (White)				Logistic (Black)				Poisson (White)				Poisson (Black)			
R2	0.22				0.26				0.02				0.03				0.03				0.04			
MSE	0.58				0.56				1.01				0.95				0.95				0.9			
	OR	***CI (95%)***			**IR**	***CI (95%)***			**OR**	***CI (95%)***			**OR**	***CI (95%)***			**IR**	***CI (95%)***			**IR**	***CI (95%)***		
INSURED	2.26	1.15	4.48	*	2.17	1.12	4.21	*	1.08	0.81	1.45		1.19	0.74	1.9		1.08	0.82	1.41		1.17	0.76	1.81	
EDUCATED	1.98	1.54	2.54	**	1.88	1.5	2.37	**	1.28	1.1	1.5	**	1.3	0.88	1.93		1.26	1.09	1.46	**	1.28	0.89	1.84	
EMPL	0.89	0.66	1.19		0.9	0.69	1.17		0.83	0.7	0.99	*	0.78	0.53	1.14		0.84	0.72	0.99	*	0.79	0.56	1.13	
INPOV	0.97	0.64	1.48		0.98	0.66	1.45		1.18	0.86	1.64		1.49	0.96	2.32		1.17	0.87	1.58		1.44	0.96	2.15	
MAR	0.72	0.52	1		0.74	0.55	0.99	*	0.82	0.64	1.06		0.76	0.55	1.05		0.83	0.66	1.06		0.78	0.58	1.05	
REPRODHIST	0.98	0.73	1.33		0.99	0.75	1.3		1.24	1.01	1.53	*	2.14	1.35	3.39	**	1.23	1.01	1.49	*	2.05	1.32	3.17	**
SCREENED	3.51	0.57	21.58		3.53	0.56	22.47		4.47	1.76	11.37	**	*SUPPRESSED*				4.31	1.72	10.82	**	*SUPPRESSED*			
FAMHISTCANCER	3.82	2.81	5.2	**	3.54	2.64	4.74	**	2.42	2.04	2.87	**	1.77	1.21	2.58	**	2.31	1.96	2.72	**	1.69	1.2	2.39	**
USUAL	5.34	1.11	25.62	*	5.11	1.04	25.16	*	1.27	0.93	1.73		1.86	0.97	3.57		1.25	0.93	1.68		1.8	0.97	3.34	
HHDELAY_COST	1.23	0.85	1.77		1.21	0.87	1.68		1.33	1.08	1.63	*	1.09	0.66	1.8		1.3	1.07	1.57	*	1.09	0.69	1.71	
HHDELAY_NOTCOST	1.41	0.98	2.01		1.36	0.99	1.89		1.13	0.88	1.43		1.2	0.77	1.89		1.12	0.89	1.4		1.19	0.79	1.79	
BLACK	0.22	0.02	2.62		0.22	0.02	2.63																	
INSURED:BLACK	1.18	0.29	4.84		1.18	0.3	4.63																	
EDUCATED:BLACK	0.74	0.4	1.36		0.75	0.43	1.32																	
EMPL:BLACK	1.68	1.01	2.81	*	1.62	1.01	2.62	*																
INPOV:BLACK	0.87	0.42	1.82		0.88	0.44	1.75																	
MAR:BLACK	0.92	0.51	1.67		0.92	0.53	1.59																	
REPRODHIST:BLACK	1.3	0.67	2.53		1.28	0.69	2.35																	
SCREENED:BLACK	5.17	0.17	155.63		5.21	0.17	160.42																	
FAMHISTCANCER:BLACK	0.92	0.52	1.63		0.92	0.54	1.56																	
USUAL:BLACK	0.58	0.05	6.54		0.58	0.05	6.53																	
HHDELAY_COST:BLACK	1.18	0.61	2.28		1.17	0.64	2.13																	
HHDELAY_NOTCOST:BLACK	1.32	0.67	2.6		1.29	0.7	2.37																	

**p-value < .05*

*** p-value <. 001*

OR = Odds Ratio

IR = Incidence Ratio

Sample: 2015

Table 6 – Regression Results

"Completed a Genetic Test to Predict Cancer Risk"

