August 27, 2019

MEMORANDUM FOR   Dr. Karen Cullen

                               Epidemiologist, Center for Tobacco Products, Federal Drug
                               Administration

                               and

                               Anne M. Hartman
                               Biostatistician/Program Director, Behavioral Research Program,
                               National Cancer Institute, Division of Cancer Control and
                               Population Sciences, National Institutes of Health

Through: Lisa Clement
                               Survey Director, Current Population & American Time Use Surveys
                               Associate Director for Demographic Programs – Survey Operations

From: Anthony G. Tersine, Jr.   *Anthony G. Tersine, Jr.*
                               Chief, Demographic Statistical Methods Division

Subject: Evaluating Nonresponse Bias in the 2014-2015 Tobacco Use
                               Supplement to the Current Population Survey

The purpose of this memorandum is to report on analysis of various nonresponse estimates computed for the 2014-2015 Tobacco Use Supplement to the Current Population Survey.

This document has gone through Disclosure Review Board (DRB) Delegated Authority Review and was assigned DRB Approval Number CBDRB-FY19-POP001-0019. All unweighted tallies and weighted estimates, including test statistics, have been rounded as required by the Census Bureau's DRB disclosure avoidance guidelines.

If you have any questions about this document, please contact KeTrena Phipps at 301.763.5931 or KeTrena.S.Phipps@census.gov or contact David Hornick at 301.763.4183 or David.V.Hornick@census.gov.

cc:

Todd Gibson	(IMS)
Gordon Willis	(NCI)
Carolyn Reyes-Guzman	
Kristin Mangold	
Dana Chomenko	(BLH)
Kyra Linse	(ADDP)
Tim Marshall	
Greg Weyland	
David Watt	(DSD)
Lorelei De Vos	
James Farber	(DSMD)
David Hornick	
KeTrena Phipps	
Mei Li	
Tim Trudell	
Rebecca Hoop	
Nghiep Huynh	
Anne Johnson	

Current Population Survey – Tobacco Use Supplement

Demographic Statistical Methods Division

U.S. Census Bureau

Evaluating Nonresponse Bias in the 2014-2015 Tobacco Use Supplement to the Current Population Survey

KeTrena Phipps

August 27, 2019

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1. Executive Summary

This report presents results of analyses of various nonresponse estimates computed for the 2014-2015 Tobacco Use Supplement (TUS) to the Current Population Survey (CPS). The sample included all persons who completed a CPS interview and remained eligible for the TUS after CPS editing. A nonresponse bias analysis was conducted to determine whether nonresponse among different demographic groups may have biased estimates. We investigated overall response rates, as well as demographic subgroup response rates and demographic respondent and nonrespondent distributions for three separate analyses: nonresponse weights, self-response weights, and restricted self-response weights.

Our key findings for the 2014-2015 TUS are:

- The weighted percentage of households where at least one person responded to CPS is 88.48 percent. From the eligible persons for the TUS, 75.65 percent of the weighted persons responded to TUS, resulting in an overall weighted TUS response rate of 66.93 percent.[1] For those TUS persons selected to respond to the additional self-response questions, 70.24 percent responded.

- This investigation found evidence of potential nonresponse bias within all three analyses for TUS persons and self-respondents for all investigated characteristics: type of living quarters, principal city status, region, urban/rural status, race, sex, Hispanic origin, age, measure of labor force, educational attainment, and number of persons selected for self-response questions (based on count of civilians, aged 18 or older, in the household).

- Within all three analyses, excluding the blanks and missing values, the largest difference in response rates is seen in number of persons selected for self-response questions, where the highest response rates were consistently for those persons within households with only one civilian aged 18 or older and the lowest response rates were for those persons within households with five or more civilians aged 18 or older. Age had the second largest response rate differences in all three analyses.[2]

- Within all three analyses, the chi-square tests showed significant differences (at the α=0.10 level) between respondent and nonrespondent distributions for all investigated characteristics. For all three analyses, very large chi-square statistics were seen for age and educational attainment. Within the two analyses

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[1] Nonresponding households may have a different number of persons than interviewed ones, so combining household- and person-level rates may lead to an over/underestimate of the true overall nonresponse rate and under/overestimate of the true overall response rate for persons for the Tobacco Use supplement.

[2] For the Nonresponse Weights Analysis, the response rate difference within educational attainment was not significantly different from the response rate difference within age.

dealing with self-respondents, large chi-square statistics were seen for number of persons selected for self-response questions.

2. Introduction

The Office of Management and Budget (OMB) provides guidelines for conducting a nonresponse bias study when the expected unit response rate of a survey is below 80 percent (OMB, 2006). The CPS household response rates have historically been above 80 percent, but the overall supplement response rates (which are the product of the CPS household and TUS person response rates) are below this threshold.

This document provides results from our evaluation of nonresponse in the 2014-2015 TUS to the CPS. Its purpose is to determine the existence of potential nonresponse bias in the 2014-2015 TUS.

3. Overview of the Current Population Survey

The monthly CPS collects primarily labor force data about the civilian noninstitutionalized population living in the United States. The institutionalized population, which is excluded from the population universe, is composed primarily of the population in correctional institutions and nursing homes (98 percent of the 4.0 million institutionalized people in Census 2010). Interviewers ask questions concerning labor force participation about each member 15 years old and over in sample households. For July 2014, January 2015, and May 2015, the week containing the nineteenth of the month is the interview week. The week containing the twelfth is the reference week (i.e., the week about which the labor force questions are asked).

The CPS uses a multistage probability sample based on the results of the decennial census, with coverage in all 50 states and the District of Columbia. The sample is continually updated to account for new residential construction. When files from the most recent decennial census become available, the Census Bureau gradually introduces a new sample design for the CPS.

Every ten years, the CPS first-stage sample is redesigned[3] reflecting changes based on the most recent decennial census. In the first stage of the sampling process, primary sampling units (PSUs)[4] were selected for sample. In the 2010 sample design, the United States was divided into 1,987 PSUs. These PSUs were then grouped into 852 strata. Within each stratum, a single PSU was chosen for the sample, with its probability of selection proportional to its population as of the most recent decennial census. In the case of strata consisting of only one PSU, the PSU was chosen with certainty.

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[3] For detailed information on the 2010 sample redesign, please see (Bureau of Labor Statistics, April 2014).

[4] The PSUs correspond to substate areas (i.e., counties or groups of counties) that are geographically contiguous.

4. **Overview of the 2014-2015 Tobacco Use Supplement to the Current Population Survey**

    The National Cancer Institute (NCI) of the National Institutes of Health (NIH) and the U.S. Food and Drug Administration's Center for Tobacco Products (FDA-CTP), both of the Department of Health and Human Services (DHHS), co-sponsored the July 2014, January 2015, and May 2015 TUS. NCI has sponsored the supplemental questions for the TUS since 1992.

    In July 2014, January 2015, and May 2015, in addition to the basic CPS questions, interviewers asked supplementary questions on tobacco use of the civilian non-institutionalized population 18 years and older. This information is used to gather reliable data to measure changes in America's use of tobacco products as well as to understand public attitudes about smoking.

    The key estimates include:
    - Number and percent of current smokers, former smokers, and those that have never smoked cigarettes
    - Percent of smokers that have attempted to quit and that intend to quit
    - For current smokers, how many cigarettes are smoked per day
    - The cost for cigarettes and purchase location
    - Extent of advice to quit smoking
    - Existence of workplace and home smoking restrictions
    - Attitudes toward smoke-free policies in public places

    Key domains for this supplement are:
    - Households
    - Families
    - Persons
    - Age

5. **Discussion of Nonresponse in the 2014-2015 Tobacco Use Supplement to the Current Population Survey**

    Some degree of nonresponse bias and variance is a normal feature of almost all statistical surveys. The TUS produces tobacco use estimates using the answers from responding households and persons. These tobacco use estimates will be biased if answers from respondents differ from the potential answers of nonrespondents. The magnitude of the bias is a function of the response rate and differences between respondents and nonrespondents.

