

# Place of birth, cancer beliefs and being current with colon cancer screening among US adults

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## Abstract

**Background** Historically, studies suggested that immigrants acquire the risk of colorectal cancer (CRC) as US-born persons within the same generation. CRC risk of immigrants is largely unknown in this era of cancer screening and widespread immigration. We investigated the association of place of birth and cancer beliefs with uptake of CRC screening.

**Methods** The 2007 Health Information National Trends Survey was used and 4,299 respondents (weighted population size=81,896,392) who were 50 years and older (3,960 US-born and 339 foreign-born) were identified. We defined being current with CRC screening guidelines as the use of fecal occult blood test within 1 year, sigmoidoscopy within 5 years, or colonoscopy within 10 years. We compared being up-to-date with CRC screening among foreign-born versus US-born respondents. Logistic regression models were used to calculate odds ratios (OR) and 95% confidence intervals (CI).

**Results** Overall, 2,594 (63.3%) US-born and 208 (52.8%) foreign-born respondents were current with CRC screening. Foreign-born respondents were less current in unadjusted model (OR 0.65; 95%CI: 0.50-0.85) but became non-statistically significant after adjustment (OR 0.79; 95%CI: 0.51-1.24). Respondents who believed that screening finds cancer when it is easy to treat (OR 2.85; 95%CI: 1.44-3.61), those who believed that cancer can be cured when detected early (OR 1.56; 95%CI: 1.20-2.00), and those who worry about getting cancer (OR 1.34; 95%CI: 1.10-1.61) were likely to be current with CRC screening. However, respondents with fatalistic beliefs were borderline less likely to be current (OR 0.82; 95%CI: 0.65-1.04).

**Conclusion** There is a need to improve education on CRC screening, particularly among foreign-born adults.

**Keywords** Cancer screening, colorectal cancer, beliefs, place of birth, nativity

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## Introduction

Approximately four decades ago, studies suggested that Japanese immigrants acquired the risk of colorectal cancer (CRC) as Caucasians in Hawaii within the same generation [1]. This was before the advent of widespread CRC screening in the United States. Access and utilization of screening are known to affect CRC burden [2]. Factors associated with low uptake of CRC screening include low socioeconomic status, lack of or inadequate insurance coverage, low literacy level, and low

perceived cancer risk [3-5]. Using data from the 1998 National Health Interview Survey (NHIS), Goel *et al* [6] reported a non-significant reduced odds of prior fecal occult blood testing (FOBT) and sigmoidoscopy use among foreign- versus US-born respondents. This was in the pre-colonoscopy screening era and colonoscopy is fast becoming the dominant CRC screening modality in the United States [7,8].

Beliefs about the cause of a particular disease can influence whether and how an individual takes steps to reduce the risk of developing that disease [9]. Powe reported that fatalism (attitude of perceiving everything as being ordained by fate) was associated with lower uptake of FOBT among 192 study participants [10]. In the present study we evaluated the association of place of birth (US- versus foreign-born) and cancer beliefs with being current with CRC screening guidelines using FOBT, sigmoidoscopy and colonoscopy.

## Materials and methods

### Health information national trends survey (HINTS)

We used data from 2007 HINTS, a probability-based sample survey of US adults conducted by National Cancer Institute in 2008. The details of HINTS have been published [11]. In summary, HINTS evaluated health communication, cancer-related information, beliefs and behavior of adults in the United States. The survey used stratified clustered sampling and utilized a dual-frame design that combined random digital dial telephone survey (n=4,092) with mailed survey using a national listing of addresses available from the United States Postal Service (n=3,582). Interviews were conducted in English or Spanish. Surnames were used to identify probable Hispanic correspondents which allowed first contact with these sample cases to be made by an interviewer who can easily transition to Spanish language if necessary. A total of 7,674 participants completed the survey. We obtained approval for the current study from Howard University Institutional Review Board (IRB-11-MED-53) and downloaded the data from HINTS website.

