MINNESOTA ADULT TOBACCO SURVEY

TOBACCO USE IN MINNESOTA

MATS 2018 METHODOLOGY REPORT

2018 UPDATE

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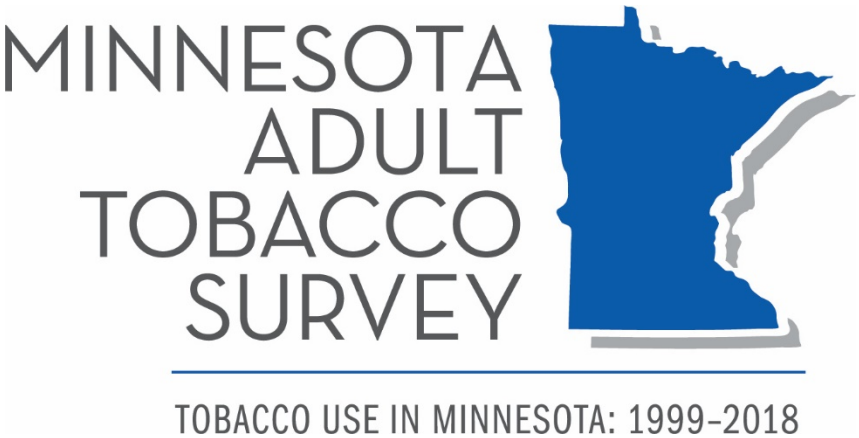

MATS 2018 Methodology Report

Tobacco Use in Minnesota:

2018 Update

January 2019

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1. Introduction

The Minnesota Adult Tobacco Survey (MATS) is a comprehensive surveillance initiative designed to monitor progress toward meeting the goal of reducing tobacco use and exposure to secondhand smoke among Minnesotans. The major objective of MATS is to collect in-depth public health surveillance data on the adult population of Minnesota, focusing on tobacco use and cigarettes in particular and including the use of e-cigarettes and vaping devices. MATS is the most comprehensive source of information about smoking prevalence, behaviors, attitudes and beliefs in the adult Minnesota population; further, MATS provides valid scientific data that track the impact of comprehensive tobacco control efforts in Minnesota. MATS 2018 is the sixth survey in this ongoing surveillance initiative.

The first three surveys—1999, 2003 and 2007—of the MATS surveillance initiative were directed by three partner organizations who lead comprehensive tobacco control efforts in the state of Minnesota: ClearWay Minnesota℠, Blue Cross and Blue Shield of Minnesota (Blue Cross), and the Minnesota Department of Health (MDH). For MATS 2010, 2014, and 2018 the partners were ClearWay Minnesota and MDH, who selected Westat as the survey vendor, made key decisions about survey design, and provided oversight for the instrumentation, data collection, analyses, and reporting of findings.

ClearWay Minnesota℠ is an organization that works to reduce tobacco's harm in Minnesota. An independent nonprofit organization funded by Minnesota's tobacco settlement, ClearWay Minnesota's mission is to enhance life for all Minnesotans by reducing tobacco use and secondhand smoke exposure through research, action and collaboration. Created in 1998 and funded to conduct tobacco-control work over a period of 25 years, the organization is a state leader in research, smoking cessation, media and public policy initiatives. ClearWay Minnesota has provided more than 100,000 Minnesotans with quit-smoking help through its free QUITPLAN® Services, advanced health policies including a statewide smoke-free law and tobacco price increases, broken ground in research, formed partnerships within diverse communities to reduce tobacco's burden and created many innovative programs.

The Minnesota Department of Health launched the first state-funded tobacco control program in the nation in 1985 with a portion of the proceeds from a cigarette tax. Since then, MDH has undertaken a number of tobacco control initiatives including participating as one of 17 American Stop-Smoking Intervention Study demonstration states, a national-level comprehensive tobacco control program sponsored by the National Cancer Institute. Funds from an endowment from the state's 1998 settlement with the tobacco industry were available to the department from 2000 through 2003 and were used to launch a comprehensive youth prevention initiative during that period. Currently, MDH works to reduce smoking through grants to reduce youth exposure to pro-tobacco influences, to create tobacco-free environments and to reduce tobacco related health disparities.

Through a competitive process, ClearWay Minnesota and MDH selected **Westat**, a leading health and social science research organization based in Rockville, MD, as the survey vendor for MATS 2018. Westat was also the survey vendor for MATS 2007, MATS 2010, and MATS 2014. Westat contributed technical expertise in sampling, weighting, and survey and analytical methods. With detailed direction from ClearWay Minnesota and MDH, Westat designed MATS 2018 and collected, analyzed and reported on MATS 2018 data. As a full-service vendor, Westat made recommendations to ClearWay Minnesota and MDH for adjustments to the previous MATS effort to accommodate changing information needs.

The main components of MATS 2018 were as follows:

- **Sampling.** Developing and drawing statistical survey samples of Minnesota residents. The sample design called for a random-digit dialing (RDD) sample of the adult Minnesota population, using samples drawn from landline and cell phone sampling frames. Targeted sampling was used to increase representation of Hispanics and non-white racial groups. In the cell frame, older adults were sub-sampled to increase the proportion of interviews from young adults in the 18-34 age range.

- **Questionnaire Development and Data Collection.** Developing and administering a survey questionnaire that would collect all the data items needed to support the larger health and tobacco-related missions of the

sponsoring organizations. The questionnaire covered domains such as general physical health, cigarette smoking and other tobacco use (including e-cigarettes), marijuana use, smoking cessation, experience with health care provider smoking interventions, exposure to secondhand smoke in various settings, risk perception and social influences, and demographic information. The questionnaire was administered using a computer-assisted telephone interviewing (CATI) system.

- **Survey Operations.** Developing various operational procedures to support the administration of the questionnaire. These included carefully constructed rules and procedures for calling attempts to maximize contact likelihood, intensive training of data collectors to maximize respondent cooperation and ongoing quality control through data review and monitoring. Operations also included supporting measures such as non-contact and refusal letters, an informational website, and a toll-free number that provided information about the survey and allowed respondents to complete the survey through inbound calls.

- **Sample Weighting.** Designing and creating sets of survey sample weights that can be used in analysis and reporting to make the sampled respondents' data statistically representative of the entire population they were designed to represent. Weights were based on the probability of selection into the sample as adjusted to selected available characteristics and counts of the adult Minnesota population. Survey weights were developed for the combination of landline and cell phone samples that is to be used for analysis and reporting on the overall Minnesota population.

- **Tabulation and Analysis.** Designing the various in-depth analyses of the survey data needed to support the sponsors' current and future programmatic, advocacy, public health, and tobacco-related health care delivery activities, as well as developing the detailed analytical tools and specifications for tabulating and analyzing the data.

- **Reporting.** Preparing an in-depth report profiling the adult Minnesota population in regard to the use, knowledge, attitudes, and experiences surrounding tobacco/cigarette use, tobacco cessation, exposure to secondhand smoke, and other tobacco and health-related areas.

MATS 2018 data will report the prevalence of tobacco use, exposure to secondhand smoke and related factors as of 2018 and will measure changes in these variables over time since MATS 2014, as well as monitor general trends from 1999 to 2018. In this context, a critical objective for MATS 2018 was to maintain continuity with the previous MATS surveys for survey items that remained of interest in 2018. This continuity served primarily to support reliable tracking of population trends over time and to support inferential statements that observed significant changes over time reflect actual changes in the population and are not artifacts of differences in the survey design.

Comparability was also an objective for the design of the survey weights. Investigators from the University of Minnesota weighted MATS 1999 and MATS 2003 in accordance with generally accepted practices, such as CDC's BRFSS and other statewide tobacco surveys. At that time, these surveys generally post-stratified only on age and gender. In recent years, however, concern has grown among the research community regarding the representativeness of telephone survey samples, particularly in terms of educational attainment. Telephone surveys increasingly appear to be more likely to reach individuals with higher education attainment (e.g., those with college degrees) than those with less education (e.g., those with a high school diploma or those who did not complete high school). While this phenomenon is not altogether new to survey research, the magnitude of the problem seems to have increased rapidly in the recent past.

Because smoking and education status are inversely associated, ClearWay Minnesota, MDH and Westat chose to include education as an adjustment factor for MATS 2007, MATS 2010, MATS 2014, and MATS 2018. Applying similar logic, race/ethnicity was also included as an additional adjustment factor for MATS 2014 and MATS 2018 as smoking prevalence and sample coverage have both been shown to vary by race/ethnicity population groups. The characteristics of education and race/ethnicity are in addition to age, gender, and telephone ownership/usage characteristics that have been used as weighting factors in all MATS. To facilitate the most accurate comparisons between years of MATS administrations, the data from MATS 1999 and MATS 2003 were reweighted in 2007 to include educational attainment and race/ethnicity. Therefore, estimates from MATS 1999 and 2003 presented in MATS 2018 reports may

vary slightly from estimates reported in publications prior to 2007. Further details about weighting of the MATS 2018 are discussed in Chapter 5 below.

1.1 Orientation to the Methods Report

This report constitutes the public documentation of general technical aspects of the MATS 2018 survey. It covers the sampling (Chapter 2), the questionnaire development and data collection methodology (Chapter 3), the operational results of the data collection (Chapter 4), the sample weighting (Chapter 5), and a discussion of comparability to previous MATS and limitations (Chapter 6). Appendices include the MATS 2018 questionnaire, letters used in contacting the survey sample members, and the contents of a website that was created to provide information about the survey to potential respondents. The MATS 2018 analysis and reporting components are outside of the scope of this survey methods report and appear as a separate, in-depth analytical report, titled *Tobacco Use in Minnesota: 2018 Update* (Minneapolis, MN: ClearWay Minnesota[SM] and Minnesota Department of Health; January 2019). This report can be found at www.clearwaymn.org/MATS.

1.2 Data Collection and Data Processing Timeline

Westat's work on the development of the MATS 2018 survey began in August 2017. Data collection concluded in July 2018 and final quality assurance checks of the data and post-coding of open-ended responses were completed by August 2018. Table 1-1 shows the timeline for the major activities of MATS 2018 from survey design through creation of the weighted data sets. Analysis and reporting activities are not included in this timeline.

Table 1-1. Timeline of MATS 2018 development, data collection and data preparation

Date	Task
5/17/2017-8/17/17	Select Westat as survey vendor, begin survey development
8/18/17	Hold kick-off meeting with Westat, ClearWay Minnesota and MDH
8/19/17-2/16/18	Design, program and internally test MATS 2018 CATI questionnaire
8/19/17-1/10/18	Develop data collection protocols and supporting materials
8/19/17-1/10/18	Design samples, create sampling frames, draw and process sample for data collection
1/11/18-1/13/18	Initial telephone interviewer training
1/15/18-1/28/18	Conduct RDD pilot test and revise questionnaire
2/12/18-7/29/18	Telephone data collection
8/1/18-9/14/18	Final data quality assurance, post-coding, and weights for review & acceptance

2. Sampling

The MATS 2018 used dual-frame landline and cell phone Random Digit Dialing (RDD) sampling. The list-assisted RDD landline frame covers all the landline numbers offered by traditional telephone companies as well as cable and Voice Over Internet (VoIP) providers. The cell phone frame contains all the possible cell phone numbers in the activated "1000-blocks". As in the MATS 2010 and MATS 2014, the MATS 2018 employed a take-all approach for the landline sample and a screening for cell phone only ("cell-only") and cell phone mostly ("cell-mostly") approach for the cell phone sample. The target numbers of completed interviews were 3,320 from the landline sample and 2,730 from the cell phone sample. The sample design was similar to MATS 2014 except that the sampling strata were not formed only by geographic region. Instead, there was interest in improving the domain estimates for race and ethnicity minority groups as well as young adults. Dual-frame stratified samples were selected to satisfy this interest while maintaining the overall design efficiency.

To improve the sample yields in race and ethnicity minority domains, sampling strata were formed based on two factors. The first factor was the density of race and ethnicity minority population among a telephone exchange or a group of identified telephone numbers. The second factor was metro versus non-metro area. On the one hand, the metro area tended to have a higher concentration of minority and young adults, and thus could be oversampled to increase the yields in these domains. On the other hand, smoking behaviors and trends could differ substantially between metro and non-metro areas, so it was desirable to have a reasonably large sample from the non-metro area. The dual-frame stratified sample design for MATS 2018 allowed a healthy mix of the samples between metro area and non-metro area while oversampling among (1) landline telephone numbers associated with Hispanic surname; (2) landline telephone numbers associated with Asian surname; (3) landline telephone numbers in the exchanges with higher density of "other minorities" (i.e., persons other than Hispanic, Asian, or non-Hispanic white only); and (4) cell phone numbers in the rate centers associated with the Minneapolis-St. Paul metro area.

Regarding the young adult domain, oversampling in high-density race and ethnicity minority strata would help bring more young adults into the sample because "minority race" and "young age" tended to be correlated. To further improve the proportion of 18-34 year olds among completed interviews, a subsampling rate of approximately 80 percent was applied to persons aged 35 and above in the cell phone screener responding sample. This subsampling strategy allowed more resources to be allocated to collecting data from 18-34 year olds without hurting the overall sample yield or statistical efficiency in any significant manner.

In terms of the reliability of the Minnesota adult smoking prevalence rate to be estimated from the combined dataset, MATS 2018 was designed to detect a two percentage point difference between two point estimates, one for 2014 and one for 2018, with 80 percent probability at the 95 percent confidence level, based on a one-tailed significance test. A single CATI questionnaire was used for both the landline and cell phone samples for the extended interview.