    There were two ways that a household/person could be a nonrespondent to the TUS:
    1. The entire household did not respond to CPS (the occupants were not found at home after repeated calls or are unavailable for some other reason).

2. The household/person responded to CPS but did not respond to the TUS interview.

Because the TUS is directly linked to the CPS response rate, the CPS and TUS attempt to minimize nonresponse bias by increasing response rates and adjusting weights for potential differences between respondents and nonrespondents. We try to increase response rates within CPS by conducting personal visit interviews for new and returning sample units, mailing advance letters for all sample units, providing a Spanish language questionnaire for potential respondents who do not speak English, allowing interpreters for potential respondents who do not speak English or Spanish, training field representatives to gain respondent cooperation, allowing proxy respondents in special circumstances, and mailing follow-up letters to nonresponding households. We also help minimize nonresponse bias by reducing respondent burden for the supplemental questions. Respondent burden is minimized two ways: 1) Limiting the average length per household to ten minutes, and 2) Implementing a random selection process, whereby only certain eligible persons within each household are required to self-respond to the questions, while the remaining eligible persons may have a proxy respond for them..

We reduce the effects of respondent/nonrespondent differences through noninterview weighting adjustments. These adjustments group respondents and nonrespondents into adjustment cells, and the weights of the nonrespondents are reallocated to the respondents within the adjustment cells.

CPS noninterview adjustment cells are formed by noninterview cluster (NICL) and central city status. The NICLs are created based on sample PSUs that are similar in metropolitan status and population size within the same state (U.S. Census Bureau, 2006). Metropolitan status is defined as metropolitan or nonmetropolitan. Within metropolitan PSUs, a further breakdown into "central city" and "not central city" is defined. This results in 127 NICLs and 214 adjustment cells. These variables were chosen for the noninterview adjustment cells because they are thought to be correlated with the CPS variables of interest.

TUS noninterview adjustment cells are defined to be the same as the CPS noninterview adjustment cells.

Despite the measures taken to reduce nonresponse bias, there is likely still some amount of nonresponse bias that we cannot correct without knowing the tobacco use of the nonrespondents.

6. Methods

Data

The data for this nonresponse bias analysis are from the July 2014, January 2015, and May 2015 TUS to the CPS and their corresponding basic CPS elements. These surveys use two sets of questions, the basic CPS and a set of supplemental questions. The CPS,

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sponsored jointly by the Census Bureau and the U.S. Bureau of Labor Statistics, is the country's primary source of labor force statistics for the entire population. The National Cancer Institute (NCI) of the National Institutes of Health (NIH) and the U.S. Food and Drug Administration's Center for Tobacco Products (FDA-CTP), both of the Department of Health and Human Services (DHHS), sponsor the supplemental questions for the TUS.

For a small number of variables, we had complete household/person information for all sample households/persons, including respondents and nonrespondents. These variables were primarily limited to geographic and sampling data. There are also some variables with partial information for the nonrespondents. Normal CPS processing uses previous responses to demographic questions (when available) and does not re-ask those that are unlikely to change from interview to interview. Any variables that have never been answered are imputed using the hot deck imputation method. Hot deck imputation assigns a value collected for a person with similar characteristics to the missing value. Where possible, we did not use allocated or imputed values because we thought it would be better to use actual values for the nonrespondents when comparing respondents to nonrespondents.

Weights

Because this analysis is on the combined file of three months of data, the weights used in this analysis are one-third of the weight from the original data.

In the detailed weighting process for the CPS, baseweights were adjusted with the weighting control factor (WCF), which accounts for subsampling in the field but does not include any nonresponse/noninterview or population coverage adjustments. This subsampling-adjusted baseweight (multiplied by 1/3 to account for the three months of data) is the weight used in Table 1 for household and person calculations for CPS.

When computing rates and distributions for TUS persons, the TUS baseweights, which are the noninterview-adjusted weights from CPS, were used (after being multiplied by 1/3 to account for the three months of data). Note that TUS weights are higher than CPS weights because they include the CPS noninterview adjustment, which inflates weights back up to the eligible weighted CPS person sample.

All numbers presented in the report are weighted unless otherwise noted.

Universe for the Estimates

The TUS has two separate weights provided on the files. One is the nonresponse weight (NRWGT), which is provided for all persons, and the other is the self-response weight (SRWGT), which is only provided for those who were selected to respond to the self-response questions. Because some questions were only asked of certain people, this report will present three separate analyses, all using the same weights mentioned in the previous section but using separate definitions of response and nonresponse.

We analyzed nonresponse for persons using all eligible TUS persons, with a response and nonresponse defined to be an interview and noninterview for the TUS, respectively.

For the first analysis, referred to as "Nonresponse Weights Analysis", all TUS persons are included in the analysis, where response is defined by whether each person satisfied the requirements to be considered an interview for the NRWGT.

For the second analysis, referred to as "Self-Response Weights Analysis", all TUS persons are included in the analysis, where response is defined by whether each self-response-selected person satisfied the requirements to be considered an interview for the SRWGT. In this situation, any person not selected for self-response questions will be treated as a noninterview, as well as those persons selected for self-response who did not respond or had a proxy response. This will allow a comparison of the self-respondents to the full TUS sample.

For the third analysis, referred to as "Restricted Self-Response Weights Analysis", only TUS persons selected for self-response questions are included in the analysis, where response is defined by whether each self-response-selected person satisfied the requirements to be considered an interview for the SRWGT. In this situation, noninterviews are made up of those persons selected for self-response who did not respond or had a proxy response. Because we are restricting our analysis to those selected for self-response, our sample size and weighted sum will be smaller in this analysis.

Characteristics of Investigation

Our analyses focus on person nonresponse within person demographics, housing unit (HU) characteristics, and geography. Because we have no TUS characteristics from nonrespondents, all analyzed characteristics come from the CPS interview.

The characteristics, and their levels, that are investigated in our analyses are the following:
- Type of Living Quarters: HU, Non-HU, and Blank (not identified or invalid identification)
- Principal City Status: Principal City within Core-Based Statistical Area/Metropolitan Statistical Area (CBSA/MSA), Not Part of a Principal City within CBSA/MSA, and Outside of a CBSA/MSA
- Region: Northeast, Midwest, South, and West
- Urban/Rural Status: Urban, Rural, and Missing
- Race: White Only, Black Only, Asian Only, Other Race/Two or More Races, and Blank
- Sex: Male, Female, and Blank
- Hispanic Origin: Hispanic, Non-Hispanic, and Blank
- Age: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+, and Blank
- Measure of Labor Force: Employed, Unemployed, Not in Labor Force, and Blank

- Educational Attainment: Less than High School (HS) Diploma; HS Diploma; Some college, no degree; Associate Degree; Bachelor's Degree; Master's Degree; Doctorate or Professional Degree; and Blank
- Number of Persons Selected for Self-Response Questions (Based on Count of Civilians, Aged 18 or older, in the Household): 1 (1 Civilian Aged 18 or Older in the Household), 2 (2 – 4 Civilians Aged 18 or Older in the Household), and 3 (5 or More Civilians Aged 18 or Older in the Household)

The response rate for blanks within these demographic subgroups will be low because these demographic items are collected during the interview, resulting in a large portion of the household/person nonrespondents falling within these blank categories instead of the categories where they belong. Any person with a blank value within the demographic subgroups above indicates that the person has not previously responded to the CPS or never provided responses to those demographic questions in previous interviews. Any nonresponse in the non-blank demographic categories are from persons which had previously responded to the CPS and provided a valid response (non-blank) within the demographic category.