### Exposure and outcome assessment

Our analytic sample consisted of 4,299 respondents who were at least 50 years of age and answered questions regarding their places of birth and CRC screening behavior (3,960 US-born respondents, weighted population size = 74,618,632; and 339 foreign-born respondents, weighted population size = 7,277,759). Survey participants answered whether they “strongly agree, somewhat agree, somewhat disagree, and strongly disagree” with statements such as “Screening finds cancer when it’s easy to treat”; “There is not much you can do to prevent cancer”; “Behavior and lifestyle causes cancer”; “Cancer can be cured when detected early”; and “Everything causes cancer”. They were also asked questions regarding their worries about cancer.

Respondents were asked when they had their most recent FOBT, sigmoidoscopy and colonoscopy. We defined being up-to-date with CRC screening as the use of FOBT within 1 year, sigmoidoscopy within the last 5 years, or colonoscopy within the last 10 years.

### Statistical analysis

HINTS data contained sample weights to obtain population-level estimates and a set of 50 replicate sampling weights to obtain the correct standard errors. Based on the recommendation from HINTS, we evaluated the effect of survey modes (mail and telephone) to determine whether a combined analysis was appropriate. There was no mode difference regarding place of birth (P=0.249). Therefore, we used the combined data for our analyses. We compared the demographic characteristics of those who were born in the United States with those who were foreign-born. We evaluated the association between place of birth (foreign- versus US-born) and being up-to-date with CRC screening. We also investigated being up-to-date with CRC screening guidelines relative to the cancer beliefs of respondents (in relation to cancer screening; cancer causes; cancer prevention; cancer fatalism; and cancer worry). The small sample size of foreign-born respondents precluded meaningful analysis of cancer beliefs stratified by place of birth. Therefore, we evaluated the association of cancer beliefs among our entire analytic cohort. We used logistic regression models to calculate the odds ratio (OR) with 95% confidence interval (CI) in association with being up-to-date with CRC screening guidelines. Our full models included age, sex, race, body mass index, education, health insurance coverage, income and marital status. These were selected *a priori*, based on literature review. We used survey weight in all analyses to obtain population based estimates, hence we reported weighted percentages rather than arithmetic percentages. Variance estimations were performed with Taylor series linearization to account for complex survey design using STATA statistical software version 12.0, College Station, Texas.

## Results

US-born respondents were older, mean age 64.0 years (95%CI: 63.8-64.2) compared to mean age 61.4 years (95%CI: 60.1-62.6) of foreign-born respondents. The mean age using weighted survey analysis for continuous variables does not produce P value. Rather, it produces mean age and the 95% CI. There is a notable difference in the mean age as evidenced by lack of overlap of the 95% CI. However, the “unweighted analysis” would have been: P=0.0035 using non-parametric rank-sum test. US-born respondents were more likely to be non-Hispanic whites (P<0.001), had more formal education (P<0.001), more likely to have health insurance (P<0.001) and were more likely to have a history of smoking (P=0.0013).

There was no difference in sex preponderance (Table 1). Being foreign-born was associated with a 35% statistically significant reduced odds of being current with CRC screening in the univariate analysis but the effect became attenuated after adjustments for potential confounders (OR 0.79; 95%CI: 0.5 -1.24) (Table 2).

Our findings suggest that the opinion of respondents regarding cancer, influence their being current with CRC screening guidelines. Respondents who had a favorable opinion that cancer can be detected early and cured were more likely to be current, whereas those with fatalistic beliefs were less likely to be current with CRC screening guidelines (Table 3).

