Evaluation of Colonoscopy and Sigmoidoscopy utilization for Colorectal Cancer Screening in Georgia

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ABSTRACT

INTRODUCTION: Colorectal cancer (CRC) is a major public health problem affecting millions of people throughout the world. It is the third most prevalent cancer, and the third most common cancer-related cause of death in the United States. Screening can reduce both CRC incidence and mortality, and the United States Preventive Services Task Force (USPSTF) recommends that adults between the ages of 50 and 75 screen for CRC via sigmoidoscopy every 5 years, and colonoscopy every 10 years.

METHOD: This study examines the 1997-2016 Behavioral Risk Factor Surveillance System (BRFSS) data for trends in sigmoidoscopy and colonoscopy utilization for CRC screening among adults in Georgia.

RESULTS: Overall, there has been an increase in the proportion of sigmoidoscopy and colonoscopy utilization in GA between 1997 and 2014 (APC=2.71; p <0.0001). Multiple regression analysis of the 2016 BRFSS data shows that age (≥60 years vs 50-59 years [OR= 1.85, p <0.0001]); education (≥high school vs <high school [OR= 1.77, p <0.0001]); insurance coverage (No vs Yes [OR=0.30, p < 0.0001]); marital status (single vs couple [OR= 0.67, p = 0.001]); income (≥ $25,000 VS < $25,000, [OR=1.24, p = 0.019]); and Asian vs White race/ethnicity [OR = 0.326, p = 0.04]; were all significantly associated with colonoscopy utilization.

CONCLUSION: Differences exist between sociodemographic groups in the utilization of colonoscopy for CRC screening. Understanding these disparities will help guide healthcare providers and researchers in targeting underserved populations and providing tailored programs that promote screening.

INTRODUCTION

- Colorectal Cancer (CRC) is the third most commonly diagnosed cancer and the third most common cause of cancer related mortality in the United States. More than 50,000 deaths in 2018 will be caused by CRC; and the overall lifetime risk of developing CRC is about 1 in 22 (4.49%) for men and 1 in 24 (4.15%) for women
- Screening reduces CRC incidence and mortality. Colonoscopy and sigmoidoscopy are the two most effective screening methods. Colonoscopy reduces mortality by two-thirds, and sigmoidoscopy reduces incidence by up to one-third and mortality by one-half
- The USPSTF recommends screening for all individuals aged 50 to 75 years. Screening via colonoscopy should occur every 10 years, and via sigmoidoscopy every 5 years
- This study examined the trends and the differences in CRC screening behaviors among sociodemographic groups.

METHODS

- Data Source: Centers for Disease Control and Prevention BRFSS Prevalence and Trends data
- Study participants: Adults aged 50+ years residing in the state of Georgia who have had a sigmoidoscopy or colonoscopy for CRC screening
- Measures: Outcome variables were assessed based on participants' demographic data including sex, age, race, income, education, insurance coverage, and marital status.

  Trends in colonoscopy/sigmoidoscopy utilization over time and association between demographic variables and colonoscopy/sigmoidoscopy utilization were assessed
- Statistical analyses: Utilization trends over time were assessed via annual percent change (APC) using Joinpoint regression analyses: 1997-2014 BRFSS data

  Association between demographics and utilization was assessed via multivariate regression analyses: 2015, 2016 BRFSS data.

RESULTS

Table 1. Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy in Georgia: 1997-2014 BRFSS Data

Variable	1997 (%)	1999 (%)	2002 (%)	2004 (%)	2006 (%)	2008 (%)	2010 (%)	2012 (%)	2014 (%)	APC*
Overall	48.1	47.4	49.2	53.7	57.0	62.2	67.7	69.4	69.8	2.71
Gender										
Male	51.6	51.3	47.4	54.4	55.4	61	67	69.4	67.6	2.18
Female	45.2	44.3	50.6	53.2	58.4	63.2	68.3	69.5	71.7	3.18
Age(years)										
50-59	40.9	38.3	41.4	45.1	47.1	50.9	57.5	58.8	57.8	2.74
60-64	-	55.1	49.8	59.3	61.8	67.4	75.6	73.1	73.1	2.69
65+	53.6	53.9	57.9	62.1	67.2	73.9	76.3	79.1	80.4	2.79
Race										
White	50.5	49.3	51.4	55.2	59.1	64.1	69.9	71.2	72.3	2.62
Black	41.0	37.7	41.4	52.3	52.4	56.5	61.6	65.2	69.7	3.72
Education										
<HS	34.7	43.1	43.3	45.2	42.9	52	53.9	58.5	52.7	2.52
HS/GED	48	38.6	44.2	51	54.4	57.1	62.3	66.4	68.3	3.06
SomePostHS	57.6	50.3	48.9	53	57.8	63.5	70.1	73.8	74.6	2.40
CollegeGrad	54.8	61.7	59.9	62.4	64.5	70.7	76	76.8	78.2	2.11
Income										
<15k	37.2	37.5	43.2	45.8	49.8	54.6	52.1	55.8	56.8	2.77
15K-24,999	50.3	-	48.7	51.8	52.1	55.8	61.5	60.7	61.4	1.55
25K-34,999	-	-	51.4	56.9	56.7	60.8	61.5	69.9	74.1	2.88
35K-49,999	-	-	44.5	47.3	58.7	62.6	69.1	70.2	75.2	4.62
50K+	59.9	52.9	56.5	57.5	60.3	68.2	74.1	77.7	75.7	2.20
Nationwide (USA) Overall	41.0	43.9	48.6	53.5	57.1	62.2	65.2	67.3	69.3	3.31