Disclosure Avoidance

This document has gone through Disclosure Review Board (DRB) Delegated Authority Review and was assigned DRB Approval Number CBDRB-FY19-POP001-0019. All unweighted tallies and weighted estimates, including test statistics, have been rounded as required by the Census Bureau's DRB disclosure avoidance guidelines.

7. Limitations

There are some limitations to this analysis which may affect the results. In particular:

1. Using past data to assign subgroup variables to nonrespondents is not necessarily accurate for households/persons. Due to inmovers and outmovers, it is possible for demographic variables that we get from past data to be out of date. However, we do not believe our results need to be 100 percent accurate in order to show major differences between respondents and nonrespondents. This assumes that the demographics of neighborhoods do not change much in one and a half years.

2. Nonrespondents for CPS are never given the opportunity to respond to the TUS.

8. Response Rates

The response rates tell us the percentage of eligible sample cases that responded to the CPS and the TUS. It is useful to compare response rates for different subgroups to understand the magnitude of potential biases.

For all three analyses within this report, we produced weighted and unweighted response rates for the 2014-2015 TUS by key domains and variables. The overall TUS response rate is the product of CPS household response and TUS person response rate.[5]

Response rates are defined as:

$$RR = \frac{\sum_{i \in s} w_i R_i D_i}{\sum_{i \in s} w_i D_i}$$

where:
w_i = the appropriate weight (1 if unweighted) for the response rate calculation
R_i = the response indicator (1 for respondents, 0 for nonrespondents)
D_i = the domain indicator (1 if within domain of interest, 0 otherwise)
s = the set of all eligible households/persons

Eligible households are all sample HUs that did not receive Type B or Type C (out-of-scope) outcome codes. Persons within group quarters (GQs) are treated as individual HUs. The CPS interview data contains all eligible and non-eligible HUs, and the TUS interview data contains only eligible persons within eligible HUs to the CPS.

For the July 2014, January 2015, and May 2015 CPS, there were approximately 183,000 occupied HUs eligible for the household analysis. Of those occupied households, approximately 162,000 were interviewed. Within those interviewed households, there were about 303,000 civilians aged 18 or older. Of those persons that were eligible for the TUS, about 231,000 persons were considered responses for NRWGT and 164,000 were considered responses for SRWGT.[6]

Table 1 shows that the weighted percentage of households where at least one person responded to CPS is 88.48 percent. From the eligible persons for the TUS, 75.65 percent of the weighted persons responded to TUS. This results in an overall weighted TUS response rate of 66.93 percent.[7] For those TUS persons selected to respond to the additional self-response questions, 70.24 percent responded.

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[5] Nonresponding households may have a different number of persons than interviewed ones, so combining household- and person-level rates may lead to an over/underestimate of the true overall nonresponse rate and under/overestimate of the true overall response rate for persons for the Tobacco Use supplement.

[6] Throughout this report, for NRWGT, a person is considered to have responded to the survey if they responded for themselves or if a proxy responded for them, and for SRWGT, a person is considered to have responded only if they responded for themselves.

[7] See footnote 5.

Table 1: 2014-2015 Tobacco Use Unit Response Rates

Response Category	Count	Weighted Sum[8]	Response Rates	
			Unweighted	Weighted
Sampled CPS[A] Households	221,000	133,500,000		
Eligible CPS[A] Households	183,000	111,600,000		
CPS[A] Household Response	162,000	98,720,000	88.36%	88.48%
CPS[A] Responding Persons (civilian 18+)	303,000	186,800,000		
Eligible TUS[B] Persons	303,000	210,700,000		
TUS[B] Person Response	231,000	159,400,000	76.47%	75.65%
TUS[B] Self-Respondent Response	164,000	112,000,000	70.84%	70.24%
Overall TUS[B] Response			67.57%	66.93%

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

[A] CPS: Current Population Survey

[B] TUS: Tobacco Use Supplement

Note: The overall TUS response rates shown here are the product of the CPS household response rate and the TUS person response rate, under the assumption that the household size for nonresponding households is similar to the household size for responding households. See footnote 5.

9. Respondent Distributions

Respondent and nonrespondent distributions show the relative percent of members of a domain subset within respondents and nonrespondents separately. This is different than the response rates, which are the relative percent of respondents within the different domain subsets. For all three analyses within this report, we used chi-square tests to determine if the respondent and nonrespondent distributions differed.

Respondent distributions are defined as:

$$RD = \frac{\sum_{i \in s} w_i R_i D_i}{\sum_{i \in s} w_i R_i}$$

This definition assumes the same eligibility criteria, weights, and indicators as the response rate calculations in the previous section. Nonrespondent distributions use the same formula, but with the R_i variable indicating nonrespondents instead of respondents. The chi-square test statistics were calculated using replicate weights to account for the sample design.

10. Nonresponse Weights Analysis

For this analysis, all TUS persons are included in the analysis, where response is defined by whether each person satisfied the requirements to be considered an interview for the NRWGT.

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[8] For CPS households, CPS household weights prior to noninterview adjustments (multiplied by 1/3 to account for the three months of data) were used. For TUS persons, the TUS baseweights, which are the noninterview-adjusted weights from CPS, were used (after being multiplied by 1/3 to account for the three months of data). Note that TUS weights are higher than CPS weights because they include the CPS noninterview adjustment, which inflates weights back up to the eligible weighted CPS person sample.

Response Rates[9]

Table 2 shows weighted response rates for all responding TUS persons by domain. Standard errors are conditional on the sample and represent expected variability in the response process, rather than traditional sampling error. Replicate weights were used to calculate the standard errors to account for the sample design.

Table 2: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Nonresponse Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping*
Type of Living Quarters					
Housing Unit	288,000	201,100,000	75.55	0.1659	B
Non-Housing Unit[10]	15,000	9,549,000	77.72	0.6293	A
Blank[11]	60	40,200	82.70	7.8800	A, B
Principal City Status					
Principal City within CBSA/MSA[c]	91,000	65,350,000	74.14	0.2930	C
Not Part of a Principal City within CBSA/MSA[c]	146,000	111,500,000	75.61	0.2052	B
Outside of a CBSA/MSA[c]	66,000	33,850,000	78.68	0.5383	A
Region					
Northeast	55,000	38,400,000	73.33	0.3979	B
Midwest	64,000	46,430,000	77.31	0.3439	A
South	105,000	76,690,000	76.73	0.2624	A
West	78,500	49,180,000	74.20	0.3282	B
Urban/Rural Status					
Urban	218,000	159,000,000	75.33	0.1875	B
Rural	66,500	39,080,000	77.43	0.3781	A
Missing	18,500	12,630,000	74.06	0.6392	B
Race					
White Only	235,000	161,300,000	76.81	0.1735	A
Black Only	30,000	22,730,000	74.09	0.4118	B
Asian Only	15,000	10,990,000	72.00	0.7587	C
Other Race/Two or More Races	8,700	4,765,000	75.27	0.8125	A, B
Blank	13,500	10,860,000	65.47	0.7178	D
Sex					
Male	144,000	99,850,000	74.92	0.1839	B
Female	159,000	110,700,000	76.40	0.1716	A
Blank	200	150,000	3.777	1.531	C
Hispanic Origin					
Hispanic	37,000	30,560,000	74.94	0.4359	B
Non-Hispanic	264,000	178,900,000	76.22	0.1694	A
Blank	1,900	1,259,000	10.80	1.176	C
Table continues on the next page					

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[9] See Section 8 for definitions and formulas for response rates.