## Discussion

We evaluated the association of place of birth (US- versus foreign-born) with being current with CRC screening guidelines. We found important differences by nativity in factors known to affect CRC screening. For example, there was a higher representation of Hispanics, lower formal education and higher percentage of respondents without health insurance coverage among foreign-born persons. Nonetheless, after taking these factors into consideration, our study is suggestive that in general, foreign-born adults in the US have lower uptake of CRC screening. We also evaluated the effect of cancer beliefs with compliance with CRC screening guidelines. We found that respondents who have positive opinion about cancer prevention were more likely to be current with CRC screening. The lower screening rates among foreign-born respondents may be related to a relative lack of organized or programmatic population based CRC screening in their countries of origin. Although HINTS did not collect data to ascertain the country of origin of foreign-born respondents, whether they migrated as adults or not and the time that has elapsed since migration, we speculate that foreign-born persons were probably less aware of CRC screening which may also be related to their poorer access to healthcare services. Overall, our study underscores the need for increased education of the population about CRC prevention, particularly among foreign-born persons.

Our findings corroborate a previous report by Goel *et al* [6]. In that study, the authors used data from the 1998 National Health Interview Survey and reported that foreign-born persons were less likely to be up-to-date with CRC screening with FOBT and sigmoidoscopy. This was prior to widespread use of colonoscopy as a screening modality. In recent times, colonoscopy is fast becoming the dominant screening modality with reduced use of other acceptable methods of CRC screening [7,8]. However, in our study, we evaluated the use of FOBT, sigmoidoscopy and colonoscopy and our findings are similar.

A low perceived risk of CRC which may be due to lack of knowledge about family history of CRC [12] in combination with inadequate knowledge of the efficacy of CRC screening has been reported to be associated with a reduced uptake of CRC screening [2,3]. Fatalism has been reported to be a psychological and sociocultural barrier and has been associated

**Table 1** Comparison of the characteristics of respondents by place of birth

	US-born N (%)	Foreign-born N (%)	P-value
Sex			0.188
Male	1568 (45.7)	137 (49.8)	
Female	2392 (54.3)	202 (51.2)	
Self-identified race			<0.001
White	3300 (83.5)	130 (29.3)	
Black	337 (10.9)	23 (7.1)	
Hispanic	124 (3.6)	109 (38.7)	
Others	115 (2.1)	72 (24.9)	
Level of education			<0.001
Less than high school	373 (15.1)	66 (30.9)	
High school	1,102 (28.5)	65 (18.1)	
Some college	1,180 (32.4)	71 (20.6)	
College graduate	1,297 (24.1)	136 (30.3)	
Smoking status			0.0013
Never	1,795 (44.3)	204 (60.4)	
Former	1538 (39.3)	92 (26.9)	
Current	575 (16.4)	35 (12.7)	
Income per year			0.13
Less <\$20,000	600 (19.1)	68 (23.4)	
Less <\$35,000	618 (18.9)	62 (22.2)	
Less <\$50,000	488 (14.5)	24 (8.1)	
Less <\$75,000	637 (19.1)	54 (21.3)	
Greater >\$75,000	948 (28.4)	81 (25.0)	
Body mass index in kg/m <sup>2</sup>			0.02
<25	1286 (31.0)	143 (41.3)	
25-29	1454 (37.7)	123 (35.9)	
>30	1182 (31.3)	71 (22.9)	
Has health insurance			<0.001
No	260 (7.8)	44 (16.1)	
Yes	3645 (92.3)	287 (83.9)	

All percentages are weighted %

**Table 2** Univariate and multivariate analysis of association between place of birth and being up-to-date with colorectal cancer screening

Nativity	N (Wt % screened)	Univariate OR (95% CI)	Multivariate OR (95% CI)
US-born (n=3,960)	2,594 (63.3)	Reference	Reference
Foreign-born (n=339)	208 (52.8)	0.65 (0.50-0.85)	0.79 (0.50-1.24)

Adjusted for age, sex, race, body mass index, education, income, health insurance, and marital status

with lower uptake of FOBT screening [10]. In contrast, uptake of CRC screening is higher among US-born respondents and among those who believe that CRC screening is efficacious.