2.1 Stratified Dual-Frame Landline and Cell Phone Samples

2.1.1 Dual Frame Design: Landline Sample

For the landline sample, an enhanced RDD sampling frame was used to improve the coverage of the inference population, as in MATS 2014. In the recent decade, an increasing number of households have been shifting from traditional landline to alternative providers (including cable companies and Voice over Internet Protocol (VoIP) providers), which were not covered by the type of sampling frame used in the MATS 2010. According to the sampling frame vendor Marketing Systems Group (MSG), the enhanced frame accounted for nearly all landline telephone numbers (published and unpublished), including those offered by traditional telephone companies (referred to as incumbent local exchange carrier (ILEC) as well as cable and VoIP providers (referred to as competitive local exchange carriers (CLEC). That is, the new landline RDD sampling frame included virtually all the active residential landline telephone numbers and eliminated concerns about the under-coverage of residential landline numbers in the United States. It is important to note that using this enhanced sampling

frame in MATS 2014 and MATS 2018 does not bring in any new population that had not been covered in MATS 2010, but simply covers the part of the inference population that would have been missed in a frame containing only ILEC landline numbers (which is the type of frame used in MATS 2010). Sampling from this enhanced frame helps maintain comparable non-sampling error structure for the MATS 2010 through MATS 2018. On the landline frame, seven sampling strata were formed to oversample race and ethnicity minority groups while balancing sample sizes between metro area and non-metro area, as will be discussed in Section 2.1.3 in greater detail.

2.1.2 Dual Frame Design: Cell Phone Sample

On the cell phone frame, four sampling strata were formed to oversample race and ethnicity minority groups while balancing sample sizes between metro area and non-metro area. The cell phone sampling frame had been introduced during the MATS 2010 and retained for MATS 2014 to include the coverage of the persons living in cell-only households and improve the coverage of the persons living in cell-mostly households. The MATS 2018 used the same approach to screen for cell-only and cell-mostly populations as in MATS 2010 and MATS 2014. That is, the MATS 2018 cell phone RDD screener asked questions about the household usage of both landline and cell phones. Then those cell phone screener respondents living in the cell-only and cell-mostly households were eligible for the extended interview, while those living in the landline-mostly households were dropped from the extended interview.

Cell-Only Households

It is well established that the exclusion of cell-only households creates under coverage bias in landline RDD surveys. The number of adults living in cell-only households had increased to 48.4 percent in Minnesota in 2016.[1] The coverage concerns were even greater for younger adults. Studies of cell phone users have also found that the characteristics of the adults in cell-only households were different from those in households with landlines. For example, adults living in cell-only households were much less likely to have health care insurance than those in households with landlines. Some demographic characteristics such as young age and minority race were associated

[1] https://www.cdc.gov/nchs/data/nhis/earlyrelease/Wireless_state_201712.pdf, last accessed on 11/27/2018.

with cell-only households. Since under-coverage rates tended to vary by some demographic characteristics such as age in landline RDD surveys, there was increasing concern about the quality of estimates derived from them. For example, given the high prevalence of young adults in cell-only households, some observed decreases in the prevalence of certain health-risk behaviors might be the artifacts of young adult under coverage, and the estimates were subject to potential bias.[2] A cell phone sample was introduced in the MATS 2010 in response to this concern, and was continued in the MATS 2014 and MATS 2018. The goal was to improve the coverage of the Minnesota population, in particular those living in households without a landline.

Cell-Mostly Households

The cell phone frame was comprised of more than just cell-only households. A large proportion of the cell frame numbers were associated with households with a landline phone number as well. To sample and interview the persons living in the households with both landline and cell phone numbers through *both* sampling frames would result in oversampling this "dual-frame" population, and thus cause inefficiency in the design. However, previous research of the dual-frame persons indicated that the coverage and response propensity of such persons was differential by their landline and cell phone usage pattern. In particular, those who received most or all of the calls through their cell phone were shown to have higher coverage and response propensity through the cell frame than through the landline frame. Additionally, the literature also suggested the tendency of under-identification of young adults within "mixed-aged" households (those with both young adults and older adults) from landline RDD samples. It seemed plausible that the inclusion of cell-mostly households from the cell frame could potentially address these issues to some degree. It was felt that for this segment of the dual-frame persons, the relative coverage improvement outweighed the relative inefficiency of oversampling. For the remaining dual-frame segment, where most of the calls were not being received on the cell phone, a decision was made to drop

[2] Delnevo, C., Gundersen D.A., Hagman, B.T. (2008) Declining Estimated Prevalence of Alcohol Drinking and Smoking among Young Adults Nationally: Artifacts of Sample Undercoverage? Am. J. Epidemiol. (2008) 167 (1): 15-19.

them from the cell phone sample based on the information collected through the screening process.

Operationally, the MATS 2018 cell phone RDD screener asked questions about the use of both landline and cell phones. Then cell phone screener respondents whose households were cell-only or cell-mostly were included in the cell sample for extended interview. The cell phone users living in the households that were landline-mostly were dropped from the cell sample, although they still had a chance of being sampled through the landline frame. The persons living in the cell-mostly households could be sampled through both cell phone frame and landline frame. As discussed in Chapter 5, combining the landline and cell phone samples to produce a single final data file for estimates required a weighting adjustment that accounts for the dual probability of selection of any dual-frame cases. One goal of the weighting process was to reduce the sampling variance resulting from the complex sample design. The current design not only achieved the overall sample design efficiency, but also yielded a large number of cell-mostly interviews.

2.1.3 Stratification and Oversampling Race and Ethnicity Minority Groups

The MATS 2018 used stratified sampling within the landline frame and cell phone frame. The sampling strata were formed based on two factors: (1) the density of race and ethnicity minority population among a telephone exchange or a group of identified telephone numbers; and (2) whether the phone number is associated with metro or non-metro area. Differential sampling rates were applied to various strata to increase the sample size for race and ethnicity minority population while maintaining overall efficiency. Table 2-1 shows the sampling strata for landline and cell phone frames as well as which strata were relatively oversampled in each frame. The extent of oversampling also varied by stratum based on the expected concentration of minority groups and expected response propensity. For example, the landline Hispanic surname and Asian surname strata were more heavily oversampled than the landline "other minorities" strata. On the cell phone frame, the "minorities" strata were only moderately oversampled because the expected proportion of minority groups in the

rate center associated with metro area was only marginally higher than the state level within the cell frame.

Table 2-1. Sampling strata and oversampling strategy

Frame	Sampling stratum	Oversampled (Yes/No)
Landline	Hispanic surname	Yes
	Asian surname	Yes
	Metro area with % of "other minorities" >= 20%*	Yes
	Metro area with % of "other minorities" >= 15% and < 20%	Yes
	Non-metro area with % of "other minorities" >= 15%	Yes
	Metro area with % of "other minorities" < 15%	No
	Non-metro area with % of "other minorities" < 15%	No
Cell phone	Metro area with % of "minorities" >= 15%**	Yes
	Non-metro area with % of "minorities" >= 15%	Yes
	Metro area with % of "minorities" < 15%	No
	Non-metro area with % of "minorities" < 15%	No

*"Other minorities" refer to persons other than Hispanic, Asian, or non-Hispanic White only.

**"Minorities" refer to persons that are not non-Hispanic White only.

Compared to MATS 2010 and MATS 2014, a higher proportion of the sample was allocated to the cell phone numbers in the MATS 2018. This is because telephone ownership and usage among the Minnesota population had changed significantly since the 2010 and 2014 data collections. At the national level, the proportion of the adult population living in cell-only households had been increasing by about 2 percentage points annually, so a significantly higher proportion of the adults in Minnesota were expected to be in the cell-only households in 2018 than in 2010 and 2014. Due to the growing cell-only and cell-mostly population and the changing cost function of RDD cell phone data collection compared to RDD landline data collection, a larger proportion of the sample was assigned to cell phone for MATS 2018 to make the survey design more cost-efficient. That is, the allocation was chosen as an optimum solution not only to account for the estimated proportion of population in cell-only and cell-mostly households but also to counterbalance the expectation of higher costs-per-case associated with cell frame completed interviews. An appropriate weighting approach was used to composite the cell phone sample and landline sample, so the change in sample allocation did not affect the comparability of the estimates between MATS 2010, MATS 2014 and MATS 2018.

In summary, the MATS 2018 target sample size was 6,050, including 2,730 cases for the landline sample and 3,320 cases for the cell phone sample. This represents a 45 percent versus 55 percent allocation of the overall sample to the landline and cell phone frame, respectively. The MATS 2018 sample was a sufficiently efficient design at the state level such that the required minimal detectable difference of 2 percentage points (based on one-tailed test with 80 percent power and 95 percent confidence level) between smoking prevalence rate estimates in 2014 and 2018 was achieved. At the same time, the stratified sampling strategy significantly improved some domain estimates (e.g., race and ethnicity minority groups, young adults).

2.2 Landline RDD Sample

As discussed in Section 2.1.1, the MATS 2018 used an enhanced landline RDD sampling frame that, according to the frame vendor MSG, included virtually all the active residential landline telephone numbers. This eliminated the concerns about under coverage of the phone numbers offered by cable and VoIP providers. Another design component in the MATS 2018 was the stratification of the sampling frame by expected densities of minority groups and metro/non-metro area. The landline RDD sampling frame was made of 1000-blocks, each of which consisted of 1000 consecutive telephone numbers. Once the frame had been stratified, a random sample of phone numbers was selected from the blocks of phone numbers that contain at least one "assigned" phone number. No sample was selected from the 1000-blocks with no assigned numbers.

The screening eligibility criteria for the MATS 2018 were similar to those used in the MATS 2010 and MATS 2014. The cases eligible for MATS 2018 were defined as sampled phone numbers associated with a residence located in the state of Minnesota. Non-residential phone numbers or those associated with a residence outside of Minnesota were dropped as ineligible. Even though the sample frame was limited to Minnesota area codes/exchanges, it was possible for some numbers to be located out of state, due to some overlap at state borders or other circumstances in the assignment of phone numbers by telecommunications companies serving Minnesota residences.

The MATS 2018 sample design called for one adult at least 18 years old to be selected at random from each household that was identified through the RDD screening process.

To select an adult from within a household, the Rizzo method[3] was used to select an adult from within a sampled household. As in the MATS 2010 and MATS 2014, nearly all of the initial refusal cases were subject to refusal conversion in MATS 2018.

2.3 Cell Phone RDD Sample

The cell phone RDD design for the MATS 2018 called for a sample of randomly generated telephone numbers that were contained within the universe of telephone numbers classified as cell phone numbers. The cell phone frame stratification method was similar to that used for the landline frame, except that the assignment was based on the "rate centers" instead of 1000-blocks. As with the landline sample, cell phone numbers not associated with a residence in the state of Minnesota were screened out. However, additional screening of the cell phone sample was required to identify those cell-only and cell-mostly households.

The cell sample design called for one adult to be selected at random from each household that was identified through the RDD screening process. While researchers hold different opinions on whether a cell phone is a person-level or household-level device, studies have shown that a non-negligible proportion of cell phone users shared their phones with other household members, a non-rare phenomenon even among cell phone-only and cell-mostly households. So, in the MATS 2018, cell phones were treated as household devices as had been done in the MATS 2010 and MATS 2014. During the screener interview, the respondent was asked whether other household members shared the cell phone, and if the answer was yes, the Rizzo method was employed to conduct the within-household sampling before the extended interview. If the answer was no (no one else shared the phone), then the person answering the phone was by default the respondent, unless the phone user was under 18 years old and therefore ineligible for the survey. Further, it was common for minors to use cell phones, either their own personal phone that only they used or one that they shared with other household members. If a minor answered a cell phone screener call, the MATS 2018 screening protocol determined if he or she was the sole user of the phone. If they were

[3] Rizzo L., Brick J. M., Park I. (2004) A Minimally Intrusive Method for Sampling Persons in Random Digit Dial Surveys. Public Opinion Quarterly 68(2):267-274.

the sole user, the phone number was considered as ineligible for MATS 2018. If they shared the phone with other household members, the protocol determined whether any of these were age-eligible adults and, if so, sought to conduct the screening interview with an adult household member (since minors were not eligible to serve as RDD screener respondents).

One new feature of the MATS 2018 cell phone sample design was the usage of the CELLWINS flag, a variable provided by MSG indicating whether a cell phone number might be "active", "inactive", or "unknown". Although the CELLWINS value was not completely accurate (i.e., some cell phone numbers flagged as "inactive" might actually be working phone numbers, and vice versa), Westat's recent project experience proved that this flag was a good predictor of the probability of a phone number being active or not. Like the purging process on a landline sample, accounting for CELLWINS values on the cell phone sample could improve the efficiency of data collection. For MATS 2018, approximately half of the sampled cell phone numbers flagged as "inactive" were subsampled for fielding. This allowed considerable cost efficiency because obtaining complete interviews from "inactive" cell phone numbers would be substantially more costly than obtaining them from "active" cell phone numbers. As a result, weights of the subsampled (and fielded) "inactive" cell phone numbers were doubled to account for the CELLWINS-based subsampling. The sociodemographic characteristics and key survey measures might differ between persons associated with "inactive" phone numbers and those associated with "active" phone numbers, so the subsampling strategy helped achieve a good balance between reducing potential bias and improving cost efficiency. In addition, a subsampling rate of approximately 80 percent was applied to persons aged 35 and above in the cell phone screener responding sample. This subsampling strategy allowed more resources to be allocated to collecting data from 18-34 year olds without hurting the overall sample yield or statistical efficiency in any significant manner.

2.4 Sample Release Strategy and Yields

For both the landline sample and cell phone sample, the entire sample was partitioned into multiple release groups within each sampling stratum, each release group being a random subsample of the entire sample. Release groups allowed for the controlled,

random release of the sampled phone numbers, so that yields of completed interviews could be closely monitored and additional samples released as needed to achieve the desired number of completed interviews, once the yield patterns became established. After an initial set of release groups was assigned to the MATS 2018 interviewing operation, additional groups were released, as needed, to reach the sample yield goal overall and by stratum.

