

BRFSS Statistical Brief on Colorectal Cancer Screening Questions

Updated September 2019

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Objective

To provide the rationale and procedures for analyzing colorectal cancer (CRC) screening measures that align with Healthy People 2020 screening objectives.

Background

Cancer remains a leading cause of death in the United States, second to heart disease, and one of the top areas of public health focus.¹⁻⁴ Because evidence-based cancer screening tools have contributed to a decline in the number of new cancer cases and prevented deaths from some cancers,⁵ cancer screening measures have been included since the inception of the Healthy People national health objectives (Appendix 1). Previous Healthy People objectives for cancer screening focused on screening tests with or without a time interval. [Healthy People 2020 objectives](#) focus on the timeliness of receiving an evidence-based screening test recommended by the United States Preventive Services Task Force (USPSTF).⁶ Healthy People 2020 also includes the objective for CRC as a leading health indicator.

Healthy People screening measures have been adapted for state use in different settings, including comprehensive cancer control plans and chronic disease indicators, with the Behavioral Risk Factor Surveillance System (BRFSS) as the data source.⁷⁻⁹ CDC's Division of Cancer Prevention and Control has analyzed BRFSS data for several publications in the *Morbidity and Mortality Weekly Report (MMWR)* (full list is available at [this citation search tool](#)). These publications usually report age-adjusted prevalence estimates for specific cancers by age groups (Appendix 2).

History

BRFSS surveys have asked questions for CRC screening about fecal occult blood tests (FOBTs) and endoscopy.

Endoscopic tests for CRC screening have changed over time and have included proctoscopy, sigmoidoscopy, and colonoscopy. In 2008, questions were added to differentiate between sigmoidoscopy and colonoscopy, the two endoscopic tests used most commonly in medical practice for screening. These questions are asked as follows:

- (1) Have you ever had either of these exams?
- (2) If "Yes" to (1), then, "Which exam did you have"?
- (3) If "Yes" to (1), then, "When was your last exam"?

The BRFSS does not include questions to distinguish between a diagnostic test and a screening test. A diagnostic test is used to determine the presence or absence of cancer when a patient shows signs or symptoms. For example, if a patient sees his or her primary care physician for blood in his or her stool, then a colonoscopy for diagnostic purposes may be ordered. A screening test is performed on people who do not show any symptoms of cancer.

More detailed information about the 2018 BRFSS questionnaire used by the states is available in Appendix 3. (Note: CATI instructions were omitted for ease in presenting the questions and their corresponding response categories. For more information, see www.cdc.gov/brfss/questionnaires/pdf-ques/2018_BRFSS_English_Questionnaire.pdf.)

Updated USPSTF Recommendations for 2018

In 2018, the USPSTF updated the screening recommendation to include several tests and timing combinations for the prevention or early detection of CRC among adults aged 50–75 years: (1) high-sensitivity FOBT (guaiac-based FOBT or fecal immunochemical test [FIT]) annually, (2) colonoscopy every 10 years, (3) sigmoidoscopy every 5 years, (4) sigmoidoscopy every 10 years with FIT every year, (5) FIT-DNA (or Cologuard®) every three years, or (6) virtual colonoscopy every 5 years. Because of limitations on the number of questions in the CRC screening module, analysts will not be able to differentiate between the guaiac-based FOBT and the FIT and will not be able to include the FIT-DNA (Cologuard) test or the virtual colonoscopy as part of the overall measure.

Analytic Code for Colorectal Cancer Screening: Fecal Occult Blood Test

This section explains the codes used to analyze data for people who have had a high-sensitivity FOBT in the past year. It is an interim step to calculating prevalence estimates for meeting the USPSTF recommendation and Healthy People objective C-16 (see page 7). See pages 3 and 4 for information on other parts of the recommendation.

HFOB1YR is a calculated variable for respondents who have had a high-sensitivity FOBT in the past year. It is derived from BLDSTOOL and LSTBLDS3. The variable _AGE80 is used to define the appropriate subset.