*APC: Annual percent change. APCs were statistically significant for all values at p = 0.05

Table 2. Sample Demographics of the total number of respondents

Variable	Colonoscopy* (2016 BRFSS data) N = 2543 (%)	Sigmoidoscopy** (2016 BRFSS data) N = 1254 (%)	Colonoscopy +Sigmoidoscopy*** (2015 BRFSS data) N = 2694 (%)
Sex			
Male	1005 (39.5)	498 (39.7)	979 (36.3)
Female	1538 (60.5)	756 (60.3)	1715 (63.7)
Age (years)			
50-59	915 (36.0)	533 (42.5)	741 (27.5)
60-69	1074 (42.2)	491 (39.2)	935 (34.7)
70-79	554 (21.8)	230 (18.3)	628 (23.3)
80+	-	-	351 (13.0)
Don't know/ Refused	-	-	39 (1.5)
Race			
White (non Hispanic)	1688 (66.4)	812 (64.8)	1924 (71.4)
Black (non Hispanic)	640 (25.2)	320 (25.5)	603 (22.4)
Hispanic	75 (2.9)	45 (3.6)	39 (1.5)
Asian	20 (0.8)	12 (1.0)	14 (0.5)
American Indian/ Pacific Islander	26 (1.0)	12 (1.0)	27 (1.0)
Other (non Hispanic)	48 (1.9)	25 (2.0)	39 (1.5)
Not Sure/Refused	46 (1.8)	28 (2.1)	48 (1.7)
Education			
<High School	281 (11.0)	176 (14.0)	329 (12.2)
High School	718 (28.3)	369 (29.4)	741 (27.5)
> High School	1540 (60.6)	706 (56.3)	1616 (60.0)
Not Sure/Refused	4 (0.1)	3 (0.3)	8 (0.3)
Annual Income (USD $)			
<25,000	701 (27.6)	397 (31.7)	730 (27.1)
25,000-50,000	517 (20.3)	255 (20.3)	550 (20.4)
>50,000	900 (35.4)	389 (31.0)	894 (33.2)
Not Sure/Refused	425 (16.7)	213 (17.0)	520 (19.3)
Marital Status			
Couple	1429 (56.2)	639 (51.0)	1408 (52.3)
Single	1104 (43.4)	606 (48.3)	1268 (47.1)
Refused	10 (0.4)	9 (0.7)	18 (0.6)
Healthcare Coverage			
Yes	2344 (92.2)	1103 (88.0)	2543 (94.4)
No	190 (7.5)	145 (11.6)	145 (5.4)
Not Sure/Refused	9 (0.3)	6 (0.4)	6 (0.2)

*Total number of adults aged 50-75 who responded to the question "Have you had a colonoscopy in the past 10 years. **Total number of adults aged 50-75 who responded to the question "Have you had a sigmoidoscopy within the past 5 years. ***Total number of adults aged 50+ who responded to the question "Have you ever had a sigmoidoscopy or colonoscopy".

DISCUSSION/CONCLUSIONS

- Utilization trends:

  Colonoscopy and sigmoidoscopy utilization rates for CRC screening in Georgia has increased from 48.1% in 1997 to 69.8% in 2014 (APC = 2.71; p< 0.0001)

  This trend is below the targeted goal of 80% screening rate by 2014 set by the CDC's Colorectal Cancer Control Program
- Demographic associations with colonoscopy and sigmoidoscopy utilization:

  Older age (≥ 60 years), higher education and income levels, insurance coverage, and being in a couple relationship are associated with colonoscopy and sigmoidoscopy utilization for CRC screening
- Implications for Public Health:

  Demographic differences exist in the methods of screening for CRC

  Understanding these differences in screening patterns among demographic subgroups is important for policy and development of tailored interventions that promote screening.

RESULTS

Table 3. Weighted percentages of respondents who answered "yes"

