Prostate Cancer: Social, Economic and Demographic Correlates of Non Use of Supplemental Diets among Black Men in Florida

Journal of Health Disparities Research and Practice

Volume 14 | Issue 2 Article 6

2021

Prostate Cancer: Social, Economic and Demographic Correlates of Non Use of Supplemental Diets among Black Men in Florida

Jemal Gishe , *Tennessee State University*, jgishe@tnstate.edu
Getachew Dagne , *University of South Florida*, gdagne@health.usf.edu
MOHAMED KANU , *Tennessee State University*, mkanu@tnstate.edu

See next page for additional authors

Recommended Citation

Gishe, Jemal; Dagne, Getachew; KANU, MOHAMED; Patel, Kushal; BRIGGS, REVLON; Odedina, Folakemi; and Pleban, Francis (2021) "Prostate Cancer: Social, Economic and Demographic Correlates of Non Use of Supplemental Diets among Black Men in Florida," *Journal of Health Disparities Research and Practice*: Vol. 14: Iss. 2, Article 6.
Available at: https://digitalscholarship.unlv.edu/jhdrp/vol14/iss2/6

Prostate Cancer: Social, Economic and Demographic Correlates of Non Use of Supplemental Diets among Black Men in Florida

Abstract

Background: Epidemiologic data consistently show that Black men in the U.S. are disproportionately affected by prostate cancer. The incidence rate is 60% higher and death rate is 2.1 times more for Black men compared to Whites. There is growing evidence from literature that nutritional supplements, such as selenium, lycopene, vitamin A, vitamin D and soy may reduce the risk of prostate cancer. However, the level of knowledge and usage of these supplemental diets among Black men is low. Therefore, it is important to understand why Black men are low users of the supplemental diets and develop intervention programs to change the underlining conditions.

Objectives: Data collected in the state of Florida on prostate cancer disparities show that large proportion of Black men living in the state are nonusers of the supplemental diets. The purpose of this study is to identify socio-economic characteristics of U.S. born and foreign born Black men who are nonusers of the supplemental diets.

Methods: A cross-sectional survey was conducted on prostate cancer disparity among Black men in five major cities in the State of Florida. Three thousand four hundred and ten valid respondents were included in the analysis. The main outcomes were socio-economic status, access to health care and awareness among Black men in relation to the use of supplemental diets that reduce the risk of prostate cancer. Descriptive statistics and zero-inflated regression models were used for data analysis.

Results: The odds of nonuse of the supplemental diets were the highest for African born (Vitamin A OR = 2.32, P-value = 0.0060), for those who pray or do nothing when sick (Vitamin A OR = 2.84, P-value = 0.0367), with no insurance (Selenium OR = 1.32, P-value = 0.0007), and with no regular doctor to visit for medical care (Vitamin A OR = 1.29, P-value = 0.0318).

Conclusion: The study data indicates that the usage of supplemental diets among Black men in Florida is very low. The study further provides rich data with regard to demographic characteristics for U.S. born and foreign born Black men that might serve to inform the usage of supplemental diets that may reduce the risk of prostate cancer.

Keywords

Prostate Cancer, Supplemental Diets, U.S. born, African Origin, Caribbean Origin, Zero-inflated Models

Authors

Jemal Gishe, Getachew Dagne, MOHAMED KANU, Kushal Patel, REVLON BRIGGS, Folakemi Odedina, and Francis Pleban

Journal of Health Disparities Research and Practice
Volume 14, Issue 2, Summer 2021, pp. 89-103

School of Public Health
University of Nevada, Las Vegas

Prostate Cancer: Social, Economic and Demographic Correlates of Non-Use of Supplemental Diets among Black Men in Florida

Jemal Gishe, Tennessee State University
Getachew Dagne, University of South Florida
Mohamed Kanu, Tennessee State University
Kushal Patel, Tennessee State University,
Revlon Briggs, Tennessee State University
Folakemi Odedina, University of Florida
Francis Pleban, Tennessee State University
Corresponding Author: Jemal Gishe, jgishe@tnstate.edu

ABSTRACT

Background: Epidemiologic data consistently show that Black men in the U.S. are disproportionately affected by prostate cancer. The incidence rate is 60% higher and death rate is 2.1 times more for Black men compared to Whites. There is growing evidence from literature that nutritional supplements, such as selenium, lycopene, vitamin A, vitamin D and soy may reduce the risk of prostate cancer. However, the level of knowledge and usage of these supplemental diets among Black men is low. Therefore, it is important to understand why Black men are low users of the supplemental diets and develop intervention programs to change the underlining conditions.

Objectives: Data collected in the state of Florida on prostate cancer disparities show that large proportion of Black men living in the state are nonusers of the supplemental diets. The purpose of this study is to identify socio-economic characteristics of U.S. born and foreign-born Black men who are nonusers of the supplemental diets.

Methods: A cross-sectional survey was conducted on prostate cancer disparity among Black men in five major cities in the State of Florida. Three thousand four hundred and ten valid respondents were included in the analysis. The main outcomes were socio-economic status, access to health care and awareness among Black men in relation to the use of supplemental diets that reduce the risk of prostate cancer. Descriptive statistics and zero-inflated regression models were used for data analysis.

Results: The odds of nonuse of the supplemental diets were the highest for African born (Vitamin A OR = 2.32, P-value = 0.0060), for those who pray or do nothing when sick (Vitamin

A OR = 2.84, P-value = 0.0367), with no insurance (Selenium OR = 1.32, P-value = 0.0007), and with no regular doctor to visit for medical care (Vitamin A OR = 1.29, P-value = 0.0318).

Conclusion: The study data indicates that the usage of supplemental diets among Black men in Florida is very low. The study further provides rich data with regard to demographic characteristics for U.S. born and foreign-born Black men that might serve to inform the usage of supplemental diets that may reduce the risk of prostate cancer.