- | | | |
|---|--|--|
| 1 | Met high-sensitivity FOBT portion of recommendation | Received a home FOBT within the past year. (BLDSTOOL=1 and LSTBLDS3=1) |
| 2 | Did not meet high-sensitivity FOBT portion of recommendation | Did not receive a home FOBT within the past year. [BLDSTOOL=2 or (BLDSTOOL=1 and LSTBLDS3=2,3,4,5)] |
| . | Missing | Don't know, not sure, or refused responses for BLDSTOOL or
Don't know, not sure, refused, or missing responses for LSTBLDS3 |

Subsetting statement: 50<=_AGE80<=75

SAS Code:

```
IF BLDSTOOL=2 THEN HFOB1YR=2;  
ELSE IF BLDSTOOL=1 THEN DO;  
    IF LSTBLDS3=1 THEN HFOB1YR=1;  
    ELSE IF LSTBLDS3 IN (2,3,4,5) THEN HFOB1YR=2;  
END;
```

R Code:

```
hfob1yr<-ifelse(bldstool==2, 2, NA)  
hfob1yr<-ifelse(bldstool==1 & lstblds3==1, 1, hfob1yr)  
hfob1yr<-ifelse(bldstool==1 & lstblds3 %in% c(2,3,4,5), 2, hfob1yr)
```

Stata Code:

```
gen hfob1yr=.
replace hfob1yr=2 if bldstool==2
replace hfob1yr=1 if bldstool==1 & lstblds3==1
replace hfob1yr=2 if bldstool==1 & lstblds3>=2 & lstblds3<=5
```

Analytic Code for Colorectal Cancer Screening: Colonoscopy

This section explains the codes used to analyze data for people who have had a colonoscopy in the past 10 years. It is an interim step to calculating prevalence estimates for meeting the USPSTF recommendation and Healthy People objective C-16 (see page 7). See pages 2 and 4 for information on the other parts of the recommendation.

COL10YR is a calculated variable for respondents who have had a colonoscopy in the past 10 years. It is derived from HADSGM3, HADSGCO1, and LASTSIG3. The variable _AGE80 is used to define the appropriate subset.

- | | |
|---|--|
| 1 Met colonoscopy portion of recommendation | Received a colonoscopy within the past 10 years. (HADSGM3=1 and HADSGCO1=2 and LASTSIG3=1,2,3,4,5) |
| 2 Did not meet colonoscopy portion of recommendation | Did not receive a colonoscopy within the past 10 years. [HADSGM3=2 or (HADSGM3=1 and LASTSIG3=6)] |
| . Missing | Don't know, not sure, or refused responses for HADSGM3 or Don't know, not sure, refused, or missing responses for LASTSIG3 or Last test was a sigmoidoscopy or unknown type that occurred within the past 10 years |

Subsetting statement: 50<=_AGE80<=75

SAS Code:

```
SUBSET: 50<=_AGE80<=75;

IF HADSGM3=2 THEN COL10YR=2;
ELSE IF HADSGM3=1 THEN DO;
  IF HADSGCO1=2 THEN DO;
    IF LASTSIG3 IN (1,2,3,4,5) THEN COL10YR=1;
    ELSE IF LASTSIG3=6 THEN COL10YR=2;
  END;
ELSE IF HADSGCO1=1 & LASTSIG3=6 THEN COL10YR=2;
END;
```

R Code:

```
col10yr<-ifelse(hadsigm3==2, 2, NA)
col10yr<-ifelse(hadsigm3==1 & hadsgco1==2 & lastsig3 %in% c(1,2,3,4,5),
1, col10yr)
col10yr<-ifelse(hadsigm3==1 & lastsig3==6, 2, col10yr)
```

Stata Code:

```
gen col10yr=.
replace col10yr=2 if hadsigm3==2
replace col10yr=1 if hadsigm3==1 & hadsgco1==2 & lastsig3>=1 &
lastsig3<=5
replace col10yr=2 if hadsigm3==1 & lastsig3==6
```

Analytic Code for Colorectal Cancer Screening: Sigmoidoscopy

This section explains the codes used to analyze data for people who have had a sigmoidoscopy in the past 5 years. It is an interim step to calculating prevalence estimates for meeting the USPSTF recommendation and Healthy People objective C-16 (see page 7). See pages 2 and 3 for information on the other parts of the recommendation.