Variable	Colonoscopy* (BRFSS 2016 data) N= 1617 (Weighted %)	Sigmoidoscopy** (BRFSS 2016 data) N= 36 (Weighted %)	Colonoscopy +Sigmoidoscopy*** (BRFSS 2015 data) N= 1989 (Weighted %)	p-value
Sex				< 0.0001
Male	648 (58.6)	19 (3.2)	731 (68.7)	
Female	969 (58.1)	17 (2.2)	1258 (68.0)	
Age (years)				< 0.0001
50-59	483 (48.7)	8 (0.9)	454 (54.4)	
60-69	738 (66.6)	17 (4.3)	741 (78.0)	
70-79	396 (69.0)	11 (6.2)	510 (79.4)	
80+			259 (74.6)	
Race				< 0.0001
White (non Hispanic)	1121 (60.4)	21 (2.2)	1441 (69.5)	
Black (non Hispanic)	383 (56.2)	10 (3.7)	422 (65.4)	
Hispanic	39 (44.3)	3 (3.5)	29 (63.0)	
Asian	9 (43.5)	0 (0.0)	11 (61.4)	
American Indian	15 (67.7)	0 (0.0)	18 (78.7)	
Pacific Islander	2 (31.5)	0 (0.0)	3 (37.1)	
Other	28 (63.4)	0 (0.0)	28 (68.3)	
Not Sure/Refused	22 (45.8)	2 (5.0)	37 (72.9)	
Education				< 0.0001
<High School	127 (43.5)	4 (3.3)	198 (52.9)	
High School	420 (52.3)	8 (1.4)	520 (67.6)	
>High School	1069 (65.9)	24 (3.2)	1267 (73.9)	
Not Sure/Refused	1 (9.2)	0 (0.0)	4 (34.9)	
Annual Income (USD $)				< 0.0001
<25,000	380 (49.2)	11 (3.0)	488 (60.7)	
25,000-50,000	321 (54.1)	7 (3.2)	390 (63.3)	
>50,000	655 (66.7)	11 (2.0)	722 (74.4)	
Not Sure/Refused	261 (58.5)	7 (2.9)	389 (73.5)	
Marital Status				< 0.0001
Couple	986 (63.5)	17 (2.2)	1101 (72.0)	
Single	627 (49.7)	18 (3.1)	876 (62.6)	
Refused	4 (45.0)	1 (3.2)	12 (72.7)	
Healthcare Coverage				< 0.0001
Yes	1558 (62.3)	33 (2.9%)	1933 (71.9)	
No	56 (24.3)	3 (1.5)	54 (29.2)	
Not Sure/Refused	3 (9.8)	0 (0.0)	2 (49.6)	

*Adults aged 50-75 who have had a colonoscopy in the past 10 years. **Adults aged 50-75 who have had a sigmoidoscopy within the past 5 years. ***Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy.

Table 4. Multiple regression analyses

Category	Reference	Odds Ratio	Confidence Interval (95%)	P - value
Colonoscopy + Sigmoidoscopy*: 2015 BRFSS Data				
Sex: Female	Male	1.04	0.82-1.31	0.75
Age 60-69	50-59	2.75	2.13-3.55	**< 0.0001**
70-79		3.08	2.28-4.16	**< 0.0001**
Education: High School	<High School	2.02	1.40-2.90	**< 0.0001**
>High School		2.71	1.88-3.89	**< 0.0001**
Insurance: No	Yes	0.25	0.16-0.38	**< 0.0001**
Income: 25,000-50,000	< 25,000	0.75	0.56-1.00	0.05
<50,000		1.32	0.96-1.83	0.09
Race: Black	White	1.10	0.85-1.43	0.45
Asian		1.12	0.45-2.82	0.81
Hispanic		4.36	0.41-46.60	0.22
American Indian/ Pacific Islander		2.12	0.60-7.43	0.24
Other		2.04	0.56-7.44	0.28
Marital status: Single	Couple	0.71	0.58-0.91	**< 0.01**
Colonoscopy: 2016 BRFSS Data**				
Sex: Female	Male	1.00	0.82-1.21	0.96
Age 60-69	50-59	1.93	1.56-2.40	**< 0.0001**
70-79		2.13	1.62-2.79	**< 0.0001**
Education: High School	<High School	1.49	1.07-2.08	**0.02**
>High School		2.07	1.49-2.89	**< 0.0001**
Insurance: No	Yes	0.30	0.21-0.45	**<0.0001**
Income: 25,000-50,000	<25,000	1.06	0.82-1.37	0.66
<50,000		1.43	1.09-1.86	**0.01**
Race: Black	White	1.01	0.81-1.26	0.94
Asian		1.09	0.62-1.92	0.76
Hispanic		0.33	0.11-0.96	0.42
American Indian/ Pacific Islander		1.57	0.57-4.33	0.39
Other		0.57	0.29-1.13	0.11
Marital status: Single	Couple	0.70	0.57-0.86	**0.01**
Sigmoidoscopy*: 2016 BRFSS Data**				
Sex: Female	Male	0.54	0.24-1.20	0.13
Age 60-69	50-59	3.31	1.23-8.88	**0.02**
70-79		1.81	0.48-6.89	0.38
Education: High School	<High School	0.96	0.23-4.03	0.96
>High School		1.56	0.42-5.83	0.51
Insurance: No	Yes	0.68	0.14-3.23	0.63
Income: 25,000-50,000	<25,000	0.78	0.35-2.74	0.96
<50,000		0.97	0.25-2.37	0.66
Race: Black	White	1.37	0.55-3.39	0.50
Asian		3.60	0.74-17.05	0.11
Marital status: Single	Couple	0.68	0.43-2.56	0.63

*Adults aged 50+ who have ever had a sigmoidoscopy or colonoscopy. **Adults aged 50-75 who have had a colonoscopy in the past 10 years. ***Adults aged 50-75 who have had a sigmoidoscopy within the past 5 years.