	Logistic				Poisson				Logistic (White)				Logistic (Black)				Poisson (White)				Poisson (Black)			
R2	0.17				0.2				0.14				0.15				0.16				0.18			
MSE	0.81				0.8				0.67				0.46				0.67				0.46			
	OR	***CI (95%)***			**IR**	***CI (95%)***			**OR**	***CI (95%)***			**OR**	***CI (95%)***			**IR**	***CI (95%)***			**IR**	***CI (95%)***		
INSURED	1.44	*0.47*	*4.46*		1.43	*0.47*	*4.36*	0.3	0.84	*0.46*	*1.53*		1.39	*0.52*	*3.73*		0.84	*0.47*	*1.52*		1.39	*0.52*	*3.69*	
EDUCATED	1.79	*1.15*	*2.78*	*	1.77	*1.15*	*2.72*	*	1.25	*0.86*	*1.82*		1.22	*0.5*	*2.94*		1.25	*0.86*	*1.81*		1.21	*0.51*	*2.91*	
EMPL	0.66	*0.4*	*1.07*		0.66	*0.41*	*1.07*		0.75	*0.52*	*1.07*		0.45	*0.23*	*0.88*	*	0.75	*0.53*	*1.07*		0.46	*0.24*	*0.88*	*
INPOV	1.01	*0.53*	*1.93*		1.01	*0.53*	*1.91*		1.05	*0.58*	*1.89*		1.17	*0.55*	*2.51*		1.05	*0.58*	*1.88*		1.17	*0.55*	*2.48*	
MAR	1.33	*0.75*	*2.35*		1.32	*0.76*	*2.31*		1.05	*0.62*	*1.76*		1.09	*0.56*	*2.12*		1.05	*0.62*	*1.75*		1.09	*0.56*	*2.11*	
REPRODHIST	0.78	*0.48*	*1.28*		0.79	*0.49*	*1.28*		1.29	*0.83*	*2*		1.76	*0.6*	*5.17*		1.29	*0.83*	*1.99*		1.75	*0.6*	*5.12*	
SCREENED	70.88	*8.22*	*611.01*	**	69.86	*8.18*	*596.69*	**	81.97	*8.24*	*815.17*	**	*SUPPRESSED*				82.12	*8.27*	*815.08*	**	*SUPPRESSED*			
FAMHISTCANCER	2.6	*1.6*	*4.23*	**	2.56	*1.58*	*4.12*	**	2.29	*1.59*	*3.32*	**	2.3	*1.07*	*4.95*	*	2.28	*1.58*	*3.29*	**	2.28	*1.07*	*4.87*	*
USUAL	1.01	*0.45*	*2.26*		1.01	*0.46*	*2.23*		2.53	*0.98*	*6.51*		3.17	*0.67*	*15.02*		2.51	*0.98*	*6.45*		3.15	*0.67*	*14.88*	
HHDELAY_COST	0.96	*0.49*	*1.87*		0.96	*0.5*	*1.84*		1.31	*0.87*	*1.98*		0.9	*0.37*	*2.18*		1.31	*0.87*	*1.97*		0.9	*0.38*	*2.17*	
HHDELAY_NOTCOST	0.9	*0.48*	*1.66*		0.9	*0.49*	*1.65*		1.28	*0.79*	*2.08*		1.35	*0.58*	*3.14*		1.28	*0.79*	*2.07*		1.34	*0.58*	*3.09*	
BLACK	*SUPPRESSED*				*SUPPRESSED*																			
INSURED:BLACK	*SUPPRESSED*				*SUPPRESSED*																			
EDUCATED:BLACK	0.13	*0.03*	*0.63*	*	0.14	*0.03*	*0.65*	*																
EMPL:BLACK	1.65	*0.61*	*4.43*		1.63	*0.62*	*4.27*																	
INPOV:BLACK	0.72	*0.21*	*2.5*		0.72	*0.21*	*2.45*																	
MAR:BLACK	0.65	*0.27*	*1.56*		0.65	*0.28*	*1.54*																	
REPRODHIST:BLACK	1.09	*0.39*	*3.02*		1.09	*0.41*	*2.92*																	
SCREENED:BLACK	0.32	*0.01*	*16.24*		0.32	*0.01*	*15.47*																	
FAMHISTCANCER:BLACK	1.18	*0.46*	*3.02*		1.16	*0.46*	*2.93*																	
USUAL:BLACK	0.88	*0.1*	*8.05*		0.89	*0.1*	*7.54*																	
HHDELAY_COST:BLACK	1.87	*0.62*	*5.67*		1.83	*0.63*	*5.37*																	
HHDELAY_NOTCOST:BLACK	2.19	*0.75*	*6.42*		2.13	*0.75*	*6.05*																	

**p-value < .05*
*** p-value <. 001*
OR = Odds Ratio
IR = Incidence Ratio

Sample: 2015

Table 7 –Odds Ratio – Exposure to a Genetic Test to Predict Cancer Risk

	Black						White					
	Knoweldge of GT	No Knowledge	Odds Ratio (OR)	95% Confidence Interval			Knowledge of GT	No Knowledge	Odds Ratio (OR)	95% Confidence Interval		
Identifies as Black or African American												
Yes	2257	11701	0.60	*0.57*	*0.63*	*						
No	12614	39151										
Insured												
Yes	1828	9042	1.25	*1.12*	*1.40*	*	11288	33516	1.43	*1.34*	*1.53*	*
No	429	2659					1326	5635				
Has Private Health Insurance												
Yes	1401	6287	1.41	*1.28*	*1.55*	*	10278	29630	1.41	*1.34*	*1.49*	*
No	856	5414					2336	9521				
Marital History												
Yes	1310	6665	1.05	*0.95*	*1.15*		10080	31083	1.03	*0.98*	*1.09*	
No	947	5036					2534	8068				
Educated (at least a College Degree)												
Yes	599	2032	1.72	*1.55*	*1.91*	*	4923	11430	1.55	*1.49*	*1.62*	*
No	1658	9669					7691	27721				
Employed												
Yes	1633	7615	1.40	*1.27*	*1.55*	*	9243	26999	1.23	*1.18*	*1.29*	*
No	624	4086					3371	12152				
Poverty Level												
At, or Above	1847	9498	1.04	*0.93*	*1.17*		11712	36473	0.95	*0.88*	*1.03*	
Below	410	2203					902	2678				
Reproductive History												
Yes	1655	3226	7.22	*6.52*	*8.00*	**	8673	6884	10.32	*9.85*	*10.80*	**
No	602	8475					3941	32267				
Ever Had Cancer Screening												
Yes	2203	4283	70.66	*53.80*	*92.80*	*	12297	10246	109.44	*97.67*	*122.62*	**
No	54	7418					317	28905				
Family History of Cancer												
Yes	727	1243	4.00	*3.60*	*4.45*	*	5972	4104	7.68	*7.32*	*8.05*	**
No	1530	10458					6642	35047				
Has Usual Place of Care												
Yes	2022	3926	17.04	*14.81*	*19.61*	**	11491	9548	31.72	*29.71*	*33.87*	**
No	235	7775					1123	29603				
Experienced Delay in Care (Due to Cost)												
Yes	326	1349	1.30	*1.14*	*1.48*	*	1679	4149	12.95	*12.20*	*13.75*	**
No	1931	10352					10935	350002				
HH Experienced Delay in Care (Due to Cost)												
Yes	468	2521	0.95	*0.85*	*1.06*		2336	6924	1.06	*1.00*	*1.11*	
No	1789	9180					10278	32227				
HH Experienced Delay in Care for Reasons NOT related to cost												
Yes	338	576	3.40	*2.95*	*3.92*	*	1587	1218	4.48	*4.15*	*4.84*	**
No	1919	11125					11027	37933				

** p <.05*
*** p <.01*
**** p <.001*
Table contains Odds Ratio calculations using unweighted responses from 2000, 2005, 2010

Table 8 – Odds Ratio – Respondent Completed a Genetic Test, Conditional on Exposure to Genetic Tests