FS5YR is a calculated variable for respondents who have had a sigmoidoscopy in the past 5 years.
FS5YR is derived from HADSIGM3, HADSGC01, and LASTSIG3.

- | | | |
|---|--|--|
| 1 | Met sigmoidoscopy portion of recommendation | Adults aged 50–75 years who have had a sigmoidoscopy within the past 5 years. (HADSIGM3=1 and HADSGC01=1 and LASTSIG3=1,2,3,4) |
| 2 | Did not meet sigmoidoscopy portion of recommendation | Did not receive a sigmoidoscopy within the past 5 years [HADSIGM3=2 or (HADSIGM3=1 and LASTSIG3=5,6)] |

Subsetting statement: 50<=_AGE80<=75

SAS Code:

```
IF HADSIGM3=2 THEN FS5YR=2;
ELSE IF HADSIGM3=1 THEN DO;
  IF HADSGC01=1 &
  LASTSIG3 IN (1,2,3,4) THEN FS5YR=1;
  ELSE IF LASTSIG3 IN (5,6) THEN FS5YR=2;
END;
```

R Code:

```
fs5yr<-ifelse(hadsigm3==2, 2, NA)
fs5yr<-ifelse(hadsigm3==1 & hadsgco1==1 & lastsig3 %in% c(1,2,3,4), 1,
fs5yr)
fs5yr<-ifelse(hadsigm3==1 & lastsig3 %in% c(5,6), 2, fs5yr)
```

Stata Code:

```
gen fs5yr=.
replace fs5yr=2 if hadsigm3==2
replace fs5yr=1 if hadsigm3==1 & hadsgco1==1 & lastsig3>=1 &
lastsig3<=4
replace fs5yr=2 if hadsigm3==1 & (lastsig3==5 | lastsig3==6)
```

Analytic Code for Colorectal Cancer Screening: Composite Measure

Meets Healthy People 2020 Objective C-16

CRC_REC is a calculated variable for respondents who have fully met the USPSTF recommendation. It is derived from HFOB1YR, FS5YR, and COL10YR.

- | | |
|--|--|
| 1 Met USPSTF recommendations | Received one or more of the recommended CRC tests within the recommended time interval. (HFOB1YR=1 or FS5YR=1 or COL10YR=1) |
| 2 Did not meet USPSTF recommendations | Did not receive one or more of the recommended CRC tests within the recommended time interval. (HFOB1YR=2 and FS5YR=2 and COL10YR=2) |

Subsetting statement: 50<=_AGE80<=75

SAS Code:
IF HFOB1YR=1 | FS5YR=1 | COL10YR=1 THEN CRC_REC=1;
ELSE IF HFOB1YR=2 & FS5YR=2 & COL10YR=2 THEN CRC_REC=2;

R Code:
crc_rec<-ifelse(hfob1yr==1 | f5yr==1 | col10yr==1, 1, 2)
crc_rec<-ifelse(is.na(crc_rec) & hfob3yr==1 & hadsigm3==1 & lastsig3
%in% c(1,2,3,4), 1, crc_rec)

Stata Code:
gen crc_rec=.
replace crc_rec=1 if hfob1yr==1 | fs5yr==1 | col10yr==1
replace crc_rec=2 if hfob1yr==2 & fs5yr==2 & col10yr==2
replace crc_rec=1 if hfob3yr==1 & hadsigm3==1 & lastsig3>=1 &
lastsig3<=4

Analytic Note

The 2018 BRFSS dataset contains the variable _crcrec which defines men and women ages 50–75 who report meeting screening recommendations with at least one modality, using the reported age variable rather than the imputed variable (_age80). Reported age is only available to users in 5-year age groups (or a variable that splits all ages into 2 categories: <65 years and ≥65 years) and cannot create all of the screening measures used by DCPC. For this reason, DCPC defines this screening variable using imputed age. There are small differences in counts and percentages between the DCPC method and the BRFSS-created variable.