[10] Non-HUs include quarters within rooming or boarding homes; non-permanent units in transient hotels, motels, etc.; unoccupied sites for mobile homes, trailers, or tents; group quarters in school dormitories; and other units that are not defined to be housing units.

[11] Blank indicates that the living quarters type was either not identified or was identified with an invalid code.

Table 2, continued: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Nonresponse Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping×
Age					
18-24	31,500	22,210,000	74.66	0.3290	D
25-34	48,500	33,510,000	78.79	0.2769	C
35-44	47,500	33,510,000	78.76	0.2725	C
45-54	52,500	36,640,000	78.08	0.2655	C
55-64	51,000	34,910,000	80.08	0.2859	B
65-74	34,500	23,840,000	82.33	0.2926	A
75+	24,500	16,930,000	81.52	0.3713	A
Blank	12,500	9,136,000	0.01357	0.01178	E
Measure of Labor Force					
Employed	182,000	125,900,000	76.30	0.1864	B
Unemployed	10,500	7,441,000	79.27	0.4969	A
Not in Labor Force	107,000	75,610,000	75.90	0.2068	B
Blank	2,400	1,745,000	1.747	0.4707	C
Educational Attainment					
Less than High School Diploma	33,000	23,700,000	75.59	0.3369	D
High School Diploma	87,000	60,020,000	75.71	0.2407	D
Some College, No Degree	55,000	38,100,000	78.24	0.2418	C
Associate Degree	28,500	19,240,000	79.65	0.3154	B
Bachelor's Degree	56,000	39,390,000	79.51	0.2338	B
Master's Degree	23,000	16,090,000	82.33	0.3450	A
Doctorate or Professional Degree	8,700	6,022,000	80.34	0.6687	A, B
Blank	11,000	8,127,000	18.21	0.5844	E
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	48,500	33,200,000	81.73	0.2386	A
2 (2-4 Civilians Aged 18 or Older)	234,000	163,000,000	75.20	0.1666	B
3 (5 or More Civilians Aged 18 or Older)	19,500	14,530,000	66.72	0.8368	C
Overall	303,000	210,700,000	75.65	0.1641	

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

C CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area

* May not sum to totals due to rounding. For weighted percent of total sample, see Table 3.

× Within each characteristic, response rates identified with the same letter are not significantly different at the $\alpha=0.10$ level[12]. A indicates the highest response rates, B indicates the next highest rates, etc.

For the responding TUS persons estimates, we have significant differences among all investigated characteristics.

Excluding the blanks and missing values, the largest difference in response rates for the responding TUS subgroups is seen in number of household members selected for self-response questions. This largest difference, excluding blanks, is 15.01 percent, where persons within households with one civilian aged 18 or older have a response rate of 81.73 percent versus 66.72 percent for persons within households with five or more civilians aged 18 or older. Age and educational attainment have the next largest differences in response rates[13], with differences of 7.66 percent between persons aged

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[12] P-values were adjusted for multiple comparisons within each demographic characteristic using the Tukey-Kramer method (NIST/SEMATECH, 2013).

[13] The response rate difference seen in age is not significantly different from the difference seen in educational attainment.

65-74 and persons aged 18-24 and 6.73 percent between persons with a master's degree and persons with less than a HS diploma.

Additionally, persons living in non-HUs have a higher response rate than persons living in HUs, persons outside a CBSA/MSA have the highest response rates among the principal city status categories, persons in the south and midwest have higher response rates than those in the northeast and west[14], persons in rural areas have higher response rates than those in urban areas, White only has a higher response rate than Black only and Asian only[15], females have a higher response rate than males, non-Hispanics have a higher response rate than Hispanics, and unemployed persons have a higher response rate than those employed and not in labor force[16].

For all response rate comparisons, the significance results within the significance groupings do not change even after blanks/missings are excluded from the analysis.

Table 2 shows standard errors which facilitate hypothesis testing of differential response rates. However, the practical significance of response rate differences is usually driven more by the magnitude of the difference. Therefore, excluding blanks, if the nonrespondents are different from respondents, the number of household members selected for self-response questions, age, and educational attainment have the most potential for bias.

Respondent Distributions[17]

Table 3 shows the percent of total sample distribution as well as comparisons of respondent and nonrespondent distributions for responding TUS persons within the different domain subgroups.

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[14] The response rates between south and midwest are not statistically different, and the response rates between northeast and west are also not statistically different.

[15] The response rate for White only is not statistically different from Other races/Two or more races.

[16] The response rate for Employed is not significantly different than the response rate for Not in Labor Force.

[17] See Section 9 for definitions and formulas for respondent and nonrespondent distributions.

Table 3: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Nonresponse Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Type of Living Quarters					
Housing Unit	95.45	95.32	95.84	12.92 (2)	0.0016
Non-Housing Unit	4.532	4.657	4.146	[11.1 (1)	0.0009]
Blank	0.01908	0.02086	0.01355		
Principal City Status					
Principal City within CBSA/MSA[C]	31.02	30.40	32.93		
Not Part of a Principal City within CBSA/MSA[C]	52.92	52.89	53.00	60.32 (2)	< 0.0001
Outside of a CBSA/MSA[C]	16.07	16.71	14.07		
Region					
Northeast	18.23	17.67	19.96		
Midwest	22.03	22.52	20.53	97.00 (3)	< 0.0001
South	36.40	36.92	34.78		
West	23.34	22.89	24.73		
Urban/Rural Status					
Urban	75.46	75.14	76.43	32.21 (2)	< 0.0001
Rural	18.55	18.99	17.19	[24.63 (1)	< 0.0001]
Missing	5.993	5.868	6.384		
Race					
White Only	76.58	77.76	72.92		
Black Only	10.79	10.57	11.48		
Asian Only	5.216	4.964	5.997	374.8 (4)	< 0.0001
Other Race/ Two or More Races	2.262	2.251	2.297	[90.72 (3)	< 0.0001]
Blank	5.156	4.463	7.311		
Sex					
Male	47.39	46.94	48.81	650.8 (2)	< 0.0001
Female	52.54	53.06	50.91	[119.0 (1)	< 0.0001]
Blank	0.07117	0.003554	0.2812		
Hispanic Origin					
Hispanic	14.50	14.37	14.92	1,253 (2)	< 0.0001
Non-Hispanic	84.90	85.55	82.89	[7.948 (1)	0.0048]
Blank	0.5975	0.08532	2.188		
Age					
18-24	10.54	10.40	10.97		
25-34	15.91	16.57	13.85		
35-44	15.91	16.56	13.87		
45-54	17.39	17.95	15.65	25,080 (7)	< 0.0001
55-64	16.57	17.54	13.55	[417.1 (6)	< 0.0001]
65-74	11.31	12.31	8.209		
75+	8.035	8.659	6.095		
Blank	4.336	0.000778	17.80		
Measure of Labor Force					
Employed	59.75	60.27	58.14		
Unemployed	3.532	3.701	3.005	3,513 (3)	< 0.0001
Not in Labor Force	35.89	36.01	35.51	[38.54 (2)	< 0.0001]
Blank	0.8282	0.01912	3.341		
Table continues on the next page					

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Table 3, continued: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Nonresponse Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Educational Attainment					
Less than High School Diploma	11.25	11.24	11.27		
High School Diploma	28.49	28.51	28.41		
Some College, No Degree	18.09	18.71	16.16		
Associate Degree	9.134	9.617	7.633	12,220 (7)	< 0.0001
Bachelor's Degree	18.70	19.65	15.73	[452.4 (6)	< 0.0001]
Master's Degree	7.635	8.309	5.541		
Doctorate or Professional Degree	2.858	3.036	2.307		
Blank	3.857	0.9286	12.95		
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	15.76	17.03	11.82		
2 (2-4 Civilians Aged 18 or Older)	77.34	76.89	78.75	475.2 (2)	< 0.0001
3 (5 or More Civilians Aged 18 or Older)	6.897	6.083	9.426		
Overall	100	100	100		

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

C   CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area

D   df: degrees of freedom

*   May not sum to totals due to rounding.