	Black						White					
	GT History	No History	Odds Ratio (OR)	95% Confidence Interval			GT History	No History	Odds Ratio (OR)	95% Confidence Interval		
Identifies as Black or African American												
Yes	39	2218	1.47	*1.03*	*2.10*	*	[redacted]					
No	149	12465										
Insured												
Yes	34	1794	1.61	*0.62*	*4.13*		131	11157	0.85	*0.52*	*1.40*	
No	5	424					18	1308				
Has Private Health Insurance												
Yes	16	1385	0.42	*0.22*	*0.80*	*	110	10168	0.64	*0.44*	*0.92*	*
No	23	833					39	2297				
Marital History												
Yes	27	1283	1.64	*0.83*	*3.25*		126	9954	1.38	*0.88*	*2.16*	
No	12	935					23	2511				
Educated (at least a College Degree)												
Yes	7	592	0.60	*0.26*	*1.37*		54	4869	0.89	*0.63*	*1.24*	
No	32	1626					95	7596				
Employed												
Yes	20	1613	0.39	*0.21*	*0.74*	*	95	9148	0.64	*0.46*	*0.89*	*
No	19	605					54	3317				
Poverty Level												
At, or Above	27	1820	0.49	*0.25*	*0.98*	*	135	11577	0.74	*0.42*	*1.29*	
Below	12	398					14	888				
Reproductive History												
Yes	35	1620	3.23	*1.14*	*9.13*	*	112	8561	1.38	*0.95*	*2.01*	
No	4	598					37	3904				
Ever Had Cancer Screening												
Yes	39	2164	1.95	*0.12*	*32.09*		148	12149	3.85	*0.54*	*27.60*	
No#	0.5	54					1	316				
Family History of Cancer												
Yes	21	706	2.50	*1.32*	*4.72*	*	98	5874	2.16	*1.53*	*3.03*	*
No	18	1512					51	6591				
Has Usual Place of Care												
Yes	37	1985	2.17	*0.52*	*9.07*		142	11349	1.99	*0.93*	*4.27*	
No	2	233					7	1116				
Experienced Delay in Care (Due to Cost)												
Yes	8	318	1.54	*0.70*	*3.38*		25	1654	1.32	*0.85*	*2.03*	
No	31	1900					124	10811				
HH Experienced Delay in Care (Due to Cost)												
Yes	8	460	0.99	*0.45*	*2.16*		36	2300	1.41	*0.96*	*2.05*	
No	31	1758					113	10165				
HH Experienced Delay in Care for Reasons NOT related to cost												
Yes	9	329	1.72	*0.81*	*3.66*		23	1564	1.27	*0.81*	*1.99*	
No	30	1889					126	10901				

** p <.05*
*** p <.01*
**** p <.001*
Table contains Odds Ratio calculations using unweighted responses from 2000, 2005, 2010 who indicated knowing of a genetic test

Table 9 –Odds Ratio – Respondent Discussed Genetic Test to Predict Cancer Risk with Medical Provider

	Black						White					
	Discussed GT w/ Doctor	No Discussion	Odds Ratio (OR)	95% Confidence Interval			Discussed GT w/ Doctor	No Discussion	Odds Ratio (OR)	95% Confidence Interval		
Identifies as Black or African American												
Yes	86	4549	0.79	*0.62*	*0.99*	*	[redacted]					
No	418	17392										
Insured												
Yes	83	4000	3.80	*1.20*	*12.06*	*	403	15902	2.52	*1.50*	*4.23*	*
No	3	549					15	1490				
Has Private Health Insurance												
Yes	58	2514	1.68	*1.06*	*2.64*	*	324	13182	1.10	*0.87*	*1.39*	
No	28	2035					94	4210				
Marital History												
Yes	42	2383	0.87	*0.57*	*1.33*		323	13405	1.01	*0.80*	*1.27*	
No	44	2166					95	3987				
Educated (at least a College Degree)												
Yes	28	1076	1.56	*0.99*	*2.46*		213	6405	1.78	*1.47*	*2.16*	*
No	58	3473					205	10987				
Employed												
Yes	62	2893	1.48	*0.92*	*2.38*		295	12151	1.03	*0.84*	*1.28*	
No	24	1656					123	5241				
Poverty Level												
At, or Above	66	3488	1.00	*0.61*	*1.66*		372	15838	0.79	*0.58*	*1.08*	
Below	20	1061					46	1554				
Reproductive History												
Yes	62	1400	5.81	*3.61*	*9.35*	*	272	4785	4.91	*4.00*	*6.02*	*
No	24	3149					146	12607				
Ever Had Cancer Screening												
Yes	85	1938	114.52	*15.93*	*823.09*	*	406	7040	49.75	*28.00*	*88.40*	**
No	1	2611					12	10352				
Family History of Cancer												
Yes	49	562	9.40	*6.08*	*14.53*	*	301	3243	11.22	*9.04*	*13.94*	**
No	37	3987					117	14149				
Has Usual Place of Care												
Yes	83	1836	40.88	*12.90*	*129.55*	*	395	6603	28.06	*18.41*	*42.77*	**
No	3	2713					23	10789				
Experienced Delay in Care (Due to Cost)												
Yes	10	154	3.76	*1.91*	*7.40*	*	53	678	3.58	*2.66*	*4.82*	*
No	76	4395					365	16714				
HH Experienced Delay in Care (Due to Cost)												
Yes	21	817	1.48	*0.90*	*2.43*		74	2806	1.12	*0.87*	*1.44*	
No	65	3732					344	14586				
HH Experienced Delay in Care for Reasons NOT related to cost												
Yes	20	308	4.17	*2.50*	*6.97*	*	76	917	3.99	*3.09*	*5.16*	*
No	66	4241					342	16475				
Knows of GT to Predict Cancer Risk												
Yes	47	1117	3.70	*2.41*	*5.69*	*	252	4298	4.62	*3.79*	*5.64*	*
No	39	3432					166	13094				

** p <.05*

*** p <.01*

**** p <.001*

Table contains Odds Ratio calculations using unweighted responses from 2015

Table 10 –Odds Ratio – Respondent Completed a Genetic Test to Predict Cancer Risk