Keywords: Prostate Cancer, Supplemental Diets, U.S. born, African Origin, Caribbean Origin, Zero-inflated Models

INTRODUCTION

For the male population, prostate cancer is the second most diagnosed cancer and the fifth cancer related cause of death worldwide (Steele et al., 2017; Torre et al., 2015), and in the U.S., it is the most frequently diagnosed cancer and the second cancer related cause of death (US Cancer Statistics [USCS], 2014). Also, epidemiologic data consistently show that Black men are disproportionately affected by prostate cancer. In the U.S., the incidence rate is over 60% higher and the death rate is more than twice for Black men compared to their White counterparts (Peisch et al., 2015; Reddy et al., 2017; Shenoy et al., 2016). A five-year prostate cancer survival rate is under 86% for a Black male while it is over 92% for a White male in the U.S. (Steele et al., 2017).

Factors that may contribute to prostate cancer related health disparities are socio-economic status, access to health care and genetics (Kish et al., 2014; Rebbeck, 2017). Overweight and obesity are associated with diseases such as cardiovascular disease and many cancers; it also increases the risk of prostate cancer (Amling et al., 2004; Kushi et al., 2012; Vidal et al., 2016). There is growing evidence in the literature that physical activity (Giovannucci, 2005; Kushi et al., 2012) and nutritional supplements such as selenium, lycopene, vitamin A, vitamin D and soy may reduce the risk of prostate cancer (Chan et al., 1999; Kolonel, 2001; Kushi et al., 2012; Lin et al., 2015).

Plasma/serum selenium and phytoestrogens retinoid that is found in vitamin A are negatively associated with the risk of having prostate cancer. Like other antioxidants, selenium and vitamin A exhibit retarding carcinogenesis and prevent the growth of cancer cells (Ambrosini et al., 2007; Combs, 1997; Rayman, 2012; Roman et al., 2014; Sharp et al., 2001; Willis & Wians, 2003). Even though the scientific reporting is inconsistent, many studies indicated that lycopene that is found in tomato reduces the risk of prostate cancer (Donkena et al., 2010; Giovannucci et al., 2002; Mills et al., 1989). The inconsistency related to lycopene and prostate cancer in the literature is attributed to low consumption, not properly accounting for important contributors of lycopene, dietary measures not adequately covering the relevant period of carcinogenesis due to long latency period of prostate cancer and not properly accounting for confounding factors (Gärtner et al., 1997; Giovannucci et al., 2002; Tonucci et al., 1995).

Vitamin D deficiency is more prevalent among the Black population compared to all other races in North America (Daniel et al., 2015; Harris, 2006). Also, ecologic and epidemiological studies indicate that prostate cancer mortality is lower among the African population living near the equator, attributing the lower risk for the population to vitamin D that is obtained from sunlight exposure (Gilbert et al., 2011; Holick, 2004; Schwartz & Hanchette, 2006). Soy is part of a regular

diet among Asian population and studies attribute the minimal risk for prostate cancer among this population to the diet (Applegate et al., 2018; Messina, 1999; Yan & Spitznagel, 2005).

The nutritional supplements indicated above reduce the risk of prostate cancer, however, the level of knowledge, usage of supplemental diets, and adherence to food based dietary guidance is low among Non-Hispanic Blacks in the U.S. (Bird et al., 2017; Kirkpatrick et al., 2012; Malek et al., 2019). Therefore, knowing the characteristics of Black men who are non-users of the supplemental diets is important to understand prostate cancer disparities and develop intervention programs to change the underlying conditions. This study provides additional information about demographic characteristics of Black men who are non-users of supplemental diets.

METHODS

This is a secondary data analysis on a self-administered cross-sectional survey that was conducted in five major cities: Jacksonville, Miami, Orlando, Tallahassee, and Tampa in the state of Florida between April 2008 and October 2009 to assess prostate cancer risk factors among Black men. The selection of the locations was based on percentage of Black population and established relationship with Black communities. The inclusion criteria were Black men between age of 40 and 70. The survey used a nonprobability sampling technique and the participants were selected at predominantly Black neighborhoods mainly at barbershops and organized health forums. The data was originally collected to study the health beliefs and cultural beliefs of Black men relative to prostate cancer. The study indicated that the men reported favorable attitude and positive outcome beliefs for prostate cancer susceptibility and moderate perceived behavioral control for prostate cancer severity (Odedina, Dagne, Pressey, et al., 2011). The details of the methodologies used in the survey are available in previous publications (Odedina, Dagne, Pressey, et al., 2011; Odedina, Dagne, LaRose-Pierre, et al., 2011; Odedina, Scrivens, LaRose-Pierre, et a., 2011).

For this study, responses from 3,410 participants were found to be complete and valid for analysis. The main outcomes observed were how the use of supplemental diets that may reduce the risk for prostate cancer affected by socio-economic status, access to health care, and awareness among Black men. Chi-square test was used for a categorical variable and Cochran-Mantel-Haenszel (CMH) for an ordinal variable to examine potential differences between U.S. born, Caribbean born and African born Black men surveyed in the state of Florida by demographic characteristics. To accommodate excessive zeros (nonusers) that the data exhibit, zero-inflated regression models were developed for the multivariate analysis. A stepwise regression analysis method was used to develop a parsimonious multivariate zero-inflated regression model for each supplemental diet using key demographic characteristics, convergence criteria and minimum AIC value. Owned by the SAS Institute Inc., Cary, North Carolina, the SAS software for Windows, Version 9.4 was used for data analysis. All the P-values were based on two-sided probability tests.

RESULTS

Demographic Characteristics

No statistically significant difference was observed among the three groups (U.S. born, Caribbean born and African born) by residence (urban or rural), annual health physical exam and if they have a regular doctor to visit. Among the three groups, Black men of African origin had more young participants (lower than 40 years old), higher percentages of college degrees,

postgraduate degrees, annual income over 100,000 U.S. dollars, no insurance, and pray or do nothing when sick. Black men of Caribbean origin had the highest married percentage and U.S. born had the highest unemployment rate, Table 1. The overall, supplemental diets usage was low for all the participants and comparing the three groups by supplemental diet usage, no significant difference was observed for selenium, vitamin A, and vitamin D. Lowest percentages of nonuse for lycopene and soy was observed for Black men of Africa origin, Table 2.