**Table 3** Association between cancer beliefs and being up-to-date with colorectal cancer screening

Cancer belief	Respondents screened, N (wt % screen)	Univariate OR (95% CI)	Multivariate OR (95% CI)
Screening finds cancer when easy to treat			
No (n=197)	87 (45.2)	Reference	Reference
Yes (n=4,057)	2,696 (63.6)	2.13 (1.43-3.17)	2.85 (1.44-3.61)
Not much you can do to prevent cancer			
No (n=3,135)	2,095 (63.8)	Reference	Reference
Yes (n=1,091)	653 (58.0)	0.78 (0.64-0.96)	0.82 (0.65-1.04)
Behavior and Lifestyle causes cancer			
No (n=2,107)	1,349 (61.2)	Reference	Reference
Yes (n=2118)	1,402 (63.3)	1.10 (0.94-1.27)	1.10 (0.92-1.34)
Cancer can be cured when detected early			
No (n=536)	306 (54.6)	Reference	Reference
Yes (n=3691)	2,451 (63.6)	1.46 (1.16-1.82)	1.56 (1.20-2.00)
Everything causes cancer			
No (n=2169)	1,445 (63.7)	Reference	Reference
Yes (n=2034)	1,297 (61.5)	0.91 (0.76-1.08)	1.00 (0.83-1.21)
Worry about getting cancer			
No (n=2193)	1,387 (60.7)	Reference	Reference
Yes (n=2073)	1,396 (64.2)	1.16 (0.98-1.37)	1.34 (1.10-1.61)

Adjusted for age, sex, race, body mass index, education, income, health insurance, and marital status

### Summary Box

#### What is already known:

- There is wide spread immigration to Europe and North America at present time
- Colorectal cancer susceptibility changes with migration
- Cancer beliefs affect colon cancer screening uptake

#### What the new findings are:

- Immigrants are less likely to be compliant with colon cancer screening guidelines
- Optimism about cancer detection and treatment enhances uptake of cancer screening
- Cancer fatalism reduces colon cancer screening uptake

This aligns with the health belief model which suggests that people are apt to act when they believe they are susceptible to the condition (perceived susceptibility), believe the condition has serious consequences (perceived severity), believe taking action would reduce their susceptibility to the condition or its severity (perceived benefits), believe costs of taking action

(perceived barriers) are outweighed by the benefits, are exposed to factors that prompt action (e.g. a television advertisement or a reminder from one's physician), and are confident in their ability to successfully perform an action (self-efficacy) [13]. Therefore, regularly providing information about advances in cancer prevention and management will be important in reducing cancer fatalistic beliefs and thus improve CRC screening uptake among US adults. Immigrants should be encouraged to discuss their diagnosis with members of their family so that they may become more aware of their individual risk so that persons at higher risk of this deadly, but largely preventable disease can take important steps to mitigate their risks. A culturally sensitive approach tailored to foreign-born individuals may also increase their acceptance and subsequent participation in CRC screening.

There are some notable strengths of our study. We used a large, nationally representative sample of US adults. The 2007 iteration of HINTS was conducted in English and Spanish with two communication modalities (telephone and mail), thereby ensuring a broad reach of the population. However, our study is limited by the fact that it was based on self-report and there was no medical record review to validate CRC screening. There was a relatively small number of foreign-born persons. Percentage of foreign-born in our study is 9%, while the actual percentage of foreign-born in the US is 13% [14]. Overall response rate of HINTS 2007 was modest; 24% for the random digital dial sample and 31% for mail sample. Furthermore, there was no information on the regions of the world foreign-born respondents migrated from to the United States.

In conclusion, suboptimal uptake of CRC screening may contribute to increased risk of CRC among immigrants in this modern era of widespread CRC screening. It is important for healthcare providers to inquire about cancer beliefs of all patients to inform cancer prevention education intervention and counseling.

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