	Black						White					
	GT History	No History	Odds Ratio (OR)	95% Confidence Interval			GT History	No History	Odds Ratio (OR)	95% Confidence Interval		
Identifies as Black or African American												
Yes	31	4604	0.82	*0.56*	*1.21*		[redacted]					
No	145	17665										
Insured												
Yes	31	4052	8.45	*0.52*	*138.27*		138	1617	18.26	*8.52*	*39.15*	*
No#	0.5	552					7	1498				
Has Private Health Insurance												
Yes	18	2554	1.11	*0.54*	*2.27*		110	13396	1.00	*0.68*	*1.47*	
No	13	2050					35	4269				
Marital History												
Yes	15	2410	0.85	*0.42*	*1.73*		120	13608	1.43	*0.93*	*2.20*	
No	16	2194					25	4057				
Educated (at least a College Degree)												
Yes	2	1102	0.22	*0.05*	*0.92*	*	71	6547	1.63	*1.17*	*2.26*	*
No	29	3502					74	11118				
Employed												
Yes	18	2937	0.79	*0.38*	*1.61*		100	12346	0.96	*0.67*	*1.36*	
No	13	1667					45	5319				
Poverty Level												
At, or Above	22	3532	0.74	*0.34*	*1.62*		133	16077	1.09	*0.61*	*1.98*	
Below	9	1072					12	1588				
Reproductive History												
Yes	22	1440	5.37	*2.47*	*11.69*	*	98	4959	5.34	*3.77*	*7.58*	*
No	9	3164					47	12706				
Ever Had Cancer Screening												
Yes	30	1993	39.30	*5.36*	*288.45*	*	143	7303	101.45	*25.12*	*409.71*	***
No	1	2611					2	10362				
Family History of Cancer												
Yes	16	595	7.19	*3.53*	*14.61*	*	105	3439	10.86	*7.53*	*15.66*	**
No	15	4009					40	14226				
Has Usual Place of Care												
Yes	28	1891	13.39	*4.07*	*44.11*	*	135	6863	21.25	*11.17*	*40.42*	**
No	3	2713					10	10802				
Experienced Delay in Care (Due to Cost)												
Yes	3	464	0.96	*0.29*	*3.16*		19	1798	1.33	*0.82*	*2.16*	
No	28	4140					126	15867				
HH Experienced Delay in Care (Due to Cost)												
Yes	8	830	1.58	*0.70*	*3.55*		21	2859	0.88	*0.55*	*1.40*	
No	23	3774					124	14806				
HH Experienced Delay in Care for Reasons NOT related to cost												
Yes	8	320	4.66	*2.07*	*10.49*	*	25	968	3.59	*2.32*	*5.56*	*
No	23	4284					120	16697				
Discussed GT with Medical Provider												
Yes	27	59	519.98	*176.40*	*1532.73*	***	120	298	279.74	*179.11*	*436.90*	***
No	4	4545					25	17367				
Medical Provider Reccomended GT												
Yes	23	24	548.65	*223.30*	*1348.03*	***	103	108	398.67	*265.73*	*598.11*	***
No	8	4580					42	17557				
Knows of GT to Predict Cancer Risk												
Yes	18	1146	4.18	*2.04*	*8.55*	*	93	4457	5.30	*3.77*	*7.45*	*
No	13	3458					52	13208				