Table 1. Demographic characteristics of the Black Men Surveyed by Ethnicity

Variables	Born in the US [1]	Caribbean Origin [1, 4]	African Origin [1, 4]	P-Value [2]
Age				
Less than 40 years	179 (6.9)	26 (8.5)	38 (12.6)	
Between 40 and 49 years	1133 (43.4)	138 (45.1)	139 (46.2)	
Between 50 and 59 years	858 (32.8)	83 (27.1)	80 (26.6)	0.0067
Between 60 and 69 years	350 (13.4)	48 (15.7)	37 (12.3)	
70 years and above	93 (3.6)	11 (3.6)	7 (2.3)	
Education				
Less than High School	367 (14.4)	34 (11.3)	41 (14.3)	
High School Diploma	1016 (39.7)	112 (37.3)	97 (33.8)	
Some College Training	518 (20.3)	55 (18.3)	34 (11.8)	<.0001
College Degree	465 (18.2)	81 (27.0)	76 (26.5)	
Post Graduate Degree	191 (7.5)	18 (6.0)	39 (13.6)	
Marital Status				
Married	1152 (44.0)	185 (58.9)	153 (50.7)	
Divorced	319 (12.2)	28 (8.9)	22 (7.3)	<.0001
Widowed	83 (3.2)	9 (2.9)	7 (2.3)	
Single	1066 (40.7)	92 (29.3)	120 (39.7)	
Current Residence				
Rural	680 (27.1)	75 (25.3)	83 (29.7)	0.4714
Urban	1833 (72.9)	222 (74.7)	196 (70.3)	
Employment Status				
Disability/Worker's compensation	253 (9.7)	13 (4.1)	24 (8.0)	
Unemployed	567 (21.8)	49 (15.6)	45 (15.0)	
Retired	299 (11.5)	38 (12.1)	30 (10.0)	<.0001
Part-time	295 (11.3)	43 (13.7)	56 (18.6)	
Full-time	1187 (45.6)	171 (54.5)	146 (48.5)	
Household Income				
19,999 or below	1060 (41.6)	81 (26.4)	107 (35.7)	
Between 20,000 and 39,999	604 (23.7)	107 (34.9)	78 (26.0)	
Between 40,000 and 59,999	329 (12.9)	60 (19.5)	36 (12.0)	0.0214
Between 60,000 and 79,999	222 (8.7)	30 (9.8)	31 (10.3)	
Between 80,000 and 99,999	154 (6.0)	20 (6.5)	14 (4.7)	
100,000 or above	182 (7.1)	9 (2.9)	34 (11.3)	
Insurance				
No	921 (35.9)	108 (35.6)	125 (43.1)	0.0493
Yes	1648 (64.1)	195 (64.4)	165 (56.9)	

Variables	Born in the US [1]	Caribbean Origin [1, 4]	African Origin [1, 4]	P-Value [2]
Annual Health Physical Exam				
No	871 (33.7)	89 (28.5)	93 (32.0)	0.1696
Yes	1713 (66.3)	223 (71.5)	198 (68.0)	
Family Doctor				
No	755 (29.8)	86 (28.6)	94 (33.8)	0.3258
Yes	1776 (70.2)	215 (71.4)	184 (66.2)	
Medical Care when get sick				
Pray or do nothing	282 (11.3)	28 (9.2)	45 (16.0)	
Other [3]	170 (6.8)	28 (9.2)	37 (13.2)	<.0001
Visit a doctor	2042 (81.9)	247 (81.5)	199 (70.8)	

[1] Frequency (percent).
[2] Chi-square test for a categorical variable, and Cochran-Mantel-Haenszel (CMH) test for an ordinal variable.
[3] Treat myself or visit other health care providers such as pharmacist.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.

Table 2. Supplemental Diet Usage of the Black Men by Ethnicity

Supplemental Diet	Born in the US [1]	Caribbean Origin [1, 3]	African Origin [1, 3]	Combined [1]	P-Value [2]
Selenium					
Never	1677 (68.3)	193 (67.5)	157 (59.2)	2027 (67.5)	
1 - 3 times a week	349 (14.2)	34 (11.9)	52 (19.6)	435 (14.5)	
4 - 6 times a week	150 (6.1)	24 (8.4)	32 (12.1)	206 (6.9)	0.1097
Once a day	212 (8.6)	29 (10.1)	16 (6.0)	257 (8.6)	
Two or more times a day	66 (2.7)	6 (2.1)	8 (3.0)	80 (2.7)	
Lycopene					
Never	1728 (70.3)	197 (68.6)	160 (56.9)	2085 (68.9)	
1 - 3 times a week	349 (14.2)	34 (11.8)	62 (22.1)	445 (14.7)	
4 - 6 times a week	142 (5.8)	27 (9.4)	29 (10.3)	198 (6.5)	0.0013
Once a day	191 (7.8)	25 (8.7)	20 (7.1)	236 (7.8)	
Two or more times a day	48 (2.0)	4 (1.4)	10 (3.6)	62 (2.0)	
Vitamin A and other retinoid					
Never	1242 (49.0)	160 (54.1)	103 (36.1)	1505 (48.3)	
1 - 3 times a week	590 (23.3)	65 (22.0)	94 (33.0)	749 (24.0)	
4 - 6 times a week	245 (9.7)	28 (9.5)	38 (13.3)	311 (10.0)	0.1650
Once a day	364 (14.3)	35 (11.8)	32 (11.2)	431 (13.8)	
Two or more times a day	96 (3.8)	8 (2.7)	18 (6.3)	122 (3.9)	
Vitamin D					
Never	1119 (43.4)	146 (48.3)	97 (33.8)	1362 (43.0)	
1 - 3 times a week	640 (24.8)	71 (23.5)	84 (29.3)	795 (25.1)	
4 - 6 times a week	293 (11.4)	33 (10.9)	42 (14.6)	368 (11.6)	0.1424
Once a day	420 (16.3)	44 (14.6)	46 (16.0)	510 (16.1)	