Table 2-2 shows the sample yields by phone type, race and ethnicity minority status, and age group for MATS 2018. The total number of completed interviews is 6,055, with 46.1 percent on the landline and 53.9 percent on the cell phone. The number of completed interviews by race and ethnicity minority persons (i.e., those who were not non-Hispanic white only) is 992, accounting for approximately 16.4 percent of all the competed interviews. The number of completed interviews by 18-34 year olds is 1,171, accounting for 19.3 percent of all the completed interviews). Based on the 2016 American Community Survey (ACS), which was the most updated information available for the MATS 2018 weighting activities, the proportions of minority persons and 18-34 year olds were 16.2 percent and 29.6 percent, respectively. Under-coverage of young adults is a well-known challenge in RDD surveys. The calibration process as described in Section 5.4 ensures that weighting adjustments be used so that the data can appropriately represent the adult population in Minnesota.

Table 2-2. Sample yields by phone type, race and ethnicity minority status, and age group

Characteristics	Group	Count	Percentage
Phone type	Landline	2,789	46.1%
	Cell phone	3,266	53.9%
Race and ethnicity*	Non-Hispanic White only	5,048	83.6%
	Not non-Hispanic White only	992	16.4%
Age	18-34	1,171	19.3%
	35 and above	4,884	80.7%

*Race or ethnicity information was missing for 15 persons that completed extended interviews.

3. Data Collection Methodology

3.1 Questionnaire Development

MATS 2018 required developing two questionnaires. The main questionnaire was the substantive survey instrument containing all of the questions for the MATS 2018 interview. In addition, MATS 2018 needed a household screening questionnaire, some form of which is used in every RDD survey to identify households and then identify and sample people within the households. For brevity, the household screening questionnaire is generally referred to as the "screener" and the MATS 2018 main substantive questionnaire as the "extended" questionnaire. The same extended questionnaire was used for both the landline and cell phone samples (except for a few questions about cell phone ownership and use that were only asked of landline respondents). The screener for the cell phone sample required some questions not contained in the landline sample screener because cell phone respondents were only eligible to complete the extended interview if they received most or all of their calls on their cell phone.

3.1.1 MATS 2018 Questionnaire

ClearWay Minnesota and MDH began the process of designing the MATS 2018 instrument in the summer of 2017 by reviewing the MATS 2014 instrument and proposing items to be added, eliminated or reworded. Applying an iterative, consensus approach, ClearWay Minnesota and MDH worked through various versions, adding items to address new research questions or provide further information about previous research questions. The proposed changes reflected the current research agenda of MATS 2018, the experience with the utility of MATS 2014 data, the need to eliminate some items to accommodate new items, and the desire to somewhat reduce the overall length of the interview. The final decision to eliminate a question or panel of questions usually reflected a general consensus that the eliminated items were of interest in the past but not in the present, or were of lesser importance, given the need to obtain different information in MATS 2018. Westat began working with ClearWay Minnesota and MDH to refine and finalize the design of the questionnaire in August 2017. While some items remained to be added or eliminated in mutual discussions, Westat focused

on working with ClearWay Minnesota and MDH representatives on question wording, response category selection and wording, question flow and ordering, and optimizing the design for telephone interviewing.

As noted in Section 1.1, maintaining continuity with the previous MATS surveys was an important objective. However, changes in questionnaire design are desirable or unavoidable in large-scale surveys repeated over long time periods, due to the emergence of new issues or phenomena in regard to tobacco control, epidemiology, treatment, and education; scientific advances; altered focus on the part of the researchers, administrators, and practitioners who use the time series data; and the impacts of real world occurrences, such as political forces, actions of the tobacco industry, funding limitations, or social factors. Maintaining continuity in the MATS 2018 questionnaire was a balancing act between continuity and making desired or necessary improvements.

Examples of substantial changes made in the MATS 2018 instrument include the elimination of questions about:

- Cigarette purchasing behaviors (cost, unit of purchase, cost saving strategies);
- Plans if menthol cigarettes were no longer sold (quit, other alternatives);
- Quitting timeline (date of last quit attempt, duration of last quit attempt);
- Frequency of discussions with medical provider (medication and other resources);
- Perceived effects of tobacco tax on cigarette smoking behavior; and
- Questions asking about respondents' willingness to participate in follow-up research and collecting contact information.

Major additions to the MATS 2018 instrument allow the exploration of new research questions about:

- Use of e-cigarettes and vaping devices (ever used, how many times in the past 30 days, reasons for use, use of flavors, regular flavor);

- Use of flavors in cigars and cigarillos;
- Use and form of marijuana;
- Perceived harm of menthol cigarettes; and
- Gender identity.

The final MATS 2018 questionnaire appears as Appendix A of this report.

The final MATS 2018 questionnaire covered domains such as general physical health, cigarette smoking and other tobacco use, marijuana use, smoking cessation, experience with health care provider smoking interventions, exposure to secondhand smoke in various settings, the effects of public and private policies and rules on smoking behaviors, risk perception and social influences, and demographic information.

Westat developed detailed specifications to program the MATS 2018 questionnaire as a CATI survey instrument. The programming specifications are embedded in the MATS 2018 instrument included as Appendix A.

3.1.2 MATS 2018 RDD Household Screeners

Appendix B contains the MATS 2018 RDD landline household screener instrument and Appendix C contains the RDD cell phone screener instrument. The landline screener was a standard RDD screener, as adapted by Westat to implement the Rizzo method for RDD respondent selection. The cell phone screener also used the Rizzo method when necessary (i.e., when the cell phone number was used by more than one person to receive calls). The cell phone screener also incorporated various questions needed to determine sampling eligibility as described above in Section 2.2 and to select the respondent for the interview. These included questions to:

- Confirm that the phone number is a cell phone number;
- Confirm the cell phone number belongs to a Minnesota resident;
- Exclude cell phone numbers used exclusively by minors;
- Determine the owner or primary user of the cell phone;

- Determine the degree to which the household receives its calls by landline, cell, or both; and
- Determine which adults in the household receive calls on the sampled cell phone number.

3.1.3 CATI Questionnaire Programming and Testing

Programming of the CATI questionnaire was carried out by Westat's CATI programming team, led by a senior CATI programmer. Testing of the programmed instrument was performed by the programmers, by an independent testing department at Westat, and by questionnaire designers from Westat. The several levels of testing revealed a few items that required correction and a few items that resulted in minor changes to the instrument design and specification.

3.2 Pilot Test

3.2.1 Background

Between January 15 and January 28, 2018, Westat conducted a pilot test of the RDD survey, including the MATS 2018 questionnaire, the landline and cell phone screeners, the within-household sampling procedures, the interviewer scripts and telephone contact procedures, and the handling of the cases in the CATI system's automated scheduling and case management system. The pilot test objectives were to complete live field testing of the:

1. Programming of the CATI questionnaires;
2. MATS 2018 questionnaire's suitability for administration by interviewers;
3. Respondents' comprehension of the questions and their ability to provide answers; and
4. Screening questionnaires, screening rules and procedures, and respondent selection.

3.2.2 Pilot Test Operations

The pilot test had a goal of 200 completed interviews, 100 from the landline sample and 100 from the cell sample. An initial sample of 2,294 landline numbers and 4,165 cell phone numbers was assigned to data collection and Westat completed 193 interviews – 98 from the landline sample and 95 from the cell sample. The pilot data collection employed substantially all of the data collection procedures to be implemented in the full survey, with two planned exceptions. Because the data collection period of the pilot test was brief and the primary objective was to test the instrument, the pilot test purposely did not carry out the refusal conversion protocol for either the household screener or the extended interview, as planned for the full survey. The pilot test sample also did not receive any of the supporting letters (non-contact letter and refusal conversion letter) that the actual survey sample received (see Section 3.4.1 for a full description of these letters).

3.2.3 Pilot Test Interview Monitoring and Interviewer Debriefing

During the pilot test, Westat's telephone supervisory staff conducted live monitoring of the interviews. Monitors could hear both sides of the conversations and see on their computer screens a live version of the interviewer's actual CATI screen. During regular survey operations, the monitoring is conducted as a quality assurance measure of the interviewer's following of the data collection protocols, correct reading of the questionnaire text, handling of questions and problems, and entry of responses. Since experienced interviewers were assigned to the pilot test, the monitors were able to focus on the aspects of the data collection design that were being tested: whether the procedures worked as planned, whether the questionnaire wording and flow supported clear administration by the interviewers, and whether the respondents had any general difficulties in understanding the questions or formulating an answer. The monitoring produced no reports of general problems along these lines. Interviewers were able to handle questions that some respondents asked about the survey or specific questions, based on their training and using the set of Frequently Asked Questions developed for them by the survey managers.

When the interviews were completed, Westat's telephone operations manager, two MATS 2018 project managers, and members from ClearWay Minnesota and MDH held

a focused 90-minute debriefing session with 7 data collectors and 2 supervisors. The debriefing session was conducted via conference call. It consisted of a discussion in response to a list of questions about the interview designed to elicit both respondent and data collectors' reactions to the questionnaire design and the interviewing experience. The questions were both general and structured and focused on specific questions that were new to the instrument.

The data collection staff were positive about the questionnaire in terms of their ability to administer it clearly and of respondents' ability to provide answers to the questions with little difficulty. Data collectors reported some challenges gaining cooperation, especially during the introduction and among the cell phone sample. The pilot test revealed no significant problems with questions new to MATS 2018. Some minor wording changes were made to a few questions to make them clearer to the respondents or to assist them in providing answers consistent with the intent of the question.

Westat statisticians examined the various yields of the pilot test, to the extent that they were predictive of yields in the full study. The pilot test was not designed to predict yields, given the unknown effect of deliberate pilot test plans, such as stopping the test when the desired number of completed interviews was reached, not using the full study mailing protocol, and not implementing refusal conversion (see Sections 3.4.1 and 3.6.2 below). While information about sample performance was very limited, completing the target number of completes for the pilot required more interviewer hours than planned and even with additional effort, Westat fell slightly short of the goal of 100 completes for each frame, with 98 landline completes and 95 cell completes. While limited, the performance of the pilot sample gave indications that sample yield rates could be lower than were assumed based on MATS 2014 results.

The pilot interview length timings averaged close to 9 minutes for both landline and cell samples (i.e. 9.11 for cell; 8.75 for landline). The MATS 2018 pilot test revealed that the design of the MATS 2018 questionnaire successfully achieved its objectives, in terms of obtaining the desired information, being clear and minimally burdensome to respondents, and readily administered by interviewers. The live test also confirmed that the CATI instrument performed correctly as to flow and data capture, as intended by

the design and as previously verified by beta testing. Perhaps most importantly, the test showed that the overall design of MATS 2018 – interviewer training, calling procedures, the RDD screening, explaining the purpose of MATS 2018, identifying and obtaining cooperation from selected individuals, and successfully taking them through the MATS 2018 questionnaire – was feasible in a real world setting. The results of the pilot test are described more fully in a memo[4] that Westat provided to ClearWay upon completion of the pilot in February 2018.

3.3 Interviewer Recruitment and Training

Westat assigned interviewers from its current staff of interviewers to the MATS 2018 data collection. The staff were located either in call centers or worked from their homes. All interviewers received MATS-specific project training (in addition to their previous general interviewer training). The general interviewer training was self-paced and self-administered, with the interviewers working though Web-based self-study modules. Before an interviewer could progress to the next module, he/she had to pass an assessment on the module just completed, with a 100 percent correct score. Interviewers could review content until they were able to attain 100 percent correct on all assessments.

The general interviewer training (GIT) modules covered topics such as:

- The concept of data and social science research, and the role of the interviewer in this research process;
- Principles and tenets of standardized interviewing and the use of the CATI system;
- Concept of a scientific sample and the importance of probability sampling; the various ways data can be collected: in-person, telephone, Web, observation, medical measurement, etc.;
- Survey design, administration, and respondent contact procedures;

[4] Readers interested in more information about this memo may contact Ann St. Claire, ClearWay Minnesota, at (952) 767-1416 or astclaire@clearwaymn.org.

- Standard call disposition codes;
- Importance of interviewer neutrality, verbatim question delivery, and exact recording of responses as central to standardized interviewing;
- Projecting professionalism and expert knowledge of the survey as key characteristics in securing respondent cooperation;
- Listening skills and speaking skills; and
- Voluntary nature of survey participation, informed consent, and confidentiality.

Training in use of the CATI system employed an interactive, self-administered, computer-based tutorial. Each interviewer moved through a series of topics, such as instruction on logging onto the CATI system, using the keyboard, the mouse, and special CATI commands. At this point interviewers learned the keys and commands for entering data and handling situations outside of the automated flow of the CATI questionnaire. Also included in this session was practice in the coding of contact results. Trainees experienced recorded replications of common contact situations and learned the proper coding techniques through presentation and practice. A follow-up test was administered to evaluate mastery of the contact procedures. The interviewers who were considered for the MATS assignment and to receive the MATS-specific training were limited to those who achieved a perfect score (100 percent) on this test.

The first stage of MATS-specific training was conducted in the same way as the general interviewer training, including the requirement to score 100 percent correct on each module's evaluation assessment before proceeding to the next training module. The self-administered portion of the MATS 2018 project training focused on the background of the study and an introduction to the screener and extended questionnaires. Following the self-administered training modules, interviewers attended a live, web-based training session with a live trainer. The trainer reinforced concepts learned through the self-paced trainings, moving through practice versions of the questionnaire and allowing the trainees to practice administering the questionnaire. Specific topics included:

- MATS questionnaire items and the flow of the MATS questionnaire, including terms and definitions;
- RDD screening process;
- Contact scripts; and
- Handling of problem situations and the use of the prepared, standard responses to frequently asked questions.