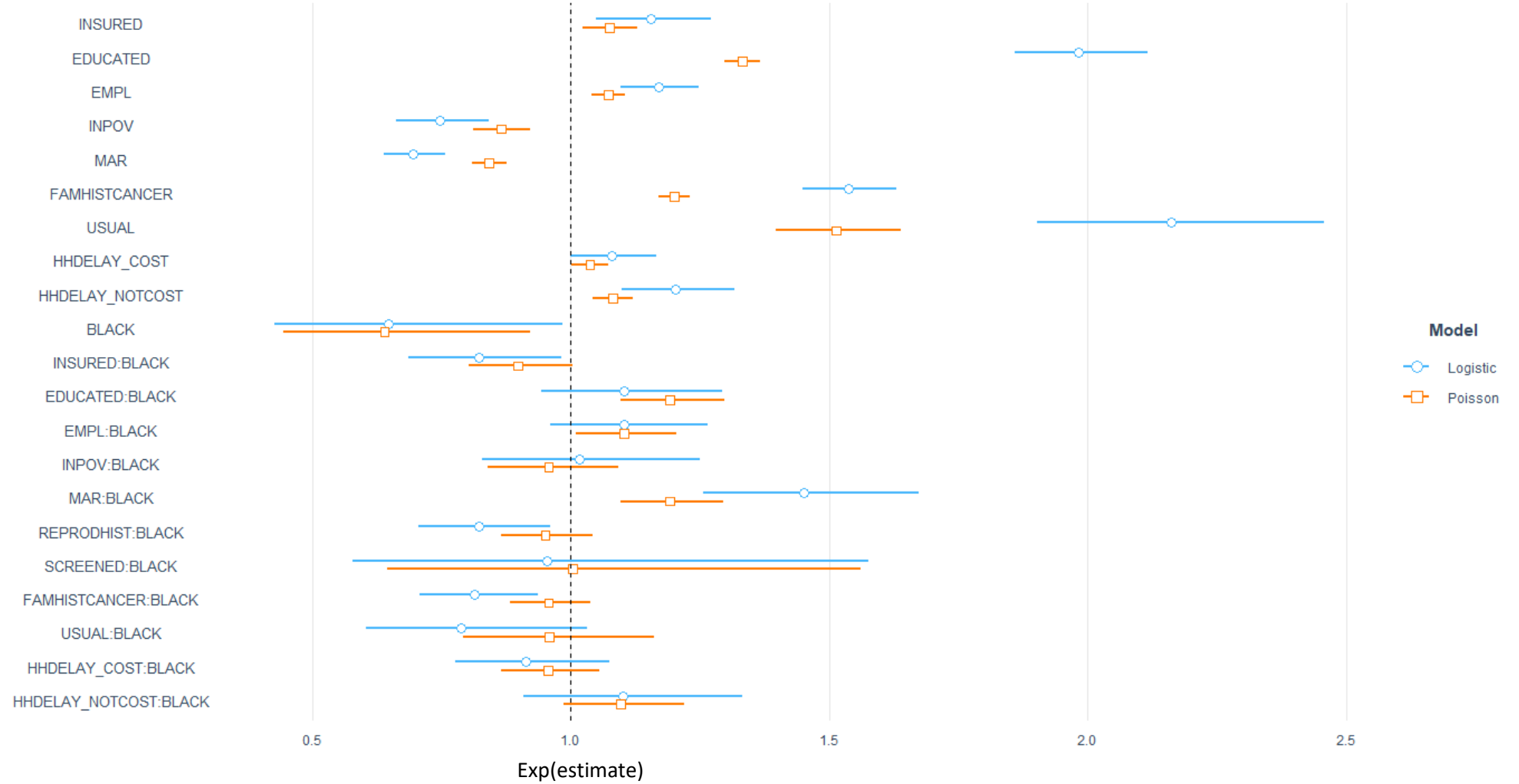
** p <.05*

*** p <.01*

**** p <.001*

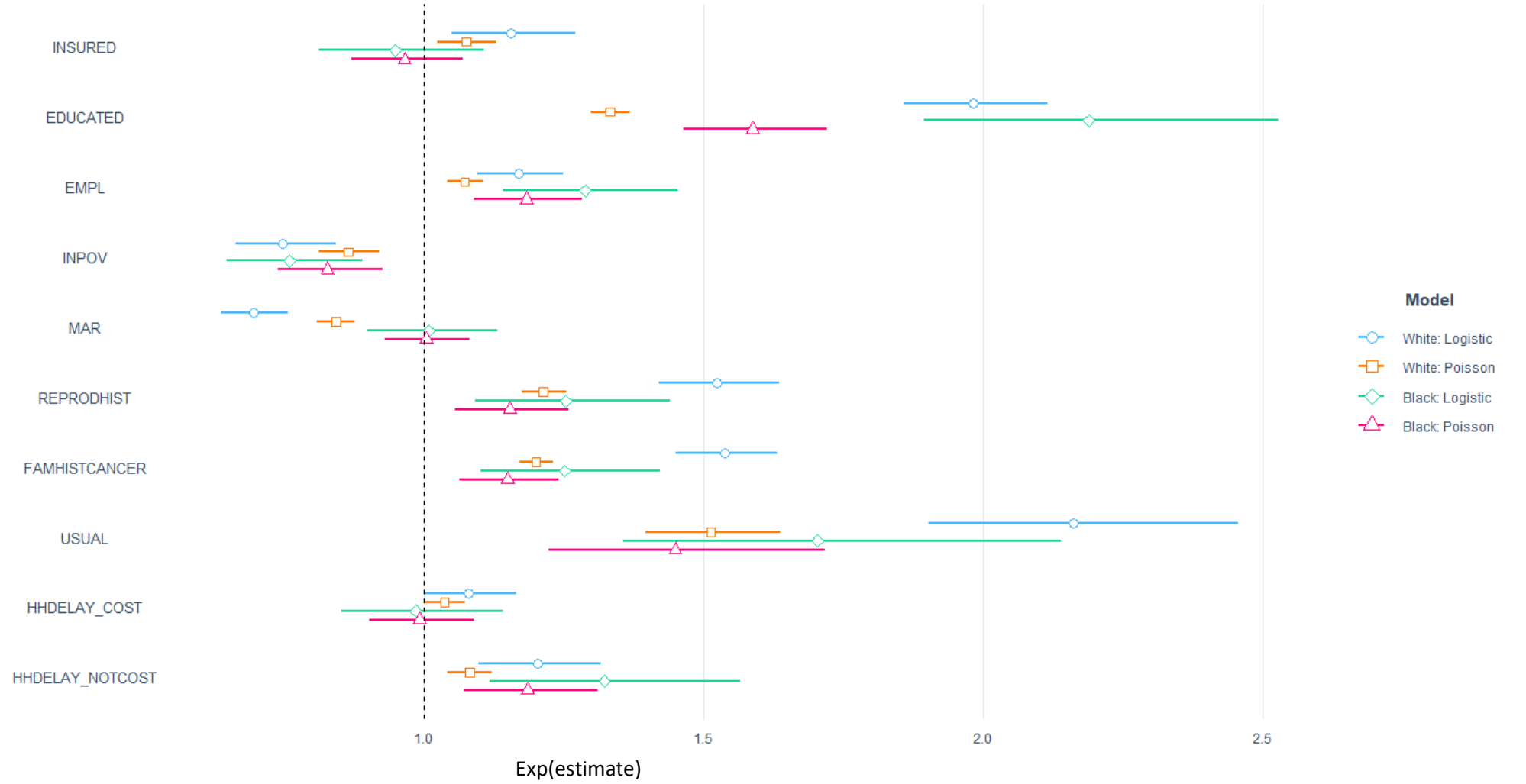
Table contains Odds Ratio calculations using unweighted responses from 2015

Figure 1: "Exposure to Genetic Tests to Predict Cancer Risk" – Variation Between Racial Groups