Supplemental Diet	Born in the US [1]	Caribbean Origin [1, 3]	African Origin [1, 3]	Combined [1]	P-Value [2]
Two or more times a day	107 (4.1)	8 (2.6)	18 (6.3)	133 (4.2)	
Soy					
Never	1568 (61.7)	186 (62.2)	130 (44.8)	1884 (60.2)	
1 - 3 times a week	516 (20.3)	46 (15.4)	84 (29.0)	646 (20.6)	
4 - 6 times a week	185 (7.3)	32 (10.7)	34 (11.7)	251 (8.0)	<.0001
Once a day	193 (7.6)	24 (8.0)	24 (8.3)	241 (7.7)	
Two or more times a day	81 (3.2)	11 (3.7)	18 (6.2)	110 (3.5)	

[1] Frequency (percent).
[2] P-value from Cochran-Mantel-Haenszel (CMH) test.
[3] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.

Selenium Supplement

The odds of nonuse of selenium supplement was lower for those with college degrees compared to those with high school diplomas (OR=0.61, CI = (0.44, 0.86), P-value = 0.0045), for divorced compared to singles (OR=0.68, CI = (0.50, 0.94), P-value = 0.0213), for unemployed compared to full-time employees (OR=0.69, CI = (0.53, 0.90), P-value = 0.0065), and for those with no annual physical exam (OR=0.83, CI = (0.71, 0.97), P-value = 0.0167). The odds of nonuse of selenium supplement was higher for those without health insurance (OR=1.32, CI = (1.12, 1.55), P-value = 0.0007), and for those who pray or do nothing when sick compared to those who visit a doctor (OR=1.60, CI = (1.14, 2.25), P-value = 0.0070). Even though nonuse of selenium supplement was higher for Black men of African origin and lower for Black men of Caribbean origin compared to U.S. born, the difference was not statistically significant, Table 3.

Table 3. The Odds of Nonuse of Selenium Supplement among the Black Men by Demographic Characteristics

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Ethnicity	African Origin [4] vs US born	1.33	(0.95, 1.85)	0.0990
	Caribbean Origin [4] vs US born	0.77	(0.58, 1.03)	0.0785
Education	Less than High School vs High School Degree	1.02	(0.70, 1.47)	0.9362
	Some College Training vs High School Degree	0.80	(0.57, 1.12)	0.2002
	College Degree vs High School Degree	0.61	(0.44, 0.86)	0.0045
	Post Graduate Degree vs High School Degree	0.74	(0.46, 1.20)	0.2243
Marital Status	Married vs Single	1.03	(0.80, 1.33)	0.7967
	Divorced vs Single	0.68	(0.50, 0.94)	0.0213
	Widowed vs Single	1.21	(0.71, 2.09)	0.4837
Employment Status	Disability/Worker's compensation vs Full-time	1.20	(0.81, 1.78)	0.3653
	Unemployed vs Full-time	0.69	(0.53, 0.90)	0.0065
	Retired vs Full-time	1.32	(0.97, 1.79)	0.0780
	Part-time vs Full-time	1.15	(0.83, 1.61)	0.4061
Insurance	No vs Yes	1.32	(1.12, 1.55)	0.0007
Annual Physical Exam	No vs Yes	0.83	(0.71, 0.97)	0.0167

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Medical Care [5]	Pray or do nothing vs See a Doctor	1.60	(1.14, 2.25)	0.0070
	Other [6] vs See a Doctor	1.01	(0.70, 1.45)	0.9505

[1] Odds Ratio of Nonuse of Selenium Supplement from Zero Inflated Probit Model.
[2] Wald's 95% Confidence Interval.
[3] P-value from Wald's Chi-Square Test.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.
[5] If you are sick, where would you rather go for your medical care.
[6] Treat myself or visit other health care providers such as pharmacist.
Note: the second group in order is used as a reference group.

Lycopene Supplement

Black men of African origin had higher odds of nonuse of lycopene supplement compared to U.S. born (OR=1.48, CI = (1.08, 2.04), P-value = 0.0155), and it was lower for Black men of Caribbean origin compared to U.S. born (OR=0.72, CI = (0.53, 0.96), P-value = 0.0270). Nonuse of lycopene supplement was lower for divorced compared to singles (OR=0.70, CI = (0.49, 1.00), P-value = 0.0479), for unemployed compared to full-time employees (OR=0.64, CI = (0.49, 0.85), P-value = 0.0016), and it was higher for those who pray or do nothing when sick compared to those who visit a doctor (OR=1.57, CI = (1.07, 2.30), P-value = 0.0220), Table 4.

Table 4. The Odds of Nonuse of Lycopene Supplement among the Black Men by Demographic Characteristics

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Ethnicity	African Origin [4] vs US born	1.48	(1.08, 2.04)	0.0155
	Caribbean Origin [4] vs US born	0.72	(0.53, 0.96)	0.0270
Marital Status	Married vs Single	0.88	(0.67, 1.16)	0.3585
	Divorced vs Single	0.70	(0.49, 1.00)	0.0479
	Widowed vs Single	1.58	(0.85, 2.95)	0.1488
Employment Status	Disability/Worker's compensation vs Full-time	1.42	(0.93, 2.16)	0.1081
	Unemployed vs Full-time	0.64	(0.49, 0.85)	0.0016
	Retired vs Full-time	1.18	(0.86, 1.61)	0.3114
	Part-time vs Full-time	1.12	(0.79, 1.59)	0.5253
Insurance	No vs Yes	1.11	(0.94, 1.31)	0.2043
Annual Physical Exam	No vs Yes	0.92	(0.79, 1.08)	0.3216
Medical Care [5]	Pray or do nothing vs See a Doctor	1.57	(1.07, 2.30)	0.0220

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
	Other [6] vs See a Doctor	1.14	(0.74, 1.77)	0.5475

[1] Odds Ratio of Nonuse of Lycopene Supplement from Zero Inflated Probit Model.
[2] Wald's 95% Confidence Interval.
[3] P-value from Wald's Chi-Square Test.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.
[5] If you are sick, where would you rather go for your medical care.
[6] Treat myself or visit other health care providers such as pharmacist.
Note: the second group in order is used as a reference group.