[ ]   The values within brackets are the chi-square statistic, df, and p-value when the blanks/missings are excluded from the chi-square test.

The chi-square tests for responding TUS persons showed significant differences (at the α=0.10 level) between respondent and nonrespondent distributions for all investigated characteristics. Simply looking at the distributions for age, educational attainment, measure of labor force, and Hispanic origin, you can tell that there are big differences between the respondent and nonrespondent distributions, which corresponds to the magnitude of the chi-square test statistics (25,080, 12,220, 3,513, and 1,253, respectively). When you exclude the blanks/missings from the chi-square tests, none of the conclusion for these subgroups change at the α=0.10 level.

Note: The chi-square tests only indicate that the distributions of respondents and nonrespondents differ but do not necessarily indicate a nonresponse bias problem. These differences will only cause bias if the respondents and nonrespondents report differing rates of tobacco use.

Even though there are significant differences between the respondents and nonrespondents, the differences might not be large enough to cause meaningful differences in estimates. Furthermore, weighting adjustments might also minimize the impact of some differences. Because the CPS and TUS noninterview adjustments take

NICL and central city status into account, the region, principal city status, and urban/rural status differences may be reduced within those adjustments.

11. Self-Response Weights Analysis

For this analysis, all TUS persons are included in the analysis, where response is defined by whether each self-response-selected person satisfied the requirements to be considered an interview for the SRWGT. In this situation, any person not selected for self-response questions will be treated as a noninterview, as well as those persons selected for self-response who did not respond or had a proxy response. This will allow a comparison of the self-respondents to the full TUS sample. Because we are using the full TUS sample, the response rates seen in this analysis will be smaller than the response rates seen in Section 12 (Restricted Self-Response Weights Analysis).

Response Rates[18]

Table 4 shows weighted response rates for all responding self-respondent TUS persons by domain. Note that the weighted response rate for all responding self-respondent TUS persons in Table 4, 53.14 percent, is not the response rate from the TUS self-respondent persons listed in Table 1 because persons not selected for self-response are included as noninterviews in this situation. The standard error column shows the standard error of the response rate. Standard errors are conditional on the sample and represent expected variability in the response process, rather than traditional sampling error. Replicate weights were used to calculate the standard errors to account for the sample design.

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[18] See Section 8 for definitions and formulas for response rates.

Table 4: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Self-Response Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping[x]
Type of Living Quarters					
Housing Unit	288,000	201,100,000	52.91	0.1490	B
Non-Housing Unit[19]	15,000	9,549,000	57.94	0.5875	A
Blank[20]	60	40,200	53.15	6.154	A, B
Principal City Status					
Principal City within CBSA/MSA[C]	91,000	65,350,000	52.44	0.2785	B
Not Part of a Principal City within CBSA/MSA[C]	146,000	111,500,000	51.96	0.1797	B
Outside of a CBSA/MSA[C]	66,000	33,850,000	58.34	0.4680	A
Region					
Northeast	55,000	38,400,000	50.26	0.3316	C
Midwest	64,000	46,430,000	56.15	0.3340	A
South	105,000	76,690,000	54.41	0.2420	B
West	78,500	49,180,000	50.54	0.2996	C
Urban/Rural Status					
Urban	218,000	159,000,000	52.70	0.1649	B
Rural	66,500	39,080,000	55.70	0.3683	A
Missing	18,500	12,630,000	50.67	0.5843	C
Race					
White Only	235,000	161,300,000	54.85	0.1687	A
Black Only	30,000	22,730,000	53.46	0.3924	B
Asian Only	15,000	10,990,000	42.16	0.5552	D
Other Race/Two or More Races	8,700	4,765,000	50.61	0.7516	C
Blank	13,500	10,860,000	39.27	0.5619	E
Sex					
Male	144,000	99,850,000	50.07	0.1893	B
Female	159,000	110,700,000	55.97	0.1721	A
Blank	200	150,000	1.842	1.021	C
Hispanic Origin					
Hispanic	37,000	30,560,000	46.58	0.3471	B
Non-Hispanic	264,000	178,900,000	54.58	0.1546	A
Blank	1,900	1,259,000	6.726	0.7215	C
Age					
18-24	31,500	22,210,000	33.41	0.3394	E
25-34	48,500	33,510,000	53.91	0.2751	D
35-44	47,500	33,510,000	55.95	0.2655	C
45-54	52,500	36,640,000	55.44	0.2566	C
55-64	51,000	34,910,000	59.72	0.2995	B
65-74	34,500	23,840,000	65.21	0.3209	A
75+	24,500	16,930,000	65.00	0.4102	A
Blank	12,500	9,136,000	0.01357	0.01178	F
Measure of Labor Force					
Employed	182,000	125,900,000	52.30	0.1657	C
Unemployed	10,500	7,441,000	54.01	0.5628	B
Not in Labor Force	107,000	75,610,000	55.64	0.2234	A
Blank	2,400	1,745,000	1.727	0.4696	D
Table continues on the next page					

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[19] Non-HUs include quarters within rooming or boarding homes; non-permanent units in transient hotels, motels, etc.; unoccupied sites for mobile homes, trailers, or tents; group quarters in school dormitories; and other units that are not defined to be housing units.

[20] Blank indicates that the living quarters type was either not identified or was identified with an invalid code.

Table 4, continued: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Self-Response Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping[x]
Educational Attainment					
Less than High School Diploma	33,000	23,700,000	49.46	0.3249	E
High School Diploma	87,000	60,020,000	51.73	0.2407	D
Some College, No Degree	55,000	38,100,000	54.08	0.2798	C
Associate Degree	28,500	19,240,000	58.70	0.3694	B
Bachelor's Degree	56,000	39,390,000	58.13	0.2481	B
Master's Degree	23,000	16,090,000	62.74	0.4124	A
Doctorate or Professional Degree	8,700	6,022,000	59.76	0.6770	B
Blank	11,000	8,127,000	8.507	0.3264	F
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	48,500	33,200,000	81.03	0.2441	A
2 (2-4 Civilians Aged 18 or Older)	234,000	163,000,000	49.70	0.1570	B
3 (5 or More Civilians Aged 18 or Older)	19,500	14,530,000	27.98	0.5266	C
Overall	303,000	210,700,000	53.14	0.1458	

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

[C] CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area

* May not sum to totals due to rounding. For weighted percent of total sample, see Table 5.

[x] Within each characteristic, response rates identified with the same letter are not significantly different at the α=0.10 level[21]. A indicates the highest response rates, B indicates the next highest rates, etc.

For the responding self-respondent TUS persons estimates, we have significant differences among all investigated characteristics.