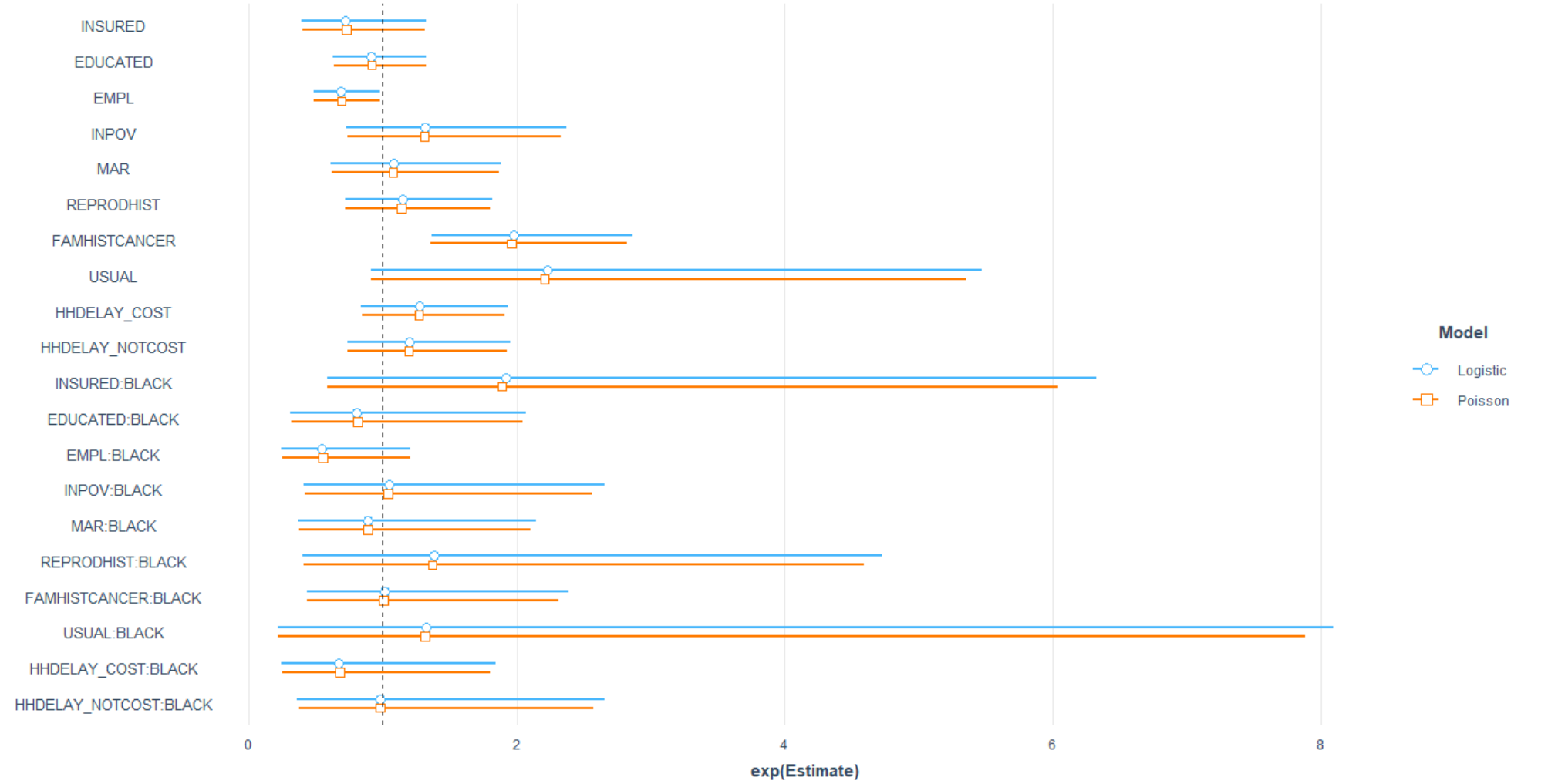
Sample: 2000, 2005, 2010

Figure 2: "Exposure to Genetic Tests to Predict Cancer Risk" – Variation Within Racial Groups



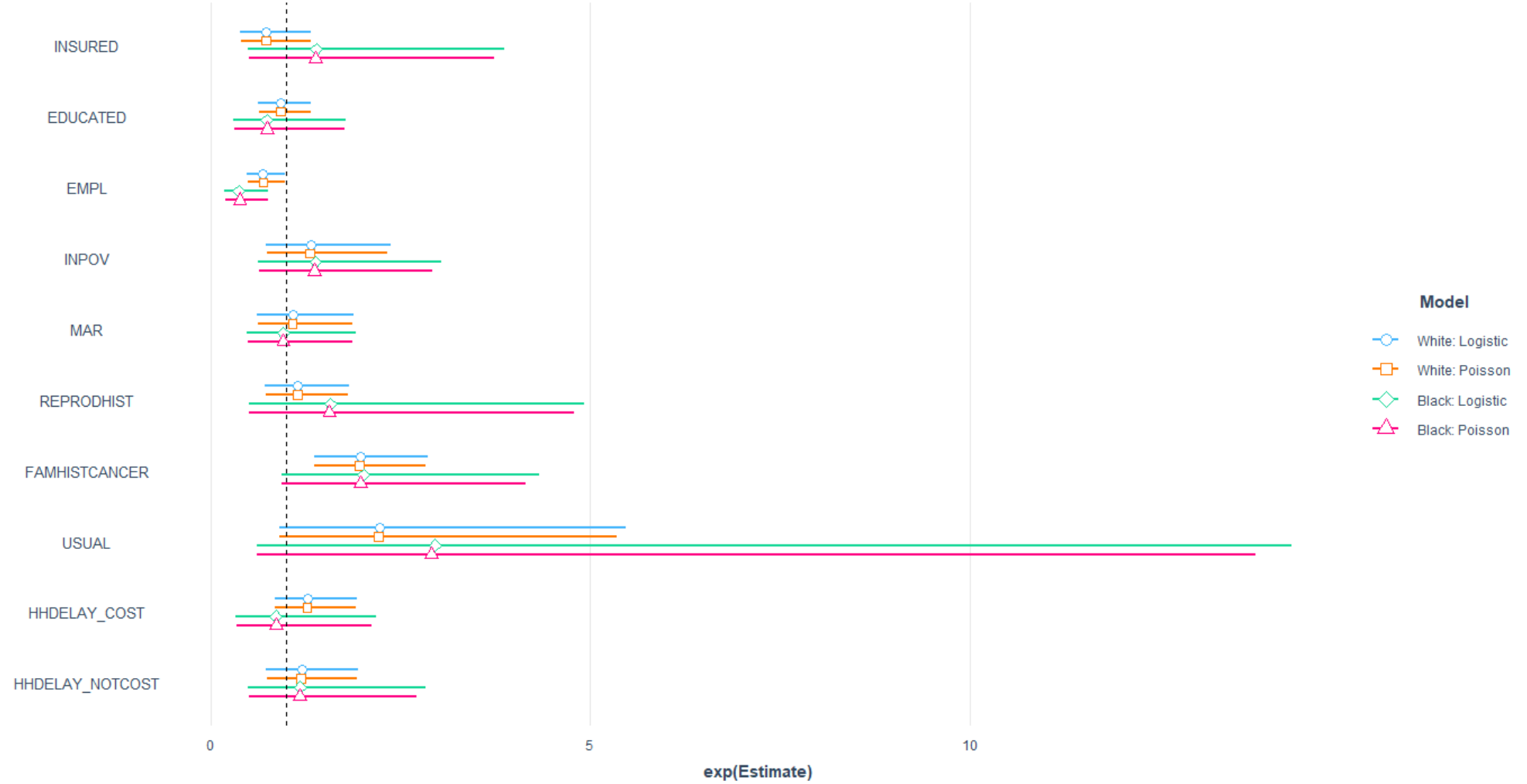
Sample: 2000, 2005, 2010

Figure 3: "Completed a Genetic Test, Conditional on Exposure" – Variation Between Racial Groups