Vitamin A Supplement

The odds of nonuse of vitamin A supplement was higher for Black men of African origin compared to U.S. born (OR=2.32, CI = (1.27, 4.24), P-value = 0.0060), and it was lower for Black men of Caribbean origin compared to U.S. born (OR=0.56, CI = (0.38, 0.84), P-value = 0.0048). It was lower for unemployed individuals compared to full-time employees (OR=0.69, CI = (0.50, 0.95), P-value = 0.0249), higher among those without a regular doctor to visit (OR=1.29, CI = (1.02, 1.62), P-value = 0.0318), and for those who pray or do nothing when sick compared to those who visit a doctor (OR=2.84, CI = (1.07, 7.55), P-value = 0.0367), Table 5.

Table 5. The Odds of Nonuse of Vitamin A Supplement among the Black Men by Demographic Characteristics

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Ethnicity	African Origin [4] vs US born	2.32	(1.27, 4.24)	0.0060
	Caribbean Origin [4] vs US born	0.56	(0.38, 0.84)	0.0048
Employment Status	Disability/Worker's compensation vs Full-time	1.30	(0.80, 2.11)	0.2940
	Unemployed vs Full-time	0.69	(0.50, 0.95)	0.0249
	Retired vs Full-time	1.02	(0.71, 1.46)	0.9208
	Part-time vs Full-time	1.35	(0.86, 2.12)	0.1915
Insurance	No vs Yes	1.04	(0.85, 1.28)	0.6877
Annual Physical Exam	No vs Yes	0.87	(0.71, 1.06)	0.1613
Regular Doctor [5]	No vs Yes	1.29	(1.02, 1.62)	0.0318
Medical Care [6]	Pray or do nothing vs See a Doctor	2.84	(1.07, 7.55)	0.0367

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
	Other [7] vs See a Doctor	0.63	(0.33, 1.21)	0.1700

[1] Odds Ratio of Nonuse of Vitamin A Supplement from Zero Inflated Probit Model.
[2] Wald's 95% Confidence Interval.
[3] P-value from Wald's Chi-Square Test.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.
[5] Do you have a regular doctor you see for your medical care?
[6] If you are sick, where would you rather go for your medical care?
[7] Treat myself or visit other health care providers such as pharmacist.
Note: the second group in order is used as a reference group.

Vitamin D Supplement

The odds of nonuse of vitamin D supplement was lower for Black men of Caribbean origin compared to U.S. born (OR=0.69, CI = (0.48, 0.98), P-value = 0.0395), for unemployed compared to full-time employees (OR=0.63, CI = (0.43, 0.91), P-value = 0.0137). On the other hand, it was higher for Black men of African origin compared to U.S. born, for those without a regular doctor to visit, and for those who pray or do nothing when sick compared to those who visit a doctor. However, the differences were only marginally significant, Table 6.

Table 6. The Odds of Nonuse of Vitamin D Supplement among the Black Men by Demographic Characteristics

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Ethnicity	African Origin [4] vs US born	1.46	(0.96, 2.23)	0.0759
	Caribbean Origin [4] vs US born	0.69	(0.48, 0.98)	0.0395
Employment Status	Disability/Worker's compensation vs Full-time	1.50	(0.77, 2.92)	0.2278
	Unemployed vs Full-time	0.63	(0.43, 0.91)	0.0137
	Retired vs Full-time	1.07	(0.70, 1.63)	0.7503
	Part-time vs Full-time	1.32	(0.77, 2.27)	0.3168
Annual Physical Exam	No vs Yes	0.92	(0.74, 1.15)	0.4647
Regular Doctor [5]	No vs Yes	1.26	(0.98, 1.61)	0.0659
Medical Care [6]	Pray or do nothing vs See a Doctor	2.28	(0.88, 5.90)	0.0902

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
	Other [7] vs See a Doctor	0.63	(0.33, 1.19)	0.1522

[1] Odds Ratio of Nonuse of Vitamin D Supplement from Zero Inflated Probit Model.
[2] Wald's 95% Confidence Interval.
[3] P-value from Wald's Chi-Square Test.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.
[5] Do you have a regular doctor you see for your medical care?
[6] If you are sick, where would you rather go for your medical care?
[7] Treat myself or visit other health care providers such as pharmacist.
Note: the second group in order is used as a reference group.

Soy Supplement

The odds of nonuse of soy supplement was higher for Black men of African origin (OR=1.70, CI = (1.18, 2.45), P-value = 0.0043) and lower for Black men of Caribbean origin (OR=0.67, CI = (0.49, 0.91), P-value = 0.0098) compared to U.S. born. However, the odds of nonuse was lower for unemployed compared to full-time employees (OR=0.68, CI = (0.50, 0.94), P-value = 0.0179), for those with no annual physical exam (OR=0.84, CI = (0.72, 0.99), P-value = 0.0426), and it was higher for those without health insurance (OR=1.25, CI = (1.04, 1.51), P-value = 0.0163) and for younger respondents (below 40 years) compared to those in the age group between 40 to 49 years (OR=2.94, CI = (1.38, 6.28), P-value = 0.0053). The odds of nonuse was lower for those with college degrees compared to those with high school diplomas, but the difference was only marginally significant, Table 7.