Excluding the blanks and missing values, the largest difference in response rates for the responding self-respondent TUS subgroups is seen in number of household members selected for self-response questions. This largest difference, excluding blanks, is 53.05 percent, where persons within households with one civilian aged 18 or older have a response rate of 81.03 percent versus 27.98 percent for persons within households with five or more civilians aged 18 or older. Age has the next largest difference in response rates, with a difference of 31.80 percent between persons aged 65-74[22] (65.21 percent) and persons aged 18-24 (33.41 percent).

Additionally, persons living in non-HUs have a higher response rate than persons living in HUs, persons outside a CBSA/MSA have the highest response rates among the principal city status categories, persons in the midwest have the highest response rates among the regions, persons in rural areas have higher response rates than those in urban areas, White only has the highest response rate among the races (and excluding blanks, Asian only has the lowest response rate among the races), females have a higher response rate than males, non-Hispanics have a higher response rate than Hispanics, persons not in labor force have the highest response rate within the measure of labor force domain, and persons with a master's degree have the highest response rate within

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[21] P-values were adjusted for multiple comparisons within each demographic characteristic using the Tukey-Kramer method (NIST/SEMATECH, 2013).

[22] The response rate for persons aged 65-74 is not significantly different from the response rate for persons aged 75 or older.

the educational attainment domain (and excluding blanks, persons with less than a high school diploma have the lowest response rate among the educational attainment domain).

For all response rate comparisons, the significance results within the significance groupings do not change even after blanks/missings are excluded from the analysis.

Table 4 shows standard errors which facilitate hypothesis testing of differential response rates. However, the practical significance of response rate differences is usually driven more by the magnitude of the difference. Therefore, excluding blanks, if the nonrespondents are different from respondents, the number of household members selected for self-response questions and age have the most potential for bias.

Respondent Distributions[23]

Table 5 shows the percent of total sample distribution as well as comparisons of respondent and nonrespondent distributions for responding self-respondent TUS persons within the different domain subgroups.

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[23] See Section 9 for definitions and formulas for respondent and nonrespondent distributions

Table 5: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Self-response Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Type of Living Quarters					
Housing Unit	95.45	95.04	95.91	95.44 (2)	< 0.0001
Non-Housing Unit	4.532	4.942	4.068	[68.79 (1)	< 0.0001]
Blank	0.01908	0.01909	0.01907		
Principal City Status					
Principal City within CBSA/MSA[C]	31.02	30.61	31.48		
Not Part of a Principal City within CBSA/MSA[C]	52.92	51.75	54.24	186.1 (2)	< 0.0001
Outside of a CBSA/MSA[C]	16.07	17.64	14.28		
Region					
Northeast	18.23	17.24	19.35		
Midwest	22.03	23.29	20.62	259.5 (3)	< 0.0001
South	36.40	37.27	35.40		
West	23.34	22.20	24.63		
Urban/Rural Status					
Urban	75.46	74.84	76.16	77.05 (2)	< 0.0001
Rural	18.55	19.45	17.53	[58.02 (1)	< 0.0001]
Missing	5.993	5.715	6.309		
Race					
White Only	76.58	79.04	73.78		
Black Only	10.79	10.86	10.71		
Asian Only	5.216	4.138	6.437	1,171 (4)	< 0.0001
Other Race/ Two or More Races	2.262	2.154	2.384	[530.2 (3)	< 0.0001]
Blank	5.156	3.811	6.682		
Sex					
Male	47.39	44.66	50.50	988.2 (2)	< 0.0001
Female	52.54	55.34	49.35	[776.8 (1)	< 0.0001]
Blank	0.07117	0.002468	0.1491		
Hispanic Origin					
Hispanic	14.50	12.71	16.53	1,441 (2)	< 0.0001
Non-Hispanic	84.90	87.21	82.28	[460.8 (1)	< 0.0001]
Blank	0.5975	0.07564	1.189		
Age					
18-24	10.54	6.628	14.98		
25-34	15.91	16.14	15.64		
35-44	15.91	16.75	14.95		
45-54	17.39	18.15	16.53	17,270 (7)	< 0.0001
55-64	16.57	18.62	14.24	[6,323 (6)	< 0.0001]
65-74	11.31	13.89	8.399		
75+	8.035	9.829	6.000		
Blank	4.336	0.001107	9.252		
Table continues on the next page					

Table 5, continued: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Self-response Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Measure of Labor Force					
Employed	59.75	58.81	60.83		
Unemployed	3.532	3.590	3.466	1,438 (3)	< 0.0001
Not in Labor Force	35.89	37.58	33.97	[210.4 (2)	< 0.0001]
Blank	0.8282	0.02691	1.737		
Educational Attainment					
Less than High School Diploma	11.25	10.47	12.13		
High School Diploma	28.49	27.73	29.34		
Some College, No Degree	18.09	18.41	17.72		
Associate Degree	9.134	10.09	8.049	7,696 (7)	< 0.0001
Bachelor's Degree	18.70	20.45	16.70	[1,224 (6)	< 0.0001]
Master's Degree	7.635	9.015	6.070		
Doctorate or Professional Degree	2.858	3.215	2.454		
Blank	3.857	0.6175	7.530		
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	15.76	24.03	6.379		
2 (2-4 Civilians Aged 18 or Older)	77.34	72.34	83.02	9,596 (2)	< 0.0001
3 (5 or More Civilians Aged 18 or Older)	6.897	3.632	10.60		
Overall	100	100	100		

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.
[C]   CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area
[D]   df: degrees of freedom
*   May not sum to totals due to rounding.
[ ]   The values within brackets are the chi-square statistic, df, and p-value when the blanks/missings are excluded from the chi-square test.

The chi-square tests for responding self-respondent TUS persons showed significant differences (at the α=0.10 level) between respondent and nonrespondent distributions for all investigated characteristics. Simply looking at the distributions for age, number of household members selected for self-response questions, educational attainment, Hispanic origin, measure of labor force, and race, you can tell that there are big differences between the respondent and nonrespondent distributions, which corresponds to the magnitude of the chi-square test statistics (17,270, 9,596, 7,696, 1,441, 1,438, and 1,171 respectively). When you exclude the blanks/missings from the chi-square tests, none of the conclusion for these subgroups change at the α=0.10 level.

Note: The chi-square tests only indicate that the distributions of respondents and nonrespondents differ but do not necessarily indicate a nonresponse bias problem. These differences will only cause bias if the respondents and nonrespondents report differing rates of tobacco use.

Even though there are significant differences between the respondents and nonrespondents, the differences might not be large enough to cause meaningful differences in estimates. Furthermore, weighting adjustments might also minimize the impact of some differences. Because the CPS and TUS noninterview adjustments take NICL and central city status into account, the region, principal city status, and urban/rural status differences may be reduced within those adjustments.

12. Restricted Self-Response Weights Analysis

For this analysis, only TUS persons selected for self-response questions are included in the analysis, where response is defined by whether each self-response-selected person satisfied the requirements to be considered an interview for the SRWGT. In this situation, noninterviews are made up of those persons selected for self-response who did not respond or had a proxy response. Because we are restricting our analysis to those selected for self-response, our sample size and weighted sum will be smaller in this analysis than what was seen in the previous two analyses and the response rates will be larger than the response rates seen in Section 11 (Self-Response Weights Analysis).

Response Rates[24]

Table 6 shows weighted response rates for all responding self-respondent TUS persons (restricted to only persons selected for self-response questions) by domain. The standard error column shows the standard error of the response rate. Standard errors are conditional on the sample and represent expected variability in the response process, rather than traditional sampling error. Replicate weights were used to calculate the standard errors to account for the sample design.