Training instructors and team leaders were available to assist interviewers should they encounter difficulty with a particular training concept or module. MATS trainers communicated with interviewers through instant messaging, training-based electronic bulletin boards, email, and telephone calls. After interviewers completed all of their training modules including the live web-based session, they were teamed with a partner to conduct practice interviews with each other (role plays). During the role play sessions each interviewer was monitored and coached to assess and enhance their interviewing skills. Once the supervisor determined that the interviewer demonstrated the appropriate command of the interview and study materials, the interviewer was permitted to conduct actual MATS interviews.

3.4 Communications with Sample Members

There were a variety of methods used to communicate with the MATS 2018 sample during data collection. These included a variety of letters, an informational website, and

several contact numbers that potential respondents could call for information or other purposes. These tools were designed to improve response rates and provide information to sample members or to the general public about the survey.

3.4.1 Letters

MATS 2018 developed two different letters sent to members of the RDD landline sample. These were a non-contact letter and a refusal conversion letter. All letters were printed and mailed using letterhead of the Minnesota Department of Health and included the signature of the Director of the MDH Center for Health Statistics. Because it is not possible to reverse match cell phone numbers to addresses, MATS 2018 did not implement any mailings for the cell phone sample and only sent letters to landline sample records where a matched address was available.

- The **non-contact letter** was mailed when, after repeated calls to an RDD landline number, no contact had been made that would allow determination of whether or not the phone number belonged to a residence. The non-contact letter was designed to get through to people who may have been screening calls through Caller ID, who may have had a phone line to which no phone was connected, or similar reason why contact could not be made. The letter stressed the importance and legitimacy of the survey and urged the recipient to respond to calls from Westat or to call Westat's toll-free number.

- The **refusal conversion** letter was mailed when a phone number had been established as belonging to a household but its members refused to participate in the household screening interview. The refusal conversion letter was designed to persuade the household to participate in the screening and then in the extended interview. It contained much of the information included in the non-contact letter, with additional emphasis on the importance of the recipient's participation.

Copies of these letters appear in Appendix D.

3.4.2 MATS 2018 Informational Website

For MATS 2018, Westat web designers developed an informational website to provide sample members and potential respondents with a set of brief, simple, and clear informational points about the survey. Its purpose was to encourage participation

among selected respondents, enhance the perceived legitimacy of the survey, and answer questions potential participants might have. Legitimacy was enhanced by the visibility of the web page on the Minnesota Department of Health's official website.

The main web page provided a brief overview of the survey with menu links to four subpages covering the following topics:

- How participants are selected;
- How the survey works;
- Frequently asked questions; and
- Sponsoring agencies and contact information.

In the letters and web pages, MATS was characterized as a health study with an emphasis on tobacco rather than exclusively as a tobacco survey. This was designed to avert non-smokers from a disinclination to participate due to a perceived lack of relevance to them and to mitigate smokers' possible perceptions of persistent focus on them by media, government, and the health care community.

The contents of the MATS 2018 informational website appear in Appendix E.

3.4.3 Toll-free Numbers and Contacts Provided by Westat and the Minnesota Department of Health

Westat operated a toll-free number that MATS 2018 sample members could call to obtain information about the survey. Westat's inbound call center answered the toll-free line and either responded with the requested information or referred the caller to an assigned contact person at MDH. MDH provided the name and direct line of a contact person. These numbers and contacts were printed in the appropriate letters, were available on the website, and were provided upon request by the telephone interviewers.

3.5 Data Collection Confidentiality Procedures and Protection of Human Subjects

All Westat staff are bound by strict confidentiality and privacy rules and procedures that are designed to prevent deliberate or inadvertent disclosure of the identity or survey data of anyone belonging to a data collection sample. All Westat staff are trained in the relevant protocols, covering oral, electronic, or printed disclosure, and in the techniques to safeguard such information in all of these forms. As a condition of employment, they are required to sign a pledge of confidentiality describing these requirements. They undergo required annual training on human subjects' protection and information security.

These general rules and procedures apply equally to center-based and home-based interviewers; home-based interviewers are subject to further requirements, in terms of working from a segregated office space within their home environment and outside of the presence of anyone else in the household. Using the web-based interface, all data collected by the home-based interviewers were entered in real time into the central survey database maintained within Westat's physical facility and behind Westat's software firewall. Sample identifying information, questionnaire text, and response data were only visible on the interviewers' screens; no data could be copied or saved electronically or printed locally.

All sample and survey data were maintained on Westat's secure, password protected network, with access to MATS-related data limited to staff approved to work on MATS 2018.

The MATS 2018 survey questionnaire, data collection, and data security plan were reviewed and approved by the Westat Institutional Review Board (IRB) and the Minnesota Department of Health IRB.

Westat's general confidentiality procedures are designed to comply with applicable requirements of state and federal law relating to Protected Health Information (PHI), including the Health Insurance Portability and Accountability Act of 1996 (HIPAA). PHI and HIPAA apply to health information contained in health records; collected

survey data are covered by other federal statutes and is subject to the oversight of the Office of Protection from Research Risks.

3.6 Data Collection Operations

Data collection occurred between February 12, 2018 and July 29, 2018. Calling took place from 9 AM to 9 PM weekdays, 10 AM to 5 PM Saturdays, and 2 PM to 9 PM Sundays (all times Central time). Consistent with standard operational practice for personal telephone interviews of individuals in their homes, the majority of calls occurred between 6 PM and 9 PM weekdays and throughout the weekends, in order to optimize the amount of effort applied when people are most likely to be found at home.

3.6.1 Calling Procedures

3.6.1.1 General Case Handling and Contact Procedures

MATS 2018 telephone procedures applied a hierarchical approach to case management. This includes making cases available for call attempts based on the current status of the call. Those cases for which an exact appointment was scheduled had the highest priority, followed by those with a general call back time (e.g., information that "evenings are best" to reach the desired person), those that had been called previously without human contact and lastly cases that had never been called. To optimize the balance between contact likelihood and overall efficiency, at least 7 call attempts were made to each sampled number, unless the number needed fewer attempts to reach a natural final disposition. Some cases released late in the data collection period to meet regional targets did not receive the full protocol. Until contact was established, the CATI scheduling system automatically spread out the calls across various times of day and various days, including weekdays and weekend days.

As described in Section 3.6.2, a second effort was made to convert refusals to the RDD household screener or to the extended interview, except for those few characterized as "hostile" refusals.

3.6.1.2 Supplemental Calling Procedures

Once data collection was in progress, MATS 2018 implemented several measures designed to improve response rates and increase the number of completed interviews obtained from the released sample. The most significant of these was the decision to re-activate cases that had been coded as final non-response because they had reached the maximum number of call attempts according the calling protocol.

In order not to badger households, the MATS calling protocol allowed for only one answering machine message to be left at a phone number prior to the point when live contact was made. Towards the end of data collection, a second answering machine message was left at any phone number where live contact still had not been made.

3.6.1.3 Calling Rules Determined by Special Case Eligibility Rules

In the previous round of MATS, two issues emerged that required the MATS 2010 design team to develop handling rules that were consistent with the study's research objectives, statistical sampling practices, and data collection operational procedures. Their common feature was temporary residence out of state. For MATS 2018, Westat used the procedures as refined and finalized for MATS 2010 and MATS 2014.

3.6.1.3.1 Snowbirds

The protocol for handling "snowbirds," residents who leave the state for warmer climates in the winter, for MATS 2018 was to consider them as valid Minnesota residents on an extended vacation. They were, therefore, eligible members of the sample, and MATS 2018 sought to interview them. However, because some MATS 2018 research questions address social and environmental factors and Minnesota policies and programs, the survey designers concluded that it was best to interview people only when they were physically within the state borders. If snowbirds currently dwelling out of state were identified during initial calls, arrangements were made to interview them upon their return to Minnesota, if they returned before the end of the data collection period. If they were not in the state during this period, they were not followed to their winter residence for an interview. Since they remained as eligible members of the sample, the latter group was classified as a form of survey non-response, rather than as

ineligibles who could be dropped from the sample for response rate calculations and sample weighting.

3.6.1.3.2 College Students Living Away from Home

A common protocol for RDD surveys (based on fairly complex rules that the U.S. Census uses to define household membership) is that students who reside away from home are considered members of the household if they live in group quarters (such as a dormitory) but not if they reside in private or small common residential units (generally defined as those occupied by nine or fewer unrelated individuals).

The research issues that arose in regard to snowbirds similarly applied to the out-of-home student situation, and MATS slightly modified the commonly applied RDD rules for students.

Young adults who were found to be attending college in Minnesota were eligible to be interviewed, even if they were not currently residing in the household at the phone number of record (most likely their parents' house). The procedure was to call them at any phone number where they could be reached to conduct the interview, including calling back at the number of record if they would be available there before the end of data collection.

Young adults who were found to be attending college outside of Minnesota were classified as not eligible for the study, because they would be less exposed to the social and environmental factors and Minnesota policies and programs that were a focus of MATS 2018. They were dropped from the sample for response rate calculations and sample weighting.

The RDD screening protocol did not seek to explicitly identify students. The protocol was applied only in the situation where a student's status as residing temporarily away from home was offered by the adult who completed the household enumeration in the MATS 2018 screener. If this happened, the interviewer was instructed to ask if the student was attending school in state or out of state. If out of state, the interviewer recorded the case as a special problem with detailed comments for review by supervisory staff. If the supervisor concurred with the determination, the case was

coded as ineligible; if not, it was reactivated with instructions to continue to pursue the interview with the student wherever he or she could be reached.

3.6.2 Refusal Conversion

In scientific surveys, it is standard practice to recontact people who initially refuse to participate in an interview, in a second attempt to persuade them to participate. This refusal conversion process is designed to increase the sample size and response rate, and also to reduce bias associated with including in the sample only those who are most inclined to respond, i.e., those who respond immediately to the participation request. This section describes the MATS 2018 refusal conversion process for the RDD screeners and extended interviews. See Section 4.4.2. for the quantitative results of these refusal conversion efforts.

When interviewers encountered reluctant respondents, they first attempted to avoid the refusal by addressing any concerns expressed. When that attempt was unsuccessful, the interviewer coded the case a refusal and completed a non-interview report form. Included in this form was a brief description of the reason for and the strength of the refusal. The strength of the refusal was coded mild, firm or hostile. Mild and firm refusals were mostly determined at the discretion of the interviewer. Typically refusals were designated mild if the respondent hung up without explanation and firm if some type of reasoned explanation was provided. The hostile designation was reserved for respondents who used vulgar language or were threatening.

Each refusal case was withheld from additional call attempts for a cooling off period of at least 13 days (except during the final weeks of the field period where this cooling off period was abbreviated). After this cooling off period, specially trained interviewers attempted to recontact the phone number (for screener refusals) or the selected adult (for the extended interview), to persuade them to participate in the survey. If the respondent refused a second time, the case was finalized as a refusal and no further attempts were made to contact them. The interviewers selected for these conversion attempts demonstrated an above-average comprehension of the study objectives and ability to share this knowledge with the respondent. They received additional training to aid them in dealing with challenging situations.

3.7 Data Quality Assurance

Data quality assurance for MATS 2018 took a variety of forms prior to, during, and following data collection. Prior to data collection, data quality assurance was addressed through the questionnaire design, specification, and testing process described elsewhere. The valid generalizability of the collected data to the overall population was further assured by a well-designed and scientifically drawn sample. The techniques for designing and drawing the sample are described throughout Chapter 2.

The present section addresses measures implemented to assure the quality of the data collected during and following data collection. Such measures include monitoring interviewers and providing feedback to them, review of the actual data captured in the CATI system during data collection, ongoing monitoring of sample performance during data collection, and processing of the data into the final database once data collection is ended.

3.7.1 Interviewer Monitoring

Westat uses a silent monitoring system that allows supervisors to listen on the phone and to watch interviews on the CATI screen in real time without the interviewer or respondent knowing that they are being observed. Monitoring reports are completed for each monitoring session and reviewed with the interviewer during each shift. This provides the opportunity to reinforce good skills and coach interviewers in areas needing improvement in a timely manner. Approximately 5 percent of all interview time was monitored in MATS 2018.

3.7.2 Data Cleaning and Editing During Data Collection

The primary method for assuring the quality of the collected data is to address this objective, before the fact, in the design and programming of the CATI questionnaire, in the data collection protocol developed, and in the training of the interviewers in general best practices and the specifics of the MATS 2018 questionnaire and interviewing protocol. All of Chapter 3 up to this point has addressed these issues in detail.

Even though the CATI system controls all skip patterns and allows only valid ranges of values to be entered by the interviewers, Westat data managers conducted additional reviews of the collected data after the fact.

The first review consisted of initial review of the frequency distributions of every survey variable during the data collection process. The CATI data manager reviewed the frequencies for each variable to check for any inconsistencies in the skip patterns or range violations. While rare in a well-tested CATI system, such errors may occur because of unusual situations not anticipated in the design or not revealed during testing. Such quality assurance allows discovering any such problems early in the process, making necessary corrections, and re-calling affected respondents to obtain corrected data (data retrieval). This process did not reveal any errors in the CATI questionnaire programming for MATS 2018.

Throughout the data collection process, the CATI data manager also reviewed comments noted by the interviewers in the CATI system. These comments might have been notes made by the interviewers themselves, or might have been extraneous comments made by the respondents and recorded by the interviewers. Often the comments required no further action. In some instances, the comment could be an indication that the respondent corrected their answer to a previous question, or the interviewer was unsure how to code a particular response. In these cases, the CATI data manager made any necessary edits to the data or referred the case to a MATS data collection manager for a decision. Any such edits were documented in the data edit log, which contains both the original value that was recorded in the interview as well as the new, updated value for each respective variable where an edit occurred, along with a brief description detailing the reason for the edit.