Table 7. The Odds of Nonuse of Soy Supplement among the Black Men by Demographic Characteristics

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Ethnicity	African Origin [4] vs US born	1.70	(1.18, 2.45)	0.0043
	Caribbean Origin [4] vs US born	0.67	(0.49, 0.91)	0.0098
Age	Less than 40 years vs Between 40 - 49 years	2.94	(1.38, 6.28)	0.0053
	Between 50 - 59 years vs Between 40 - 49 years	0.95	(0.69, 1.30)	0.7445
	Between 60 - 69 years vs Between 40 - 49 years	1.24	(0.76, 2.01)	0.3941
	70 years and above vs Between 40 - 49 years	0.98	(0.42, 2.31)	0.9710
Education	Less than High School vs High School Degree	0.72	(0.46, 1.11)	0.1310
	Some College Training vs High School Degree	0.82	(0.56, 1.20)	0.3113
	College Degree vs High School Degree	0.72	(0.48, 1.06)	0.0936
	Post Graduate Degree vs High School Degree	0.89	(0.50, 1.57)	0.6852
Employment Status	Disability/Worker's compensation vs Full-time	1.20	(0.73, 1.97)	0.4670
	Unemployed vs Full-time	0.68	(0.50, 0.94)	0.0179
	Retired vs Full-time	1.23	(0.80, 1.87)	0.3456
	Part-time vs Full-time	1.33	(0.86, 2.04)	0.1961
Insurance	No vs Yes	1.25	(1.04, 1.51)	0.0163

Characteristics	Groups Compared	Odds Ratio [1]	95% CI [2]	P-Value [3]
Annual Physical Exam	No vs Yes	0.84	(0.72, 0.99)	0.0426

[1] Odds Ratio of Nonuse of Soy Supplement from Zero Inflated Probit Model.
[2] Wald's 95% Confidence Interval.
[3] P-value from Wald's Chi-Square Test.
[4] African Origin - born in Africa but now an American citizen,
Caribbean Origin - born in one of the Caribbean Islands but now an American citizen.
Note: the second group in order is used as a reference group.

DISCUSSION

The data used in this study strongly indicate that generally Black men's usage of supplemental diets is low. The subgroup analyses further provide useful data with regard to socio economic characteristics for U.S. born and foreign-born Black men about the usage of supplemental diets that may reduce the risk of prostate cancer. The study results show that observed odds of nonuse of supplemental diets were higher among Black men of African origin, younger age group (below 40 years) respondents, those without health insurance, those with no regular doctor to visit and those who pray or do nothing when they are sick. On the other hand, the odds of nonuse of supplemental diets were lower for Black men of Caribbean origin, for those with a college degree, divorced, and unemployed.

Nutrition (to include the use of dietary supplements) is part of cultural values and practices. As such, variation in cultural patterns and practices should explain why people from one culture have dietary preferences that are different from people of other cultural backgrounds.

African born Black men in the current study exhibited rare or nonuse of dietary supplements compared with Caribbean or U.S. born counterparts. While these foreign-born respondents may not be malnourished per se (that is, purely due to nonuse of supplement), scientific evidence show that dietary supplements are associated with health benefits and it is recommended that these individuals use supplements frequently (Chan et al., 1999; Kolonel, 2001; Kushi et al., 2012; Lin et al., 2015).

A World Food and Nutrition Study conducted decades ago concluded that, "Effective nutritional interventions may have more effect on human health than similar investments in Medicare." (*World Food and Nutrition Study, 1975*). While the study referred to developing countries, those findings may have applicability to immigrants from developing countries that have migrated to developed countries but are maintaining aspects of dietary cultural practices brought with them from their home countries. Although this sub-population may not be averse to use of supplements, they may not consider supplements as a necessary component of their diet. This is in spite of the scientific evidence associating these supplements (e.g. omega 3 fatty acids) with health benefits in preventing osteoporosis, joint problems and rheumatoid arthritis (Felson & Bischoff-Ferrari, 2015).

Malnutrition is not limited to having insufficient food; rather, poor nutrition includes having either too little, too much, or having food of the wrong type. In the current study, these

"transplanted" immigrants from Africa may consider their present diets as being adequate even without using supplements (Jakub et al., 2018).

The NIH cancer statistics data indicate that there is a change of trend in prostate cancer since 2014, both rate of new cases and death rate are on the rise (*Cancer of the Prostate - Cancer Stat Facts*, n.d.). The outcome of this study adds important information to the current understanding of supplemental diets usage among Black men that can be used for further research, and by public health practitioners and policy makers to develop intervention programs that may help reduce the risk of prostate cancer.

For future research, a more in-depth study utilizing appropriate qualitative methodology (such as focus group and key informant interviews, participant observation etc.) could uncover possible underlying cultural and other potential factors affronting the consumption of dietary supplements among this sub-population of immigrants.

For implications of public health practice, it is important to understand why the study participants were less likely to use dietary supplements. Future public health interventions must be culturally sensitive and must address cultural perceptions of food among the target population. Intervention activities and messages used to encourage and promote the use of dietary food supplements must be tailored to this population for maximum impact. The results also revealed low usage of dietary supplements for younger respondents and those without insurance coverage who frequently have no annual physical exams. These are broader social factors that must be addressed by state and federal governments. When people have insurance coverage, doctors are more likely to encourage them towards proper dietary habits following regular doctor visits.

Among the limitations for this study is the use of cross-sectional, self-reported data. Cross sectional data prevent us from making causal inferences while self-reported data are sometimes known for inaccuracy. Also, due to convenient sampling technique and since cross-sectional survey data are prone to response bias, the generalizability of the result is limited. However, a study on the behavioral aspects of the characteristics of Black men was published based on this dataset and showed an acceptable level of accuracy (Odedina, Dagne, Pressey, et al., 2011; Odedina, Dagne, LaRose-Pierre, et al., 2011; Odedina, Scrivens, LaRose-Pierre, et a., 2011).