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[24] See Section 8 for definitions and formulas for response rates.

Table 6: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Restricted Self-Response Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping×
Type of Living Quarters					
Housing Unit	220,000	151,900,000	70.03	0.1490	B
Non-Housing Unit[25]	11,500	7,422,000	74.55	0.5481	A
Blank[26]	50	33,240	64.27	6.827	A, B
Principal City Status					
Principal City within CBSA/MSA[c]	68,500	48,450,000	70.73	0.2771	B
Not Part of a Principal City within CBSA/MSA[c]	111,000	84,300,000	68.73	0.1915	C
Outside of a CBSA/MSA[c]	52,000	26,630,000	74.15	0.3412	A
Region					
Northeast	41,000	28,160,000	68.54	0.3237	C
Midwest	49,000	35,890,000	72.63	0.2766	A
South	81,500	58,840,000	70.92	0.2373	B
West	59,500	36,490,000	68.12	0.3400	C
Urban/Rural Status					
Urban	166,000	119,800,000	69.96	0.1660	B
Rural	52,000	30,260,000	71.94	0.3002	A
Missing	13,500	9,352,000	68.42	0.5609	C
Race					
White Only	182,000	123,900,000	71.41	0.1568	A
Black Only	22,500	16,840,000	72.16	0.4017	A
Asian Only	11,000	7,912,000	58.56	0.5494	C
Other Race/Two or More Races	6,700	3,587,000	67.23	0.7049	B
Blank	8,800	7,112,000	59.98	0.5759	C
Sex					
Male	109,000	74,810,000	66.83	0.1992	B
Female	122,000	84,560,000	73.27	0.1750	A
Blank	N < 15	5,664	48.78	20.79	A, B+
Hispanic Origin					
Hispanic	28,000	22,900,000	62.16	0.3625	B
Non-Hispanic	203,000	136,300,000	71.61	0.1542	A
Blank	250	136,000	62.28	3.673	B
Age					
18-24	24,000	16,580,000	44.75	0.4408	F
25-34	38,500	26,400,000	68.42	0.2751	E
35-44	38,000	26,390,000	71.04	0.2422	D
45-54	41,000	28,610,000	71.01	0.2719	D
55-64	41,500	27,960,000	74.58	0.2463	C
65-74	29,000	19,630,000	79.21	0.2672	B
75+	20,000	13,800,000	79.73	0.3363	B
Blank	N < 15	1,240	100.0	0.0000	A+
Measure of Labor Force					
Employed	141,000	96,060,000	68.54	0.1676	C
Unemployed	8,300	5,899,000	68.13	0.5438	C
Not in Labor Force	82,500	57,390,000	73.30	0.2125	B
Blank	40	30,480	98.85	0.9116	A
Table continues on the next page					

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[25] Non-HUs include quarters within rooming or boarding homes; non-permanent units in transient hotels, motels, etc.; unoccupied sites for mobile homes, trailers, or tents; group quarters in school dormitories; and other units that are not defined to be housing units.

[26] Blank indicates that the living quarters type was either not identified or was identified with an invalid code.

Table 6, continued: Combined Tobacco Use Response Rates for July 2014, January 2015, and May 2015: Restricted Self-Response Weights Analysis

Characteristic	Unweighted Persons*	Weighted Persons*	Weighted Response Rate (%)	Standard Error (%)	Significance Grouping×
Educational Attainment					
Less than High School Diploma	25,000	17,920,000	65.43	0.3706	D
High School Diploma	67,000	45,440,000	68.33	0.2293	C
Some College, No Degree	43,500	29,810,000	69.12	0.2627	C
Associate Degree	23,000	15,330,000	73.70	0.3703	B
Bachelor's Degree	45,000	31,320,000	73.11	0.2818	B
Master's Degree	19,000	13,240,000	76.21	0.3851	A
Doctorate or Professional Degree	7,100	4,838,000	74.39	0.6004	A, B
Blank	2,000	1,480,000	46.71	1.219	E
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	40,000	27,140,000	99.15	0.05512	A
2 (2-4 Civilians Aged 18 or Older)	178,000	122,500,000	66.08	0.1614	B
3 (5 or More Civilians Aged 18 or Older)	13,000	9,695,000	41.94	0.6047	C
Overall	231,000	159,400,000	70.24	0.1466	

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

C CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area

* May not sum to totals due to rounding. For weighted percent of total sample, see Table 7.

× Within each characteristic, response rates identified with the same letter are not significantly different at the α=0.10 level[27]. A indicates the highest response rates, B indicates the next highest rates, etc.

+ Exercise caution: The sample size is extremely small, leading to unreliable estimates.

For the responding self-respondent TUS persons estimates (restricted to only persons selected for self-response questions), we have significant differences among all investigated characteristics.

Excluding the blanks and missing values, the largest difference in response rates for the responding self-respondent TUS persons (restricted to only persons selected for self-response questions) subgroups is seen in number of household members selected for self-response questions. This largest difference, excluding blanks, is 57.21 percent, where self-respondents within households with one civilian aged 18 or older have a response rate of 99.15 percent versus 41.94 percent for self-respondents within households with five or more civilians aged 18 or older. Age has the next largest difference in response rates, with a difference of 34.98 percent between self-respondents aged 75 or older[28] (79.73 percent) and persons aged 18-24 (44.75 percent).

Additionally, self-respondents living in non-HUs have a higher response rate than self-respondents living in HUs, self-respondents outside a CBSA/MSA have the highest response rates among the principal city status categories, self-respondents in the midwest have the highest response rates among the regions, self-respondents in rural

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[27] P-values were adjusted for multiple comparisons within each demographic characteristic using the Tukey-Kramer method (NIST/SEMATECH, 2013).

[28] The response rate for self-respondents aged 65-74 is not significantly different from the response rate for self-respondents aged 75 or older.

areas have higher response rates than those in urban areas, self-respondents who are White only or Black only[29] have higher response rates than the other race categories (and excluding blanks, Asian only has the lowest response rate among the races), females have a higher response rate than males, non-Hispanics have a higher response rate than Hispanics, self-respondents not in labor force have the highest response rate within the measure of labor force domain (excluding blanks), and self-respondents with a master's degree have the highest response rate[30] within the educational attainment domain (and excluding blanks, self-respondents with less than a high school diploma have the lowest response rage among the educational attainment domain).

The significance grouping conclusions change within educational attainment when blank is removed from the analysis, resulting in a conclusion that the response rate for self-respondents with a master's degree is higher than that for self-respondents with a doctorate or professional degree. For all other response rate comparisons, the significance results within the significance groupings do not change even after blanks/missings are excluded from the analysis.

Table 6 shows standard errors which facilitate hypothesis testing of differential response rates. However, the practical significance of response rate differences is usually driven more by the magnitude of the difference. Therefore, excluding blanks, if the nonrespondents are different from respondents, the number of household members selected for self-response questions and age have the most potential for bias for the restricted self-respondent group.

Respondent Distributions[31]

Table 7 shows the percent of total sample distribution as well as comparisons of respondent and nonrespondent distributions for responding self-respondent TUS persons (restricted to only persons selected for self-response questions) within the different domain subgroups.

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[29] The response rates for self-respondents who are White only is not statistically different from the response rates for self-respondents who are Black only.

[30] The response rates for self-respondents with a master's degree is not statistically different from the response rates for self-respondents with a doctorate or professional degree.