3.7.3 Data Cleaning and Editing Following Data Collection

After data collection was completed, the MATS 2018 data delivery manager developed a SAS program that independently tested the data integrity rules and ascertained the follow through of all skip patterns. This SAS program served as a second layer of quality control to ensure the accuracy of the data integrity rules specified for the instrument. The program produced a detailed, case-by-case, variable-by-variable report

if any errors were encountered. Errors in this context refer to instances where data were either missing, or data were present where they should not have been. The data manager reviewed the error report and made any necessary corrections to the data to accurately satisfy the data integrity rules of the instrument. The data delivery manager also rechecked each variable for values outside of the allowed ranges. All edits made to the dataset were documented in the same data edit log that was used for edits made by the CATI data manager during data collection.

3.7.3.1 Post-coding of Verbatim Text in 'Other-Specify' Questions

Once the data were cleaned, text responses to the various open-ended 'Other-Specify' questions that appear in the MATS 2018 questionnaire were reviewed and recoded. ClearWay Minnesota and MDH approved post-coding and recoding decisions made by Westat, most of which were similar to decisions made in MATS 2014. In addition to creating post-codes for the 'Other-Specify' responses, this process also identified some instances where a categorical response to an earlier question in the same sequence as a given 'Other-Specify' question should be recoded, based on the additional information that the respondent furnished in the 'Other-Specify' response.

All updates made to the data as a result of this process were stored in the final dataset in newly created variables, and the data as originally collected were preserved in historical variables in the dataset. Westat documented the process in a review and recoding protocol document: a database at the record and variable level that recorded all 'Other-Specify' text responses, post-codes, and recodes.

3.7.4 Sample Performance Monitoring During Data Collection

Throughout the data collection process, it was vital to monitor several outcomes, mainly to project estimated final totals from interim results and determine what adjustments were needed or possible, in order to support maximizing the representation of young adults and minority racial and ethnic groups. Aside from standard weekly reports of case dispositions for the sample, there were two areas of particular interest to the survey sponsors and Westat technical managers.

1. From a sample management perspective, it was necessary to monitor the overall yield of completed interviews resulting from the sample release groups activated at the outset and then in subsequent releases, to assure achieving the target number of completed interviews.

2. Sample performance monitoring focused on yield rates by phone type (landline or cell), as well as by sample stratum. Weekly reports also tracked overall number of completes, completes by age group, completes by smoking status, and completes by race/ethnicity.

3.7.4.1 Monitoring the Overall Number of Interviews

It is standard practice in survey research to initially not release all of the originally projected number of sample release groups, and instead release a portion of the sample and then monitor sample performance to determine if more sample is needed. In response to trends and patterns in sample performance identified through the monitoring process, the statisticians and operations managers updated the projections at several points during data collection to determine if the release of additional sample was warranted. Chapter 4 contains additional details about sample sizes.

The landline sample screener and extended response rates were considerably lower than the rates expected based on MATS 2014 results that were adjusted for the estimated decline in RDD response rates from 2014 to 2018. Also, yield rates for both landline and cell sample varied considerably across sampled strata. Westat initially ordered 150 percent of the sample thought to be needed for each stratum. The lower response rates and differential yield rates across sample strata required using more than 100 percent of planned sample for most strata.

3.7.4.2 *Monitoring Smoking Prevalence Rates*

Smoking prevalence rates were monitored throughout data collection, and particularly at the point when the completed sample size was large enough to make the interim calculated rate predictive of the final estimates. There were no indications of any problems or issues based on the review of unweighted counts and proportions of respondents indicating their smoking status. The MATS 2018 unweighted proportions from the landline sample were reasonable based on estimates from MATS 2014. This was true overall and by the two monitored age groups: 18-24 and 25+. In addition, comparisons were made between the landline and cell phone unweighted smoking status proportions. The observed relationships were all within expectations.

4. Data Collection Results

Chapter 4 presents various statistics summarizing the outcomes of the MATS 2018 data collection, separately for the landline and cell phone samples and for the combined sample. The key statistics presented are the call dispositions and the response rates for these two sample groups.

4.1 Completed Interviews

Table 4-1 presents the overall number of completed interviews for the landline and cell phone samples.

Table 4-1. MATS 2018 completed interviews, by sample type

	Landline	Cell	Total
Completed interviews	2,789	3,266	6,055

4.2 Telephone Interviewing Results

4.2.1 Landline Sample Call Dispositions

Tables 4-2 and 4-3 show the detailed dispositions for all of the sampled landline telephone numbers that were released to data collection. Table 4-2 shows the dispositions for the screening of the 106,695 sampled landline numbers; Table 4-3 shows the dispositions of the 4,189 numbers for which a household screener was completed and from which an adult was selected for the MATS 2018 interview. These tables tabulate the actual disposition categories that Westat employed to manage the sample for the MATS 2018 interviewing operations. They also show the standard AAPOR disposition codes to which each lower-level MATS 2018 disposition category is mapped. (AAPOR is the American Association for Public Opinion Research, to which many survey researchers belong and whose members have established various standards for scientific survey research that are widely accepted.)

Table 4-2. MATS 2018 landline telephone number sample dispositions

AAPOR code	Description	Count	Percent (%)
N/A	Completed eligible screener.	4,189	3.9%
4.10	Ineligible screener – Not a landline phone or rings into a household outside Minnesota.	128	0.1%
4.70	Ineligible screener – There is no one in the household age 18 or older to do the screener.	82	0.1%
4.20	Ineligible – Fax or data line.	825	0.8%
4.30	Ineligible – Non-working or disconnected number identified through MSG purging or through data collection.	75,141	70.4%
4.50	Ineligible – Non-residential number identified through MSG purging or through data collection.	6,106	5.7%
2.111	Refusal – Household screener respondent refused to be interviewed or broke off during the screener interview.	5,697	5.3%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number and there are no refusals or language problems in the call history for the household.	822	0.8%
2.21	Respondent never available.	78	0.1%
2.25	Respondent not available during field period.	2	0.0%
2.31	Respondent deceased.	3	0.0%
2.32	Respondent physically or mentally unable to do interview.	14	0.0%
2.33	Language problem: Unable to communicate due to a hearing or speech problem or unable to reach an English speaking household member.	443	0.4%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	5,218	4.9%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	7,947	7.4%
	Total	**106,695**	**100%**

Table 4-3. MATS 2018 landline extended interview sample dispositions

AAPOR code	Description	Count	Percent (%)
1.1	Completed interview.	2,789	66.6%
4.10	Number was determined to be out of scope after screening (duplicate, not a landline).	6	0.1%
4.30	Number was found to be non-working after screening.	16	0.4%
4.50	Number was determined to be non-residential after screening.	6	0.1%
2.112	Refusal – The selected respondent or a gatekeeper refused the interview or the selected respondent broke off during the interview and refused to continue.	857	20.5%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number.	383	9.1%
2.21	Respondent was reported as unavailable at sampled number.	44	1.1%
2.25	Respondent not available during field period.	2	0.0%
2.31	Respondent deceased.	1	0.0%
2.32	Respondent physically or mentally unable to do interview.	39	0.9%
2.332	Respondent language problem.	44	1.1%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	1	0.0%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	1	0.0%
	Total	**4,189**	**100.00%**

Note that AAPOR dispositions account for each sampled phone number. The two tables account for the results of the sampled household members in the 4,189 completed household screeners as a second level of detailed disposition codes. For this reason, there is no corresponding AAPOR code for these cases in Table 4-2; rather, the AAPOR codes for these cases appear in Table 4-3. Separating the cases into the two operational stages provides a clearer understanding of the landline data collection outcomes, while still allowing all 106,695 sampled landline telephone numbers to be classified as to their outcomes according to the standard AAPOR disposition codes.

4.2.2 Cell Phone Sample Call Dispositions

Tables 4-4 and 4-5 show the detailed dispositions for all of the sampled cell phone telephone numbers that were released to data collection. Table 4-4 shows the dispositions for the screening of the 77,925 sampled cell phone numbers; Table 4-5 shows the dispositions of the 4,327 numbers for which a household screener was completed and from which an adult was selected for the MATS 2018 interview.

Table 4-4. MATS 2018 cell phone telephone number sample dispositions

AAPOR code	Description	Count	Percent (%)
N/A	Completed eligible screener.	4,327	5.6%
4.10	Ineligible screener – Not a cell phone, respondent outside Minnesota, not cell-only/cell-mostly.	1,932	2.5%
4.70	Ineligible screener – There is no one in the household age 18 or older to do the screener or sub-sampled out due to age.	4,113	5.3%
4.30	Ineligible – Non-working or disconnected number identified through MSG purging or through data collection.	8,125	10.4%
4.50	Ineligible – Non-residential number.	1,744	2.2%
2.111	Refusal – Household screener respondent refused to be interviewed or broke off during the screener interview.	16,057	20.6%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number and there are no refusals or language problems in the call history for the household.	2,407	3.1%
2.31	Respondent deceased.	1	0.0%
2.32	Respondent physically or mentally unable to do interview.	3	0.0%
2.331	Language problem: Unable to communicate due to a hearing or speech problem or unable to reach an English speaking household member.	782	1.0%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	8,100	10.4%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	30,334	38.9%
	Total	**77,925**	**100%**

Table 4-5. MATS 2018 cell phone extended interview sample dispositions

AAPOR code	Description	Count	Percent (%)
1.1	Completed interview.	3,266	75.5%
4.30	Number was found to be non-working after screening.	18	0.4%
4.50	Number was determined to be non-residential after screening.	6	0.1%
4.70	Respondent was determined to be under age 18 after screening.	1	0.0%
2.112	Refusal – The selected respondent or a gatekeeper refused the interview or the selected respondent broke off during the interview and refused to continue.	642	14.8%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number.	336	7.8%
2.21	Respondent was reported as unavailable at sampled number.	17	0.4%
2.25	Respondent not available during field period.	1	0.0%
2.32	Respondent physically or mentally unable to do interview.	4	0.1%
2.332	Respondent language problem.	29	0.7%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	2	0.0%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	5	0.1%
	Total	**4,327**	**100.00%**

4.2.3 Combined Sample Call Dispositions

Tables 4-6 and 4-7 show the detailed dispositions for all of the sampled telephone numbers (landline and cell combined) that were released to data collection. Table 4-6 shows the dispositions for the screening of the 184,620 sampled telephone numbers; Table 4-7 shows the dispositions of the 8,516 numbers for which a household screener was completed and from which an adult was selected for the MATS 2018 interview.

Table 4-6. MATS 2018 combined telephone number sample dispositions

AAPOR code	Description	Count	Percent (%)
N/A	Completed eligible screener.	8,516	4.6%
4.10	Ineligible screener – Not from correct frame, rings into a household outside Minnesota, cell phone is not cell-only/cell-mostly.	2,060	1.1%
4.70	Ineligible screener – There is no one in the household age 18 or older to do the screener or sub-sampled out due to age (in cell frame).	4,195	2.3%
4.20	Ineligible – Fax or data line.	825	0.4%
4.30	Ineligible – Non-working or disconnected number identified through MSG purging or through data collection.	83,266	45.1%
4.50	Ineligible – Non-residential number identified through MSG purging or through data collection.	7,850	4.3%
2.111	Refusal – Household screener respondent refused to be interviewed or broke off during the screener interview.	21,754	11.8%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number and there are no refusals or language problems in the call history for the household.	3,229	1.7%
2.21	Respondent never available.	78	0.0%
2.25	Respondent not available during field period.	2	0.0%
2.31	Respondent deceased.	4	0.0%
2.32	Respondent physically or mentally unable to do interview.	17	0.0%
2.33	Language problem: Unable to communicate due to a hearing or speech problem or unable to reach an English speaking household member.	1,225	0.7%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	13,318	7.2%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	38,281	20.7%
	Total	**184,620**	**100%**

Table 4-7. MATS 2018 combined extended interview sample dispositions

AAPOR code	Description	Count	Percent (%)
1.1	Completed interview.	6,055	71.1%
4.70	Respondent was determined to be under age 18 after screening.	1	0.0%
4.10	Number was determined to be out of scope after screening (duplicate, not a landline).	6	0.1%
4.30	Number was found to be non-working after screening.	34	0.4%
4.50	Number was determined to be non-residential after screening.	12	0.1%
2.112	Refusal – The selected respondent or a gatekeeper refused the interview or the selected respondent broke off during the interview and refused to continue.	1,499	17.6%
2.20	The maximum calling algorithm has been fulfilled. At least one "human" contact has been made at the number.	719	8.4%
2.21	Respondent was reported as unavailable at sampled number.	61	0.7%
2.25	Respondent not available during field period.	3	0.0%
2.31	Respondent deceased.	1	0.0%
2.32	Respondent physically or mentally unable to do interview.	43	0.5%
2.332	Respondent language problem.	73	0.9%
3.13	The calling algorithm has been fulfilled with no "human" or answering machine contact.	3	0.0%
3.14	The maximum calling algorithm has been fulfilled for a telephone number and only answering machine contact was made.	6	0.1%
	Total	**8,516**	**100%**

4.3 MATS 2018 Response Rates

This section presents the survey response rates for MATS 2018. The method for calculating the MATS 2018 response rates is essentially the same as that used in the MATS 2010 and MATS 2014. Since two independent samples were drawn for the cell phone and landline interviews, the response rates are reported separately for each sample. Section 4.3.1 describes the methodology, including the two phases at which non-response could be encountered, formulas for response rate calculation, and the rationale for focusing on the weighted response rates. Sections 4.3.2 and 4.3.3 report the response rates for the screener and the extended phase respectively, followed by the overall response rates across both phases.