REFERENCES

Ambrosini, G. L., de Klerk, N. H., Fritschi, L., Mackerras, D., & Musk, B. (2007). Fruit, vegetable, vitamin A intakes, and prostate cancer risk. *Prostate Cancer and Prostatic Diseases*, *11*(1), 61–66. https://doi.org/10.1038/sj.pcan.4500979

Amling, C. L., Riffenburgh, R. H., Sun, L., Moul, J. W., Lance, R. S., Kusuda, L., Sexton, W. J., Soderdahl, D. W., Donahue, T. F., Foley, J. P., Chung, A. K., & McLeod, D. G. (2004). Pathologic variables and recurrence rates as related to obesity and race in men with prostate cancer undergoing radical prostatectomy. *Journal of Clinical Oncology*, *22*(3), 439–445. https://doi.org/10.1200/jco.2004.03.132

Applegate, C., Rowles, J., Ranard, K., Jeon, S., & Erdman, J. (2018). Soy consumption and the risk of prostate cancer: An updated systematic review and meta-analysis. *Nutrients*, *10*(1), 40. https://doi.org/10.3390/nu10010040

Bird, J., Murphy, R., Ciappio, E., & McBurney, M. (2017). Risk of deficiency in multiple concurrent micronutrients in children and adults in the United States. *Nutrients*, *9*(7), 655. https://doi.org/10.3390/nu9070655

Cancer of the Prostate - Cancer Stat Facts. (n.d.). SEER. Retrieved January 26, 2018, from https://seer.cancer.gov/statfacts/html/prost.html

Chan, J. M., Stampfer, M. J., Ma, J., Rimm, E. B., Willett, W. C., & Giovannucci, E.L. (1999). Supplemental vitamin E intake and prostate cancer risk in a large cohort of men in the United States. *Cancer Epidemiology Biomarkers & Prevention*, 8(10), 893–899.

Combs, G. F. (1997). *Selenium and cancer prevention. In Antioxidants and Disease Prevention. Ed. Garewal*. CRC Press.

Daniel, D., Hardigan, P., Bray, N., Penzell, D., & Savu, C. (2015). The incidence of vitamin D deficiency in the obese: a retrospective chart review. *Journal of Community Hospital Internal Medicine Perspectives*, *5*(1), 26069. https://doi.org/10.3402/jchimp.v5.26069

Donkena, K. V., Karnes, R. J., & Young, C. Y. (2010). Vitamins and prostate cancer risk. *Molecules*, *15*(3), 1762–1783. https://doi.org/10.3390/molecules15031762

Felson, D. T., & Bischoff-Ferrari, H. A. (2015). Dietary fatty acids for the treatment of OA, including fish oil. *Annals of the Rheumatic Diseases*, *75*(1), 1–2. https://doi.org/10.1136/annrheumdis-2015-208329

Gärtner, C., Stahl, W., & Sies, H. (1997). Lycopene is more bioavailable from tomato paste than from fresh tomatoes. *The American Journal of Clinical Nutrition*, *66*(1), 116–122. https://doi.org/10.1093/ajcn/66.1.116

Gilbert, R., Metcalfe, C., Fraser, W. D., Donovan, J., Hamdy, F., Neal, D. E., Lane, J. A., & Martin, R. M. (2011). Associations of circulating 25-hydroxyvitamin D with prostate cancer diagnosis, stage and grade. *International Journal of Cancer*, *131*(5), 1187–1196. https://doi.org/10.1002/ijc.27327

Giovannucci, E. L., Rimm, E. B., Liu, Y., Stampfer, M. J., & Willett, W. C. (2002). A prospective study of tomato products, lycopene, and prostate cancer risk. *Journal of the National Cancer Institute*, *94*(5), 391–398. https://doi.org/10.1093/jnci/94.5.391

Giovannucci, E. L. (2005). A prospective study of physical activity and incident and fatal prostate cancer. *Archives of Internal Medicine*, *165*(9), 1005. https://doi.org/10.1001/archinte.165.9.1005

Harris, S. S. (2006). Vitamin D and African Americans. *The Journal of Nutrition*, *136*(4), 1126–1129. https://doi.org/10.1093/jn/136.4.1126

Holick, M. F. (2004). Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *The American Journal of Clinical Nutrition*, *80*(6), 1678S-1688S. https://doi.org/10.1093/ajcn/80.6.1678s

Jakub, K. E., Turk, M. T., Fapohunda, A., & Zoucha, R. (2018). Cultural beliefs, perceptions, and practices of young adult offspring of African immigrants regarding healthy eating and activity. *Journal of Transcultural Nursing*, *29*(6), 548–554. https://doi.org/10.1177/1043659618761532

Kirkpatrick, S. I., Dodd, K. W., Reedy, J., & Krebs-Smith, S. M. (2012). Income and race/ethnicity are associated with adherence to food-based dietary guidance among US adults and

children. *Journal of the Academy of Nutrition and Dietetics*, *112*(5), 624–635.e6. https://doi.org/10.1016/j.jand.2011.11.012

Kish, J. K., Yu, M., Percy-Laurry, A., & Altekruse, S. F. (2014). Racial and ethnic disparities in cancer survival by neighborhood socioeconomic status in surveillance, epidemiology, and end results (SEER) registries. *JNCI Monographs*, *2014*(49), 236–243. https://doi.org/10.1093/jncimonographs/lgu020

Kolonel, L. N. (2001). *Nutrition and Prostate Cancer, in Coulston AM, Rock CL, Monsen ER (eds): Nutrition in the Prevention and Treatment of Disease.* San Diego, CA: Academic Press. 373–386.

Kushi, L. H., Doyle, C., McCullough, M., Rock, C. L., Demark-Wahnefried, W., Bandera, E. V., Gapstur, S., Patel, A. V., Andrews, K., & Gansler, T. (2012). American Cancer Society guidelines on nutrition and physical activity for cancer prevention. *CA: A Cancer Journal for Clinicians*, *62*(1), 30–67. https://doi.org/10.3322/caac.20140

Lin, P. H., Aronson, W., & Freedland, S. J. (2015). Nutrition, dietary interventions and prostate cancer: the latest evidence. *BMC Medicine*, *13*(1). https://doi.org/10.1186/s12916-014-0234-y

Malek, A. M., Newman, J. C., Hunt, K. J., & Marriott, B. P. (2019). Race/ethnicity, enrichment/fortification, and dietary supplementation in the U.S. population, NHANES 2009–2012. *Nutrients*, *11*(5), 1005. https://doi.org/10.3390/nu11051005

Messina, M. J. (1999). Legumes and soybeans: Overview of their nutritional profiles and health effects. *The American Journal of Clinical Nutrition*, *70*(3), 439s–450s. https://doi.org/10.1093/ajcn/70.3.439s

Mills, P. K., Beeson, W. L., Phillips, R. L., & Fraser, G. E. (1989). Cohort study of diet, lifestyle, and prostate cancer in Adventist men. *Cancer*, *64*(3), 598–604.