Sample: 200,2005,2010

Figure 4: "Completed a Genetic Test, Conditional on Exposure" – Variation Within Racial Groups

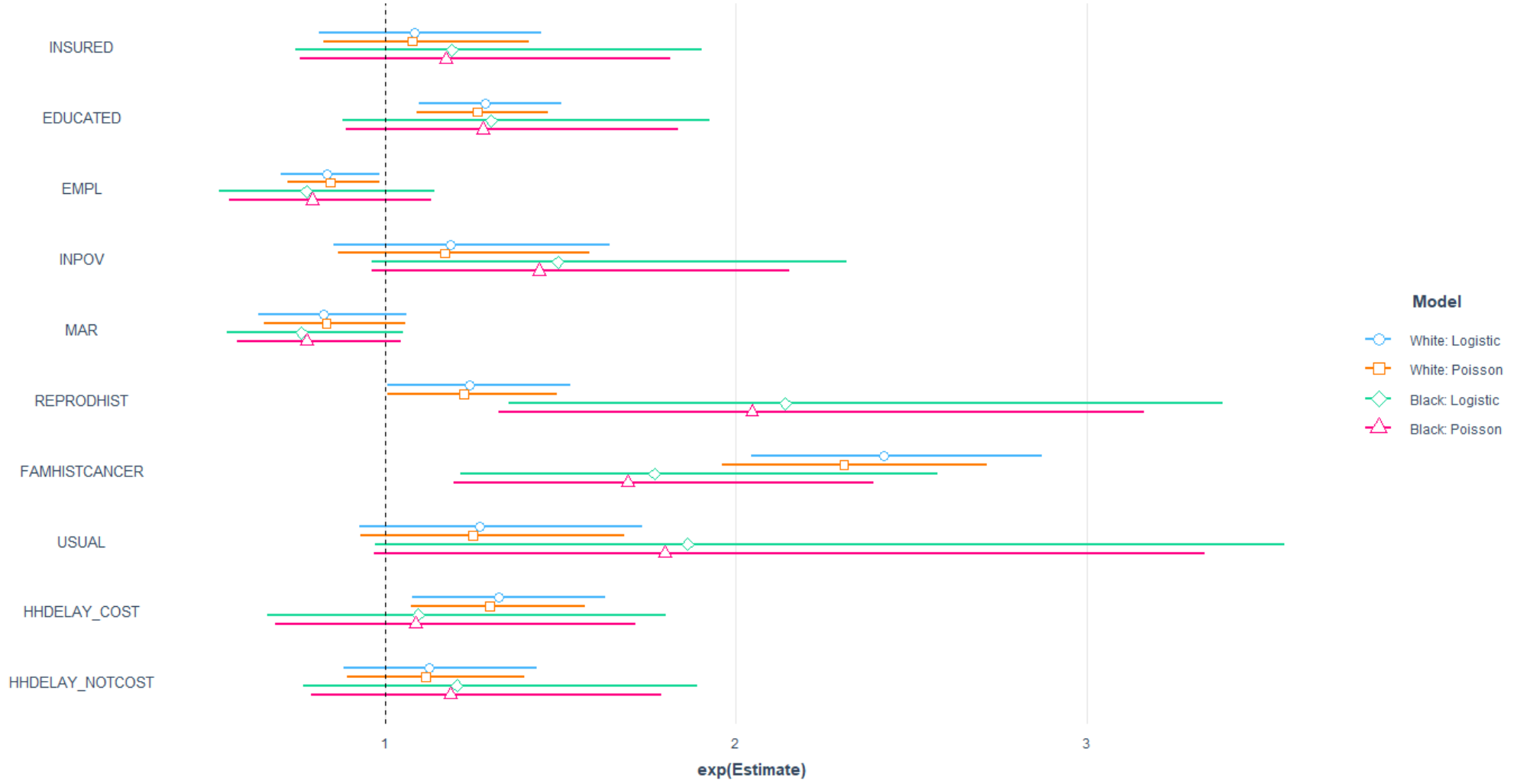


Sample: 2000, 2005, 2010

Figure 5: "Discussed Genetic Tests to Predict Cancer Risk with a Medical Provider" – Variation Between Racial Groups