4.3.1 Methodology

Two independent RDD samples were fielded on landline phones and cell phones. Landline phones are usually considered household devices. For the MATS 2018, one adult was randomly sampled from each household for the extended interview once the screener had been completed. In contrast, researchers hold different opinions on whether a cell phone is a person-level or household-level device. Studies have shown that a non-negligible proportion of cell phone users shared their phones with other household members, a common phenomenon even among cell phone-only and cell-mostly households. In the MATS 2018, cell phones were treated as household devices. During the screener interview, the respondent was asked whether other household members shared the cell phone, and if the answer was yes, within-household sampling was conducted to select a respondent for the extended interview. In summary, household members were identified for interviews in a two-phase process for both RDD samples. Screener interviews were conducted to enumerate and sample household members, and then an extended questionnaire, the MATS 2018 instrument, was administered to the sampled person.

Although the screener respondent was automatically selected for extended interview in single-person households in both samples, and in the cell sample when no cell phone sharing occurred, the logic of the two-phase interview still applied to these cases conceptually. The discussions will generally refer to the screening target as "household" and the extended unit for the MATS 2018 interview as "person." The response rates are provided at the following levels:

i. Household-level response to the screening interview;

ii. Person-level response to the extended interview, conditional on screener household response; and

iii. Overall response across the screener and extended phases, which is the product of (i) and (ii). The overall response rate indicates the percentage of possible interviews that were completed taking both survey phases into account.

For each phase, the response rate is generally defined as the ratio of the eligible responding units (i.e., households or persons) to the (estimated) number of units sampled and eligible for the interview in that phase. The MATS 2018 response rates are based on the AAPOR standards.[5] All of the AAPOR response rate formulas collapse the numeric AAPOR disposition codes (Tables 4-2 through 4-5) and then assign them to the broad response categories in Table 4-8. The AAPOR formulas further collapse the latter into a few categories represented by the symbols that appear in the mathematical formula statements.

Table 4-8. AAPOR response rate formula categories

AAPOR response category	AAPOR response category meaning	Screener response rate formula category
I	Completed Interview	E
P	Partial Interview	N_e
R	Refusal and break-off	N_e
NC	Non-contact	N_e
O	Other	N_e
UH	Unknown if household occupied	N_u
UO	Unknown, other	N_u

AAPOR has two similar response rate formulas that are relevant to the MATS 2018, RR3 and RR4. The only difference between AAPOR RR3 and RR4 is that RR3 excludes partial completes from the numerator and RR4 includes them, resulting in a slightly higher response rate. RR4 can be used only if partial completes are weighted and included in the final data file. The MATS 2018 did not include partial completes in the analysis file and did not assign a final sample weight to them. To be included in the weighted file used for analysis, an interview had to have reached the last question, J11, J11a, or J11b, as applicable based on the skip pattern. Those that broke off before this point are accounted for in Tables 4-3 and 4-5 among the breakoffs.

[5] For reasons explained in Section 4.3.2, MATS 2018 developed an allocation factor to account for the proportion of non-response screener cases that were outside the population covered by each the two sample frames. This factor, called *f*, is not an AAPOR standard, although it is comparable in purpose and application to the AAPOR *e* factor applied to screener non-response to account for non-residential phone numbers among the non-responding screener sample.

The screener response rates for both samples are calculated using the following formula:

$$R_{screener} = \frac{E}{E + f(N_e + eN_u)}$$

where

E = number of responding households;
N_e = number of nonresponding households (known to be residential ; unknown about whether the households belonged to the MATS 2018 target population);
N_u = number of cases with unknown residential status (due to non-contact);
e = estimated residential rate among nonresponding cases with unknown residential status; and
f = estimated proportion of the nonresponding residential cases that belonged to the MATS 2018 target population.

For the MATS 2018, since there is no auxiliary information about the residential status of the non-contact cases or the proportion of the nonresponding residential cases that belonged to the target population, it is necessary to estimate the factors *e* and *f* in the screener response rate formula using the residential and eligibility rates among those whose status could be determined through the screener. Details will be discussed in Section 4.3.2.

The extended interview was administered only among the eligible adults sampled from the screener responding households. At the extended stage, there is no sampling unit with unknown residential and/or eligibility status. The extended response rate is calculated at the person level using the simple formula:

$$R_{extend} = \frac{E}{E + N_e}$$

where

E = number of respondents to the extended interview; and
N_e = number of nonrespondents to the extended interview.

Response rates can be either unweighted or weighted. The unweighted response rate, computed using the raw number of cases, provides a useful description of the success of

the operational aspects of the survey. The weighted rate, computed by summing the weights for all the cases in both the numerator and denominator, gives a better description of the success of the survey with respect to the sampled population. For the MATS 2018, the unweighted and weighted rates differed moderately due to different basic design weights for sampled phone numbers, CELLWINS-based subsampling, weight adjustment factor associated with within-household selection, and age-based subsampling. Sections 4.3.2 and 4.3.3 report the weighted response rates because weighted response rates allow direct comparisons between different surveys with the same target population regardless of the sample design employed.

4.3.2 Screener Response Rates

Table 4-9 shows the counts of the phone numbers fielded in the MATS 2018 by response rate formula category. The four major types of residential status are (1) those identified as residential households that belonged to the target population of MATS 2018 (E and N_e), (2) those identified as residential households but not belonging to the MATS 2018 target population (I_{NT}), (3) those identified as nonresidential (primarily nonworking and business) phone numbers (I_{NR}), and (4) those phone numbers that, despite numerous attempts, could not be classified as either residential or nonresidential (N_u). The inclusion of the second type is driven mainly by the variety and large number of cases in the cell phone sample that were screened but not included in the interviewed sample (out of state, used exclusively by minors, not cell phone-only or cell phone-mostly), but some of these situations also occur in the landline sample, although far less often. Calculation of response rates is complex because of the possible ways to estimate the residential rate among the phone numbers whose residential status is unknown as well as the proportion of non-responding households that belong to the target population. In the landline RDD survey for MATS 2007, the residential rate was estimated using subfactor e's of 0.27 and 0.63 for "No Answers" and "Answering Machines," respectively, which produced a blended e of 0.44. Since the MATS 2010, due to the changing telephone industry and our incomplete knowledge of cell phone usage pattern, e has been estimated using the Council of American Survey Research Organizations (CASRO) approach. The CASRO rate is computed by allocating the

numbers with unknown residential status in the same proportion observed in the numbers with known residential status, which is considered a conservative approach.

$$e = \frac{E + N_e + I_{NT}}{E + N_e + I_{NT} + I_{NR}}$$

where

E = number of responding households;
N_e = number of nonresponding households (known to be residential; unknown about whether the households belonged to the MATS target population);
I_{NT} = number of residential households determined (through the screening interview) to be out of scope of the MATS target population; and
I_{NR} = number of sampled phone numbers determined to be nonresidential.

Table 4-9. Unweighted counts of phone numbers by screener response rate formula category

Screener response rate formula category	Landline sample	Cell phone sample
Residential respondents *(E)*	4,191	4,327
Nonrespondents known to be residential; unknown whether the households belonged to the MATS 2014 target population *(N_e)*	7,057	19,250
Residential households determined (through the screening interview) to be out of scope of the MATS 2014 target population (I_{NT})	210	6,045
Sampled phone numbers determined to be nonresidential (nonworking or business) *(I_{NR})*	82,072	9,869
Nonrespondents with unknown residential status due to non-contact (N_u)	13,165	38,434
Ring no answer	5,693	8,100
Answer machine	7,472	30,334

For MATS 2018, the CASRO approach was used to estimate residential rates among the phone numbers with unknown residential status, although the implementation detail was slightly different from MATS 2010 and MATS 2014. This is because our research indicated that for MATS 2018, the residential rates varied noticeably by landline sampling stratum and cell phone CELLWINS value. Therefore, the residential rates were calculated separately for each landline sampling stratum and cell phone CELLWINS group. Table 4-10 shows the estimated residential rates. For the landline sample, the residential rates were substantially higher for the Hispanic surname and

Asian surname strata than for other strata. For the cell phone sample, the phone numbers flagged as "active" were significantly more likely to be residential than those flagged as "inactive" or "unknown".

Table 4-10. Estimated residential rates (*e*) by landline sampling stratum and cell phone CELLWINS flag

Frame	Sampling stratum or CELLWINS flag	Estimated residential rate
Landline	Hispanic surname	0.75
	Asian surname	0.82
	Metro area with % of "other minorities" >= 20%*	0.43
	Metro area with % of "other minorities" >= 15% and < 20%	0.59
	Non-metro area with % of "other minorities" >= 15%	0.28
	Metro area with % of "other minorities" < 15%	0.53
	Non-metro area with % of "other minorities" < 15%	0.39
Cell phone	Active	0.85
	Inactive	0.11
	Unknown	0.07

*"Other minorities" refer to persons other than Hispanic, Asian, or non-Hispanic White only.

In the absence of any additional information for calculating the factor *f*, the proportion of nonresponding residential households that belonged to the MATS 2018 target population, this rate is estimated using the information collected during the MATS screening interview. The factor *f* is calculated as below, and a single value is obtained at the state level for stability. The estimated *f* is 0.96 for the landline sample and 0.41 for the cell phone sample. The low rate for the cell phone sample is due to the large proportion of residential cell phone numbers that were not the MATS target population (e.g. non-adult cell phone users, not cell phone-only or cell phone-mostly).

$$f = \frac{E}{E + I_{NT}}$$

where

E = number of responding households; and
I_{NT} = number of residential households determined (through the screening interview) to be out of scope of the MATS 2018 target population.

The screener weighted response rates are calculated using screener result codes, the estimated *e* and *f*, and household base weights. The results are shown in Table 4-12, with 26.9 percent for the landline sample and 18.1 percent for the cell phone sample.

4.3.3 Extended Response Rates and Overall Response Rates

One adult was selected from each eligible, screened household for the extended interview. Table 4-11 gives the final status of all adults sampled for the extended interview. All sampled adults were eligible for interview, so they were either respondents or nonrespondents. A person-level base weight is applicable at the extended phase, which accounts for household basic design weights, CELLWINS-based subsampling, within-household subsampling, and cell phone age-based subsampling. The weighted extended response rates are 64.9 percent for the landline sample and 73.8 percent for the cell phone sample, as shown in Table 4-12.

Table 4-11. Unweighted counts of sampled persons by extended response rate formula category

Extended response rate formula category	Landline sample	Cell phone sample
Respondents *(E)*	2,789	3,266
Nonrespondents *(N_e)*	1,400	1,061

Table 4-12. Weighted response rates for landline and cell phone samples

Weighted response rate	Landline sample	Cell phone sample
Screener	26.9%	18.1%
Extended	64.9%	73.8%
Overall	17.5%	13.4%

Table 4-12 indicates that it is easier to obtain response on the landline than on the cell phone at the screener phase. However, once the screener has been completed, a cell phone case is more likely to respond to the extended interview than a landline case. This is probably because the majority of cell phones are personal devices (i.e. not shared by other household members), so the screener respondent himself/herself is very likely to be selected for the extended interview. In contrast, within-household sampling is applicable to the majority of landline cases, and it is more difficult to gain cooperation

when a different person other than the one who has responded to the screener is sampled for the extended interview.

The last row in Table 4-12 gives the overall weighted response rate for each sample, which is the product of the screener and extended rates. The non-responseoverall weighted response rates are 17.5 percent for the landline sample and 13.4 percent for the cell phone sample.

4.4 Selected Operational Statistics

This section presents some statistics that characterize various operational aspects of MATS 2018.

4.4.1 Principal Sources of Non-response

4.4.1.1 Principal Sources of Non-response in Landline Sample

Table 4-13 summarizes the results for all landline cases, after eliminating the known non-working and non-residential numbers. Consistent with the AAPOR RR3 formula, this table collapses the screening and extended interview processes into a single set of results. For example, a screener refusal in one case and a completed screener that resulted in a refusal of the extended interview in another case are treated identically and count as two refusals in this table. The largest source of landline sample non-response was non-contact to the screener or extended interview: 60 percent out of the total 21,596 possible phone numbers that could have yielded a completed interview were not able to be contacted at one of the two stages. Refusal was the second-largest source of landline sample non-response. 6,554 cases (30.3 percent) resulted in a refusal at either the screener or extended stage. Combined, these two outcomes accounted for 91.3 percent of the total non-response. The remaining 1,875 cases (8.7 percent) were contacts that did not refuse, but did not complete the interview. These were cases where an initial contact requested a call-back but where future contact attempts were unsuccessful.

Table 4-13. Sources of non-response in landline sample, collapsed across screening and extended interview stages

	Count	Percent of non-respondents
Total non-respondents	21,596	
Refused	6,554	30.3%
No contact	13,167	61.0%
Other	1,875	8.7%

There is one point to keep in mind in regard to the numbers cited in the previous paragraph. First, as explained in Section 4.3, some undetermined proportion of the non-contact cases at the screener level were not really households, and the response rate formula discounted a proportion of them as non-residential. The statistics presented in this section are purely operational and count all non-contact cases as non-response. It is also informative, and more straightforward, to look at sources of non-response for the landline extended interview, that is, among the 4,189 adults selected for the interview from the completed screeners. Table 4-14 shows there were 4,177 eligible cases among the 4,189 selected. Those who were not eligible were individuals who, upon being contacted for the interview, were found to have been called at a non-household number or were otherwise out of scope. There were 1,388 non-respondents, of whom the largest number were 857 refusals (61.7 percent of non-respondents and 20.5 percent of all eligible sample). Most of the remainder were individuals who could not be reached despite repeated attempts to do so, including the extra call attempts made beyond the protocol parameters. These were 385 cases, or 27.7 percent of non-response and 9.2 percent of all eligible sample. Combined, refusals and maximum contacts accounted for 1,242 non-respondents, or 89.5 percent of all non-response and 29.7 percent of all eligible adult sample.