Odedina, F. T., Dagne, G., LaRose-Pierre, M., Scrivens, J., Emanuel, F., Adams, A., Pressey, S., & Odedina, O. (2011). Within-group differences between native-born and foreign-born black men on prostate cancer risk reduction and early detection practices. *Journal of Immigrant and Minority Health*, *13*(6), 996–1004. https://doi.org/10.1007/s10903-011-9471-8

Odedina, F. T., Dagne, G., Pressey, S., Odedina, O., Emanuel, F., Scrivens, J., Reams, R. R., Adams, A., & LaRose-Pierre, M. (2011). Prostate cancer health and cultural beliefs of black men: The Florida prostate cancer disparity project. *Infectious Agents and Cancer*, *6*(S2). https://doi.org/10.1186/1750-9378-6-s2-s10

Odedina, F. T., Scrivens J., LaRose-Pierre, M., Emanuel, F., Adams, A. D., Dagne, G. A., Pressey, S., & Odedina, O., (2011). Modifiable prostate cancer risk reduction and early detection behaviors in black men. *American Journal of Health Behavior*, *35*(4), 470–484. . https://doi.org/10.5993/ajhb.35.4.9

Peisch, S. F., Gerke, T., Wilson, K. M., Giovannucci, E. L., Signorello, L. B., & Mucci, L. A. (2015). Abstract A29: Racial disparities in prostate cancer: Estimating the role of diet, lifestyle, and genetic factors among African-American and Caucasian-American men. *Epidemiology/Lifestyle Factors*. Published. https://doi.org/10.1158/1940-6215.prev-14-a29

Rayman, M. P. (2012). Selenium and human health. *The Lancet*, *379*(9822), 1256–1268. https://doi.org/10.1016/s0140-6736(11)61452-9

Rebbeck, T. R. (2017). Prostate cancer genetics: Variation by race, ethnicity, and geography. *Seminars in Radiation Oncology*, *27*(1), 3–10. https://doi.org/10.1016/j.semradonc.2016.08.002

Reddy, A. G., Shenoy, D., Packianathan, S., Giri, S., & Vijayakumar, S. (2017). Abstract C85: Do African-American veterans need distinct "Prostate Cancer Screening Guidelines" to overcome outcome disparities? *Prevention Research*. Published. https://doi.org/10.1158/1538-7755.disp16-c85

Roman, M., Jitaru, P., & Barbante, C. (2014). Selenium biochemistry and its role for human health. *Metallomics*, *6*(1), 25–54. https://doi.org/10.1039/c3mt00185g

Schwartz, G. G., & Hanchette, C. L. (2006). UV, latitude, and spatial trends in prostate cancer mortality: All sunlight is not the same (United States). *Cancer Causes & Control*, *17*(8), 1091–1101. https://doi.org/10.1007/s10552-006-0050-6

Sharp, R. M., Bello-DeOcampo, D., Quader, S. T., & Webber, M. M. (2001). N-(4-hydroxyphenyl) retinamide (4-HPR) decreases neoplastic properties of human prostate cells: an agent for prevention. *Mutation Research/Genetic Toxicology and Environmental Mutagenesis*, *496*(1–2), 163–170. https://doi.org/10.1016/s1383-5718(01)00231-5

Shenoy, D., Packianathan, S., Chen, A. M., & Vijayakumar, S. (2016). Do African-American men need separate prostate cancer screening guidelines? *BMC Urology*, *16*(1). https://doi.org/10.1186/s12894-016-0137-7

Steele, C. B., Li, J., Huang, B., & Weir, H. K. (2017). Prostate cancer survival in the United States by race and stage (2001-2009): Findings from the CONCORD-2 study. *Cancer*, *123*, 5160–5177. https://doi.org/10.1002/cncr.31026

Tonucci, L. H., Holden, J. M., Beecher, G. R., Khachik, F., Davis, C. S., & Mulokozi, G. (1995). Carotenoid content of thermally processed tomato-based food products. *Journal of Agricultural and Food Chemistry*, *43*(3), 579–586. https://doi.org/10.1021/jf00051a005

Torre, L. A., Bray, F., Siegel, R. L., Ferlay, J., Lortet-Tieulent, J., & Jemal, A. (2015). Global cancer statistics, 2012. *CA: A Cancer Journal for Clinicians*, *65*(2), 87–108. https://doi.org/10.3322/caac.21262

US Cancer Statistics: 2010–2014 Incidence and Mortality Web-Based Report. (2014). US Cancer Statistics (USCS) Working Group. Retrieved January 26, 2018, from https://www.cdc.gov/uscs

Vidal, A. C., Howard, L. E., Sun, S. X., Cooperberg, M. R., Kane, C. J., Aronson, W. J., Terris, M. K., Amling, C. L., & Freedland, S. J. (2016). Obesity and prostate cancer-specific mortality after radical prostatectomy: results from the Shared Equal Access Regional Cancer Hospital (SEARCH) database. *Prostate Cancer and Prostatic Diseases*, *20*(1), 72–78. https://doi.org/10.1038/pcan.2016.47

Willis, M. S., & Wians, F. H. (2003). The role of nutrition in preventing prostate cancer: a review of the proposed mechanism of action of various dietary substances. *Clinica Chimica Acta*, *330*(1–2), 57–83. https://doi.org/10.1016/s0009-8981(03)00048-2

Yan, L., & Spitznagel, E. L. (2005). Meta-analysis of soy food and risk of prostate cancer in men. *International Journal of Cancer*, *117*(4), 667–669. https://doi.org/10.1002/ijc.21266