References

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Appendix 1. Healthy People: Colorectal Cancer Screening Objectives

Healthy People 2000

16.13 Colon screening, 50 years and older: Fecal occult blood test (past 2 years) *and* Sigmoidoscopy (ever)

Healthy People 2010

3-12a Colorectal cancer screening—Fecal occult blood test (FOBT) within past 2 years (age adjusted, 50+ years)

3-12b Colorectal cancer screening— Proctoscopy, colonoscopy, or sigmoidoscopy ever received (age adjusted, 50+ years)

Healthy People 2020

C-16 Increase the proportion of men and women who receive a colorectal cancer screening based on the most recent guidelines (leading health indicator)

Appendix 2. Age Categories for Age Adjustment

Healthy People 2020

Cancer Screening Type	Sex/Age Group	Age Categories
Colorectal Cancer Screening	Adults Aged 50–75 Years	if 50<=_AGE80<=64 then ageadj=1; else if 65<=_AGE80<=75 then ageadj=2;

Other suggested age groups

Cancer Screening Type	Sex/Age Group	Age Categories
Colorectal Cancer Screening	Adults Aged 50–75 Years	if 50<=_AGE80<=64 then ageadj=1; else if 65<=_AGE80<=75 then ageadj=2; OR if 50<=_AGE80<=59 then ageadj=1; else if 60<=_AGE80<=69 then ageadj=2; else if 70<=_AGE80<=75 then ageadj=3;

Appendix 3. Questions from the BRFSS Colorectal Cancer Screening Module

16.01 A blood stool test is a test that may use a special kit at home to determine whether the stool contains blood. Have you ever had this test using a home kit?

- 1 Yes
- 2 No [Go to Q16.03]
- 7 Don't know / Not sure [Go to Q16.03]
- 9 Refused [Go to Q16.03]

16.02 How long has it been since you had your last blood stool test using a home kit?

- 1 Within the past year (anytime less than 12 months ago)
- 2 Within the past 2 years (1 year but less than 2 years ago)
- 3 Within the past 3 years (2 years but less than 3 years ago)
- 4 Within the past 5 years (3 years but less than 5 years ago)
- 5 5 or more years ago
- 7 Don't know / Not sure
- 9 Refused

16.03 Sigmoidoscopy and colonoscopy are exams in which a tube is inserted in the rectum to view the colon for signs of cancer or other health problems. Have you ever had either of these exams?

- 1 Yes
- 2 No [Go to next section]
- 7 Don't know / Not sure [Go to next section]
- 9 Refused [Go to next section]

16.04 For a SIGMOIDOSCOPY, a flexible tube is inserted into the rectum to look for problems.

A COLONOSCOPY is similar, but uses a longer tube, and you are usually given medication through a needle in your arm to make you sleepy and told to have someone else drive you home after the test. Was your MOST RECENT exam a sigmoidoscopy or a colonoscopy?

- 1 Sigmoidoscopy
- 2 Colonoscopy
- 7 Don't know / Not sure
- 9 Refused

16.05 How long has it been since you had your last sigmoidoscopy or colonoscopy?

- 1 Within the past year (anytime less than 12 months ago)
- 2 Within the past 2 years (1 year but less than 2 years ago)
- 3 Within the past 3 years (2 years but less than 3 years ago)
- 4 Within the past 5 years (3 years but less than 5 years ago)
- 5 Within the past 10 years (5 years but less than 10 years ago)
- 6 10 or more years ago
- 7 Don't know / Not sure
- 9 Refused