Table 4-14. Primary sources of non-response in landline extended interview sample

	Count	Percent of non-respondents (n = 1,388)	Percent of total eligible sampled (n = 4,177)
Total sampled	4,189	–	–
Ineligible/out of scope	12	–	–
Total eligible sampled	4,177	–	100.0
Total complete	2,789	–	66.8
Total non-respondents	1,388	100.0	33.2
Refused	857	61.7	20.5
Maximum contact attempts	385	27.7	9.2
Other	146	10.5	3.5

4.4.1.2 Principal Sources of Non-response in Cell Phone Sample

Table 4-15 summarizes the results for all cell phone cases, after eliminating the known non-working numbers and numbers not used for personal use. As in the landline non-response table above (Table 4-14), this table collapses the screening and extended interview processes into a single set of results. The largest source of cell phone non-response was non-contact to the screener or extended interview: 65.5 percent out of the total 58,720 possible cell phone numbers that could have yielded a completed interview or successful screener were not able to be contacted at one of the two stages. Refusal was the second-largest source of cell phone non-response: 16,699 cases (28.4 percent) resulted in a refusal at either the screener or extended stage. Combined, these two outcomes accounted for 93.9 percent of the total non-response. As with the landline sample, most of the other non-response consists of cases that were initially contacted without a refusal, but where further contact attempts were unsuccessful.

Table 4-15. Primary sources of non-response in cell phone sample, collapsed across screening and extended interview stages

	Count	Percent of non-respondents
Total non-respondents	58,720	
Refused	16,699	28.4%
No contact	38,441	65.5%
Other	3,580	6.1%

As in the landline non-response discussion, the statistics presented in this section for the cell phone sample are purely operational and count all non-contact cases as non-response. Again, it is interesting to look at sources of non-response for the cell phone extended interview, that is, among the 4,327 adults selected for the interview from the completed screeners. Table 4-16 shows there were 4,320 eligible cases among the 4,327 selected. Most of those not eligible were individuals who, upon being contacted for the interview, were found to have been called on a non-residential phone. There were 1,054 non-respondents, of whom the largest number were 642 refusals (60.9 percent of non-respondents and 14.9 percent of all eligible sample). Following the refusals were individuals who could not be reached despite repeated attempts to do so, including the extra call attempts made beyond the protocol parameters. These were 343 cases, or 32.5 percent of non-response and 7.9 percent of all eligible sample. Combined, refusals and maximum contacts accounted for 985 non-respondents, or 93.5 percent of all non-response and 22.8 percent of all eligible adult sample.

Table 4-16. Primary sources of non-response in the cell phone extended interview sample

	Count	Percent of non-respondents (n = 1,054)	Percent of total eligible sampled (n = 4,320)
Total sampled	4,327	–	–
Ineligible/out of scope	7	–	–
Total eligible sampled	4,320	–	100.0
Total complete	3,266	–	75.6
Total non-respondents	1,054	100.0	24.4
Refused	642	60.9	14.9
Maximum contact attempts	343	32.5	7.9
Other	69	6.5	1.6

4.4.2 Refusal Conversion Results

Recontacting people who initially refuse to participate in an interview is designed to increase the sample size and response rates, and also to reduce bias associated with including in the sample only those who are most inclined to respond. This section describes the results of the refusal conversion efforts for the landline and cell phone screeners, and the landline and cell phone extended interviews, as summarized in Table 4-17 and Table 4-18. In table 4.17, the number of screeners converted refers to completed screeners that were identified as eligible. There were additional cases that

initially refused and were then successfully contacted and identified as ineligible. From a technical perspective, the screeners were completed for these cases; however, this table focuses on showing how the refusal conversion effort improved the sample yield and thus only counts cases screened as eligible as successful conversions.

4.4.2.1 Screener Refusal Conversion Results

Table 4-17. MATS 2018 screener refusal conversion

	Landline screener	Cell phone screener	Combined screener
Assigned to data collection	113,050	77,925	190,975
Initially refused (#)	7,250	19,326	26,576
Converted (#)	1,136	1,212	2,348
Converted (%)	15.7%	6.3%	8.8%
Total completed	4,189	4,327	8,516
Converted as percent of completed	27.1%	28.0%	27.6%

Table 4-18. MATS 2018 extended interview refusal conversion

	Landline extended	Cell phone extended	Combined extended
Assigned to data collection	4,189	4,327	8,516
Initially refused (#)	1,024	711	1,735
Converted (#)	217	122	339
Converted (%)	21.2%	17.2%	19.5%
Total completed	2,789	3,266	6,055
Converted as percent of completed	7.8%	3.7%	5.6%

Landline Screener Conversion. At the screener stage, the initial telephone contact resulted in a refusal to respond to the landline screener questions at 7,250 landline phone numbers. After conversion attempts with the initial landline refusals, 1,136 of these cases became (eligible) completed screener interviews, representing a conversion rate of 15.7 percent and constituting 27.1 percent of the total 4,189 completed landline screeners.

Cell Phone Screener Conversion. The initial cell phone contact resulted in a refusal to respond to the cell phone screener questions at 19,326 cell phone numbers. After conversion attempts with the initial cell phone refusals, 1,212 of these cases became (eligible) completed screener interviews, representing a conversion rate of 6.3 percent and constituting 28.0 percent of the total 4,327 completed cell phone screeners. As

compared to the landline screener, it was more difficult to convert a cell phone screener refusal. While there are many possible explanations for the lower conversion rate in the cell phone sample, one explanation could be due to the fact that cell phones are often used by one individual, while landline phones are often used by multiple members of a household. When calling back to convert a landline refusal, there is a greater chance of reaching a different (and willing) screener respondent than when calling cell phone refusals. Also, the cell phone sample had larger numbers of ineligible cases as cell phones were much more likely than landlines to be used exclusively by someone under the age of 18 or to be used by someone living outside of Minnesota. Also, cell phone cases had to meet the criteria of being cell-only or cell-mostly. Very few initial screener refusals from the landline sample (n=21) were found to be ineligible during conversion, while this number was considerably larger for the cell sample (n=1,408). The screener conversion success rates including cases screened as ineligible were 16.0 percent for landline and 13.6 percent for cell.

Combined Screener Conversion. Overall at the screener stage, the initial contact resulted in a refusal to respond to the screener questions at 26,576 phone numbers. After conversion attempts with the initial refusals, 2,348 of these cases became completed screener interviews, representing a conversion rate of 8.8 percent and constituting 27.6 percent of the total 8,516 completed screeners.

4.4.2.2 Selected Household Member Conversion

Conversion of Selected Household Members in Landline Sample. Among the household members selected for the MATS 2018 interview in the landline sample, 1,024 initially refused to respond to the interview. After conversion attempts, 217 of these completed the interview. This is a conversion rate of 21.2 percent, representing 7.8 percent of the total 2,789 completed landline interviews.

Conversion of Selected Cell Phone Users in Cell Phone Sample. Among the cell phone users selected for the MATS 2018 interview in the cell phone sample, 711 initially refused to respond to the interview. After conversion attempts, 122 of these completed the interview. This is a conversion rate of 17.2 percent, representing 3.7 percent of the total 3,266 completed cell phone interviews. While it was easier to convert a landline

screener refusal than a cell phone screener refusal, there is not a large difference in the landline and cell phone *extended* conversion rates. Using the same logic discussed above, the landline respondent has already been selected at the extended level, so the conversion attempt must be made with the same respondent. The landline extended interview conversion no longer has the possibility of reaching a different household member who may be more willing to complete the interview.

Conversion of Selected Respondents in Combined Sample. Among the respondents selected across both samples, 1,735 initially refused to respond to the extended interview. After conversion attempts, 339 of these completed the interview. This is a conversion rate of 19.5 percent representing 5.6 percent of the total 6,055 completed interviews.

4.5 Interview Timing

Tables 4-19 and 4-20 present statistics about the length of time it took to administer the MATS 2018 interview. Table 4-20 shows the mean, minimum, and maximum lengths for the cell phone and landline screener; Table 4-21 shows the mean, minimum, and maximum lengths of the extended interview for the overall sample and for different smoking statuses.

Table 4-19. Screener lengths (minutes)

Sample group	Mean	Minimum	Maximum
Cell phone	2.98	1.17	11.92
Landline	2.17	1.17	21.35

Table 4-20. Extended interview lengths (minutes)

Sample group	Mean	Minimum	Maximum
Current smokers	15.41	7.78	37.43
Former smokers	11.74	6.37	41.18
Experimental smokers	10.15	5.62	41.80
Never smokers	10.52	6.07	29.15
All respondents	11.29	5.62	41.80

Overall, the average extended interview lasted just over 11 minutes. The design target for the MATS 2018 extended questionnaire was a sizable reduction from the 13.8-minute 2014 interview. As expected, interviews with current and former smokers took longer to complete than did those with experimental and never smokers, with the current smokers requiring the most time on average, owing to the largest number of questions applying to their circumstance.

5. Weighting

The objectives of the MATS 2018 survey are to not only make inferences about the entire civilian, non-institutionalized adult population in Minnesota, but to also give good precision for estimates about race and ethnicity minority groups and young adults. Sample weights are created so that population estimates can be calculated using the results of a survey from a sample of a finite population. Weighting is necessary to account for the differential probabilities of selection and to reduce potential bias due to non-response and differential coverage of subpopulations. Although weighting adjustments are aimed at reducing bias, these adjustments typically introduce variation in the weights, which increases the variances of survey estimates. Care was taken in the development and implementation of the weighting methodology for the MATS 2018 to meet the analysis needs and balance the bias reductions against the potential increases in variance.

Two Random Digit Dialing (RDD) samples were selected and fielded for MATS 2018, one on landline phones, and the other on cell phones. The weighting process consists of the following stages:

1. Create household-level base weights that reflect the different probabilities of selection for the sampled phone numbers from landline and cell phone frames by sampling stratum and account for CELLWINS subsampling. Then adjust these weights for screener non-response and multiple phone numbers in a household.

2. Calculate person-level weights to account for within-household sampling and cell phone age-based subsampling, and then adjust for non-response to extended interviews.

3. Conduct a composite weighting adjustment on the overlap component between the two samples – the cell phone-mostly group.

4. Calibrate the composite weights to the population totals estimated from reliable external sources to further reduce remaining non-response and non-coverage errors. A trimming and re-calibration step was also incorporated into this stage.

Parallel weighting adjustments were conducted for the landline and cell phone samples separately in stages 1 and 2 before the two samples were combined for stages 3 and 4. Only one set of weights was created for the combined dataset that includes the respondents from both samples, which can be used to produce estimates for the entire adult population in Minnesota as well as its subgroups. Sections 5.1 through 5.4 cover each of the four weighting stages. Some of the stages involve multiple steps, which will be discussed in greater detail below.

5.1 Household-Level Weights

As discussed in Chapter 2, both cell phone and landline phones were treated as household devices in MATS 2018. The primary purpose of the screening interview was to provide information required to assess the eligibility of household members for the MATS 2018 interview. Household weights were calculated solely for use as a basis for computing person-level weights for the analysis of interview data.

The household-level weight for household j sampled from phone type p, $HHW_{j(p)}$, is the product of three factors:

- Base weight of the telephone number sampled from phone type p, which accounts for both differential sampling across stratum and CELLWINS-based subsampling ($A_{j(p)}$);
- Adjustment for screener non-response ($B_{j(p)}$); and
- Adjustment for the number of telephone numbers in a household ($C_{j(p)}$).

The procedure for computing the household-level weights for each sample is described in Sections 5.1.1 through 5.1.3.

5.1.1 Household Base Weights

Each sampled telephone number was assigned an initial base weight, and this was done separately by sampling stratum for each of the two RDD samples. This initial base weight was computed as the product of (1) the inverse of the probability of selection of the telephone number from the stratified sampling frame; and (2) the inverse of the subsampling rate for CELLWINS-based subsampling. Since differential selection

probabilities were used across the sampling strata, the base weights ($A_{j(p)}$) varied noticeably within the landline sample and cell phone sample.

5.1.2 Adjustment for Screener Non-response

This step adjusts for households that did not respond to the screener. Each sampled telephone number was classified as a respondent (*R*), a nonrespondent (*NR*), or an ineligible case (*I*). The base weights of the nonrespondent cases were distributed to the weights of the respondent cases. Separate adjustments were made by phone type because the screener response propensities varied noticeably between cell phone and landlines. Since the sampling strata were formed based on density of race and ethnicity minority groups and metro/non-metro area, this information was used to create non-response adjustment cells within each phone type. The non-response adjustment factor $B_{j(p)}$ applied to each responding household j in phone type p is

$$B_{j(p)} = \frac{\sum_{j(p)\in R} A_{j(p)} + \sum_{j(p)\in NR} A_{j(p)}}{\sum_{j(p)\in R} A_{j(p)}}$$

5.1.3 Adjustment for Multiple Telephone Numbers in Household

At the end of the landline screener interview, information about the existence of additional telephone numbers and their use in the household was collected. If the household had an additional telephone number for residential use (not solely for business, fax or computer use), the selection probability associated with the household was higher and the weight had to be adjusted to account for this. For the cell phone sample, if there were multiple persons in the household, each with a cell phone that was not shared by other household members, then the multiple phone number adjustment factor should be cancelled out by the weighting factor for within-household selection (to be discussed in Section 5.2.1). To keep the implementation simple, a factor of 1 was applied for all the cell phone sample cases in this step.