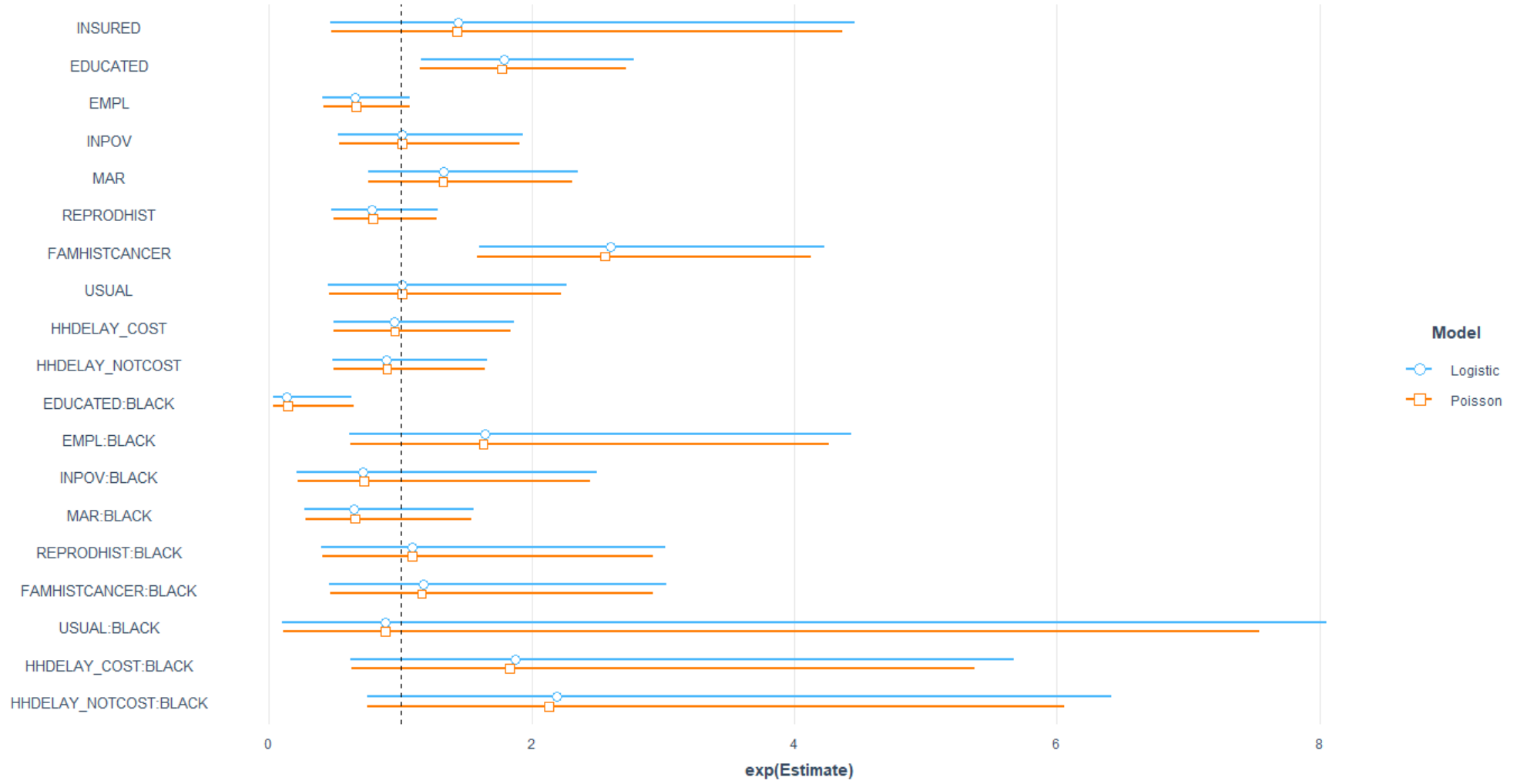
Sample: 2015

Figure 6: "Discussed Genetic Tests to Predict Cancer Risk with a Medical Provider" – Variation Within Racial Groups



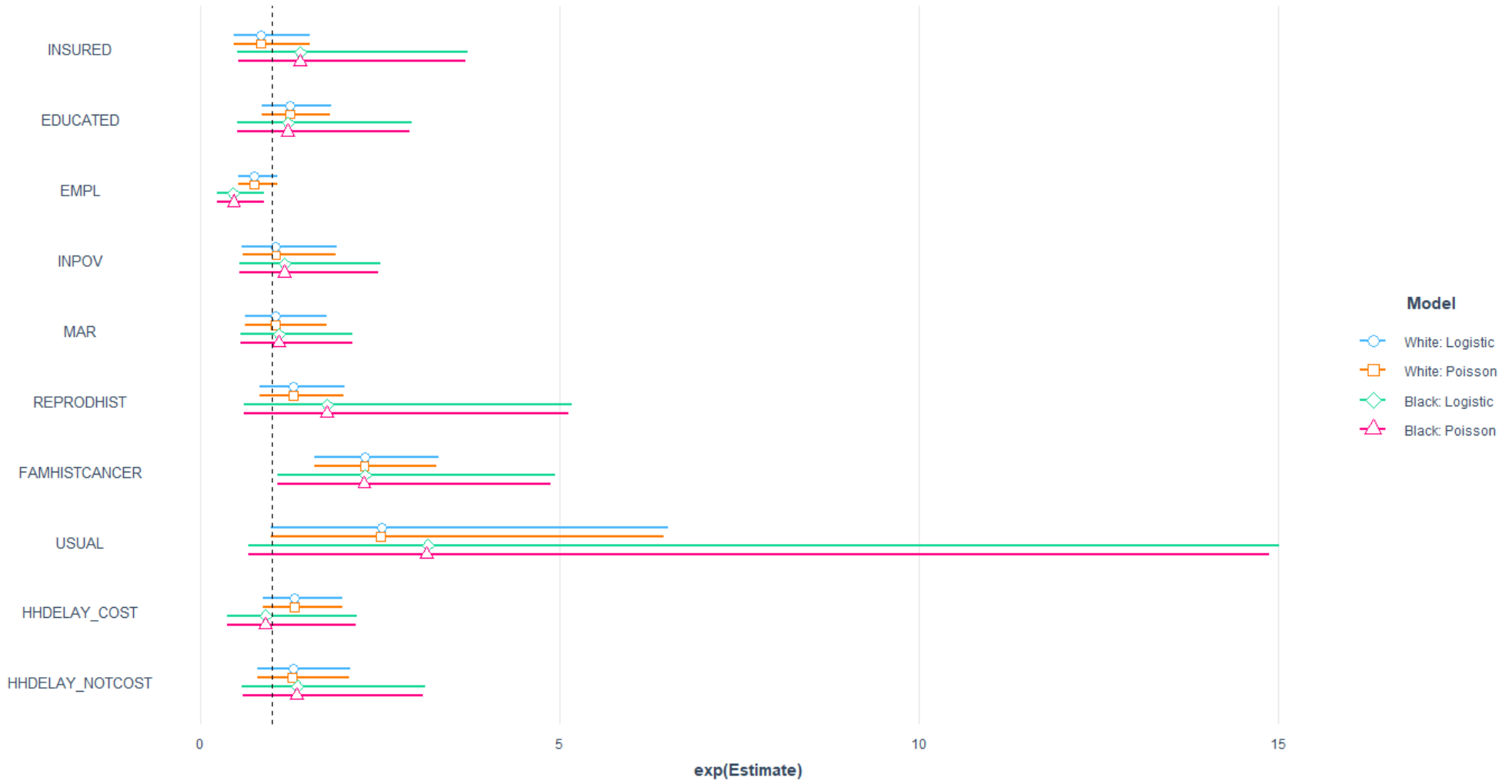
Sample: 2015

Figure 7: Completed a Genetic Test – Variation Between Racial Groups



Sample: 2015

Figure 8: "Completed a Genetic Test" – Variation Within Racial Groups



Sample: 2015