[31] See Section 9 for definitions and formulas for respondent and nonrespondent distributions

Table 7: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Restricted Self-response Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Type of Living Quarters					
Housing Unit	95.32	95.04	95.99	76.73 (2)	< 0.0001
Non-Housing Unit	4.657	4.942	3.983	[59.99 (1)]	< 0.0001]
Blank	0.02086	0.01909	0.02505		
Principal City Status					
Principal City within CBSA/MSA[C]	30.40	30.61	29.90		
Not Part of a Principal City within CBSA/MSA[C]	52.89	51.75	55.58	181.9 (2)	< 0.0001
Outside of a CBSA/MSA[C]	16.71	17.64	14.52		
Region					
Northeast	17.67	17.24	18.68		
Midwest	22.52	23.29	20.71	147.3 (3)	< 0.0001
South	36.92	37.27	36.08		
West	22.89	22.20	24.53		
Urban/Rural Status					
Urban	75.14	74.84	75.86	46.29 (2)	< 0.0001
Rural	18.99	19.45	17.91	[36.1 (1)]	< 0.0001]
Missing	5.868	5.715	6.228		
Race					
White Only	77.76	79.04	74.72		
Black Only	10.57	10.86	9.887		
Asian Only	4.964	4.138	6.914	1,004 (4)	< 0.0001
Other Race/ Two or More Races	2.251	2.154	2.478	[625.7 (3)]	< 0.0001]
Blank	4.463	3.811	6.002		
Sex					
Male	46.94	44.66	52.33	823.7 (2)	< 0.0001
Female	53.06	55.34	47.67	[771.0 (1)]	< 0.0001]
Blank	0.003554	0.002468	0.006118		
Hispanic Origin					
Hispanic	14.37	12.71	18.27	839.2 (2)	< 0.0001
Non-Hispanic	85.55	87.21	81.62	[671.9 (1)]	< 0.0001]
Blank	0.08532	0.07564	0.1082		
Age					
18-24	10.4	6.628	19.32		
25-34	16.57	16.14	17.58		
35-44	16.56	16.75	16.12		
45-54	17.95	18.15	17.49	N/A (7)	N/A
55-64	17.54	18.62	14.99	[8,048 (6)]	< 0.0001]
65-74	12.31	13.89	8.604		
75+	8.659	9.829	5.897		
Blank	0.000778	0.001107	0.000		
Table continues on the next page					

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Table 7, continued: Combined Tobacco Use Respondent and Nonrespondent Distributions for July 2014, January 2015, and May 2015: Restricted Self-response Weights Analysis

Characteristic	% of Total Sample*	Household Respondent %*	Household Nonrespondent %*	Chi-Square Statistic (df[D])	P-value
Measure of Labor Force					
Employed	60.27	58.81	63.73		
Unemployed	3.701	3.590	3.964	636.9 (3)	< 0.0001
Not in Labor Force	36.01	37.58	32.31	[464.1 (2)]	< 0.0001]
Blank	0.01912	0.02691	0.000737		
Educational Attainment					
Less than High School Diploma	11.24	10.47	13.06		
High School Diploma	28.51	27.73	30.35		
Some College, No Degree	18.71	18.41	19.41		
Associate Degree	9.617	10.09	8.499	1,209 (7)	< 0.0001
Bachelor's Degree	19.65	20.45	17.76	[785.9 (6)]	< 0.0001]
Master's Degree	8.309	9.015	6.643		
Doctorate or Professional Degree	3.036	3.215	2.613		
Blank	0.9286	0.6175	1.663		
Number of Household Members Selected for Self-Response Questions (a Function of the Number of Civilians Aged 18 and Older in the Household)					
1 (1 Civilian Aged 18 or Older)	17.03	24.03	0.4876		
2 (2-4 Civilians Aged 18 or Older)	76.89	72.34	87.64	14,040 (2)	< 0.0001
3 (5 or More Civilians Aged 18 or Older)	6.083	3.632	11.87		
Overall	100	100	100		

Source: U.S. Census Bureau, Internal Current Population Survey data files for July 2014, January 2015, and May 2015.

Note: The chi-square test for age could not be calculated due to a frequency of 0 within the blank/nonrespondent cell.

[C] CBSA/MSA: Core-Based Statistical Area/Metropolitan Statistical Area

[D] df: degrees of freedom

* May not sum to totals due to rounding.

[ ] The values within brackets are the chi-square statistic, df, and p-value when the blanks/missings are excluded from the chi-square test.

The chi-square tests for responding self-respondent TUS persons (restricted to only persons selected for self-response questions) showed significant differences (at the α=0.10 level) between respondent and nonrespondent distributions for all investigated characteristics. Simply looking at the distributions for number of household members selected for self-response questions, age, educational attainment, and race, you can tell that there are big differences between the respondent and nonrespondent distributions, which corresponds to the magnitude of the chi-square test statistics (14,040, 8,048[32], 1,209, and 1,004 respectively). When you exclude the blanks/missings

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[32] The chi-square statistic could not be calculated for the full distribution for age due to a zero frequency in the blank/nonrespondent cell. The chi-square statistic reported here is the chi-square test statistic calculated after excluding blanks from the analysis.

from the chi-square tests, none of the conclusion for these subgroups change at the α=0.10 level. Note: The chi-square tests only indicate that the distributions of respondents and nonrespondents differ but do not necessarily indicate a nonresponse bias problem. These differences will only cause bias if the respondents and nonrespondents report differing rates of tobacco use.

Even though there are significant differences between the respondents and nonrespondents, the differences might not be large enough to cause meaningful differences in estimates. Furthermore, weighting adjustments might also minimize the impact of some differences. Because the CPS and TUS noninterview adjustments take NICL and central city status into account, the region, principal city status, and urban/rural status differences may be reduced within those adjustments.

13. Discussions and Conclusions

This investigation found evidence of potential nonresponse bias within all three analyses for TUS persons and self-respondents for all investigated characteristics: type of living quarters, principal city status, region, urban/rural status, race, sex, Hispanic origin, age, measure of labor force, educational attainment, and number of persons selected for self-response questions (based on count of civilians, aged 18 or older, in the household).

Within all three analyses, excluding the blanks and missing values, the largest difference in response rates is seen in number of persons selected for self-response questions, where the highest response rates were consistently for those persons within households with only one civilian aged 18 or older and the lowest response rates were for those persons within households with five or more civilians aged 18 or older. Age had the second largest response rate differences in all three analyses.[33]

Within all three analyses, the chi-square tests showed significant differences (at the α=0.10 level) between respondent and nonrespondent distributions for all investigated characteristics. For all three analyses, very large chi-square statistics were seen for age and educational attainment. Within the two analyses dealing with self-respondents, large chi-square statistics were seen for number of persons selected for self-response questions.

The results seen for the number of persons selected for self-response questions, which is a function of the household size, are not surprising and are, in fact, anticipated with all surveys. They are presented within this analysis for transparency to the sponsor.

Using the information learned from this analysis, discussions should be had with the sponsor regarding enhancements to the weighting process. The findings suggest that research be done into the possible inclusion of other geographic and demographic characteristics into the person noninterview adjustments for the TUS. Research could

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[33] For the Nonresponse Weights Analysis, the response rate difference within educational attainment was not significantly different from the response rate difference within age.

be conducted into whether the nonresponse adjustment should include the geographic and demographic characteristics that were investigated in this report to determine if they can help reduce the nonresponse bias. Some other potential characteristics that may be related to tobacco use to consider including in the noninterview adjustment may be block and/or tract planning database variables, which would include geographic and demographic variables based on the location of the sampled household, such as percent of population that is Hispanic, percent of HUs where no one lives regularly (vacant HUs), and percent of population that is below the poverty level. Note: planning database variables are estimates using American Community Survey or 2010 Census data.

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