The adjustment factor for multiple phone numbers is independent of the sampling stratum and takes the following values:

$C_{j(p)}$ = 1 if phone type p indicates cell phone
= 1 if phone type p indicates landline and household j has no more than one telephone number
= 0.5 if phone type p indicates landline and household j has more than one telephone number

In this adjustment, it is standard practice to assume that there is at most one additional residential use telephone number in the household. Research has shown that there are too few households with more than two such numbers to significantly affect the weight distribution even if the inverse of the exact number of phone lines is used in the formula.

Thus, the household-level weight for household j of phone type p, $HHW_{j(p)}$, is given by:

$$HHW_{j(p)} = A_{j(p)} \cdot B_{j(p)} \cdot C_{j(p)}$$

As in the MATS 2010 and MATS 2014, all the initial refusals were subject to refusal conversion during the MATS 2018 data collection period. By doing so, there was no longer any need for computing and applying a household adjustment factor for refusal conversion subsampling as was done for the MATS 2007, because the adjustment factor would equal 1 for all the cases.

5.2 Person-Level Weights

Household-level weights were used as the starting point for creating person-level weights. The person-level weight for sampled person in household j of phone type p, $PW_{j(p)}$, is the product of the household-level weight and two weighting adjustment factors:

- Adjustment factor associated with within-household selection and age-based subsampling ($D_{j(p)}$); and
- Adjustment for the MATS 2014 extended interview unit non-response ($E_{j(pc)}$).

The procedure for computing the person-level weights for each sample is described in Sections 5.2.1 and 5.2.2.

5.2.1 Adjustment for Within-Household Selection and Cell Phone Age-Based Subsampling

For both phone types, the extended interview was administered to only one person per household. The adjustment factor accounting for within-household sampling and cell phone age-based subsampling for the sampled person from household *j* interviewed through phone type *p* is:

$$D_{j(p)} = N_{j(p)} \cdot M_{j(p)}$$

where $N_{j(p)}$ is the number of eligible adults in household *j* with phone type *p* that shared the sampled telephone number, and $M_{j(p)}$ is the weighting factor accounting for cell phone age-based subsampling as described in Section 2 (with value of 1 for all the landline cases).

For the landline cases as well as the cell phone cases where the phone was shared, the adjustment factor is equal to the number of eligible adults in the household (standard landline RDD protocol simply assumes that all adults in a household "share" the sampled phone number). For the cell phone sample, if the screener respondent reported that the phone was not shared by any other adult household members, then he/she was invited to continue with the extended interview directly, and thus received an adjustment factor of 1 for within-household selection. Similar to what was done in the MATS 2010 and MATS 2014, the maximum value for this adjustment factor was set to 3 for the shared cell phone cases in the MATS 2018 because the proportion of households with more than three adults sharing a single cell phone is very small. For the landline sample, no upper limit was set for this adjustment factor.

For the sampled person from household j of phone type p, the person-level weight before extended non-response adjustment, $UPW_{j(p)}$, can be calculated as the product of the household-level weight and the adjustment factor accounting for within-household sampling and cell phone age-based subsampling:

$$UPW_{j(p)} = HHW_{j(p)} \cdot D_{j(p)}$$

5.2.2 Adjustment for Extended Interview Non-response

The adjustment for extended interview non-response was very similar to what was done for the screener phase, except that it was possible to use the variables collected during the screening interview to form non-response adjustment cells. For each phone type, the non-response adjustment cells were formed based on phone ownership and usage status, gender, age categories, and whether the phone number was associated with metro or non-metro area. The non-response adjustment factor, $E_{j(pc)}$, applied to the respondent from household j in adjustment cell c of phone type p is

$$E_{j(pc)} = \frac{\sum_{j(pc)\in R} UPW_{j(pc)} + \sum_{j(pc)\in NR} UPW_{j(pc)}}{\sum_{j(pc)\in R} UPW_{j(pc)}}$$

The person-level weight for the sample person from household j associated with phone type p and extended non-response adjustment cell c, $PW_{j(pc)}$, is calculated as:

$$PW_{j(pc)} = UPW_{j(p)} \cdot E_{j(pc)}$$

5.3 Composite Weights

Although separate person-level weights were created for landline and cell phone cases, as described in Section 5.2, it is inappropriate to generate population estimates using either sample by itself. Each sample covers only a subset of the Minnesota adult population and these subsets also overlap somewhat. Specifically, the landline sample is missing the cell-only households and the cell phone sample includes the cell-only and cell-mostly households; the cell sample and the landline sample both include the cell-mostly households. Given this, the next step was to combine the two samples into one

dataset and develop a single set of weights (referred to as composite weights). The composite weight, $PW_{j\,(comp)}$, for the sample person in household j, is calculated as:

$$
\begin{aligned}
PW_{j(comp)} &= \lambda \cdot PW_{j(cellphone)} && \text{for cell phone-mostly cases in cell phone sample} \\
&= (1-\lambda) \cdot PW_{j(landline)} && \text{for cell phone-mostly cases in landline sample} \\
&= PW_{j(cellphone)} && \text{for other cases in cell phone sample} \\
&= PW_{j(landline)} && \text{for other cases in landline sample}
\end{aligned}
$$

where λ is the compositing factor for the overlapping cell phone-mostly cases.

Careful considerations were given to the determination of λ associated with the cell phone-mostly cases covered by both samples to balance the trade-off between bias and variance. A single compositing factor is used to combine the cell-mostly cases from the landline sample and cell phone sample regardless of the sampling strata because choosing different compositing factors by stratum might increase the variance without reducing bias significantly. For MATS 2018, λ was calculated to be 0.65 to minimize the variances of the measures of interest.

5.4 Calibration to External Population Totals

The last stage of weighting was to calibrate the composite person-level weights to Minnesota adult population estimates. Calibration to population control totals is a commonly used estimation procedure to reduce potential bias and variance. The calibration method used for the MATS 2018 was raking, an iterative procedure where the weights are benchmarked to multiple sets (or dimensions) of marginal control totals in a sequential order until the sums of the raked weights equal the marginal control totals for all the dimensions, or the differences are within a specified tolerance level. Two data sources were used to obtain the population estimates: (1) demographic information from the 2016 ACS; and (2) distribution of phone status from the most recent National Health Interview Survey. As in the MATS 2010 and MATS 2014, phone status was included as a dimension for calibration because tobacco use behavior was believed to be associated with landline/cell phone ownership and usage (e.g., cell-only or cell-mostly) pattern. The raking dimensions for MATS 2018 are very similar to those in MATS 2014 except that the "region" dimension is dropped. The "metro/mon-metro

by collapsed race" dimension is still used, and "education by age" remains the last dimension as in the MATS 2010 and MATS 2014 because the smoking prevalence rates are most sensitive to these two variables. The raked weight for the responding person in household j, RPW_j, can be expressed as

$$RPW_j = PW_{j(comp)} \cdot \prod_{d=1}^{D} RF_{dl}$$

where RF_{dl} is the raking factor for dimension d, level l which respondent jk is in. For example, if the 4th dimension (d =4) is sex with two levels (l=1 for male and l=2 for female), then the raking factor for this dimension is RF_{41} for the adult male. The raking factors are derived so the following relationship holds for every raking dimension d, level l:

$$CNT_{dl} = \sum_{j} \delta_{dlj} \cdot RPW_j$$

where CNT_{dl} is the control total, and δ_{dlj} = 1 if the adult in household j is in level l of dimension d and δ_{dlj} = 0, otherwise. The MATS 2018 weights were raked to the five dimensions defined in Table 5-1. Raking to these six dimensions simultaneously controlled for phone status, gender, age, race/ethnicity, metro/non-metro residence, and educational attainment. A very small proportion of these variables had missing values and were imputed in order to categorize each person to the appropriate categories for raking. Random allocation was used to impute the data. The algorithm ensured that the distributions of the imputed values were the same as the distributions of the respondent-reported non-missing values.

Table 5-1. Description of variables used to define MATS 2018 RDD raking cells

Raking dimensions	Raking cell definitions
Dimension 1	
Telephone status/usage	Having cell phone only Having cell phone mostly Having landline and cell phone, but not cell phone mostly Having landline only
Dimension 2	
Gender x Age groups	Male, 18 to 24 years Male, 25 to 29 years Male, 30 to 34 years Male, 35 to 44 years Male, 45 to 54 years Male, 55 to 64 years Male, 65 years and older Female, 18 to 24 years Female, 25 to 29 years Female, 30 to 34 years Female, 35 to 44 years Female, 45 to 54 years Female, 55 to 64 years Female, 65 years and older
Dimension 3	
Race/Ethnicity	Hispanic Non-Hispanic, White Non-Hispanic, African American Non-Hispanic, Asian Non-Hispanic, Native American, Pacific Islander Non-Hispanic, Other race, 2 or more races
Dimension 4	
Metropolitan/Non-metropolitan x Collapsed Race	Metropolitan, Hispanic Metropolitan, Non-Hispanic, White Metropolitan, Non-Hispanic, African American Metropolitan, Non-Hispanic, Asian Metropolitan, Non-Hispanic, Native American, Pacific Islander, Other race, 2 or more races Outside Metropolitan, Hispanic Outside Metropolitan, Non-Hispanic, White Outside Metropolitan, Non-Hispanic, African American, Asian, Native American, Pacific Islander, Other race, 2 or more races
Dimension 5	
Educational attainment x Age	Less than HS degree by the age groups in dimension 2 HS degree or equivalent, by the age groups in dimension 2 At least some college, by the age groups in dimension 2 BS degree or above, by the age groups in dimension 2

Due to the cumulative effect of all the weighting steps described above, very large weights resulted for a small number of cases, which would drive up the variance of the estimates. Weight trimming to reduce the impact of such large weights was conducted for the MATS 2018. The portions of the trimmed weights were redistributed to other cases by similar dimensions shown in Table 5-1 where the weights were trimmed, and the calibration operation described above was then reapplied to the trimmed/redistributed weights. This iterative process was repeated three times. Weight trimming is commonly used in regular survey practice. Evaluation was conducted using the smoking prevalence estimate to ensure that the potential small bias introduced through trimming was outweighed by the variance reduction, such that a reduction in the overall mean squared error was expected.

6. Comparability with Previous MATS Surveys and Limitations of the Data

It is helpful for users of the MATS 2018 data to be aware of the survey methods described in this methodology report when analyzing the data, interpreting the findings, reading reports, and applying the results to historical assessment and planning for the future. It is likewise helpful for them to be informed of any known or potential limitations that apply to the use of the data. Finally, when comparing the results of MATS 2018 to those of previous MATS surveys, it is important to consider methodological factors that may affect the comparability of the data from one round to the next. This report focuses mainly on comparability of MATS 2018 with the immediately previous round, MATS 2014, but also examines comparability across all six rounds when relevant and feasible.

6.1 Comparability Issues

6.1.1 Sampling

From the sample design perspective, the MATS 2014 and the MATS 2018 were similar in that the two designs targeted the same inference population and had similar general coverage of that population. However, MATS 2014 sampled the state disproportionately by region whereas MATS 2018 over-sampled phone numbers that were more likely to reach minority race and ethnic groups. Also, MATS 2018 sub-sampled adults over the age of 34 in the cell frame to increase the proportion of interviews from younger adults. The weighting described in Chapter 5 adjusted for these sampling differences and statewide estimates are consistent across the two surveys.

6.1.1.1 Similarities Between the 2014 and 2018 Sample Design

The sample design for 2014 and 2018 were similar in many aspects. First of all, a dual-frame RDD sample including landline and cell phone was used in both the MATS 2014 and the MATS 2018. Both designs employed a take-all approach for the landline sample and a screening for cell-only and cell-mostly approach for the cell phone sample.

Second, the eligibility criteria were the same between the MATS 2014 design and MATS 2018 design. The sampled telephone number must belong to a household located in Minnesota (in the landline sample) or an adult whose primary residence is in Minnesota (in the cell phone sample); otherwise the household/adult would be ineligible for the survey. For people with a primary residence in Minnesota but living out of state during the survey period (e.g. "snowbirds"), interviews were re-scheduled for their return to Minnesota if they planned to return during the survey field period; if not, these respondents were considered ineligible. The MATS 2018 also used the same protocol as in the MATS 2014 for handling students living away from home – they were eligible to be sampled from a screened household if they were considered members of the household and did not live in their own apartment at school (e.g., they lived in a dorm or fraternity/sorority house). If the sampled RDD telephone number reached a Minnesota residence where a student himself or herself was currently dwelling, then he/she would be eligible to be selected into MATS 2018. These principles also represent the final rules used since MATS 2007 that evolved during data collection.

Third, the MATS 2018 within-household sampling method was the same as that used in the MATS 2014. In a landline household with multiple adults or a cell phone household where the sampled cell phone number was shared, the Rizzo method (Rizzo et al 2004) was used to randomly sample one adult per household.

Finally, the same sampling protocol was used for refusal conversion in MATS 2014 and MATS 2018. That is, for both landline and cell phone sample, all the households were eligible to be converted after the initial refusal except for a small number of refusals considered hostile.

6.1.1.2 Differences Between 2014 and 2018 Sample Design

Two major factors drove the differences between the designs in the MATS 2014 and the MATS 2018. First, telephone ownership and usage among the Minnesota population had changed since the MATS 2014 data collection. At the national level, the proportion of adult population living in cell-only households had been increasing by about 2 percentage points annually, so a higher proportion of the adults in Minnesota were expected to be in the cell-only households in 2018 than in 2014. Due to the growing cell-

only and cell-mostly population and the changing cost function of RDD cell phone data collection compared to RDD landline data collection, a larger proportion of the sample was assigned to cell phone in the MATS 2018 survey design to improve cost efficiency and increase the proportion of younger adults included in the sample. As discussed in Chapter 5, an appropriate weighting approach was used to composite the cell phone sample and landline sample, so the change in sample allocation should not affect the comparability of the estimates between MATS 2014 and MATS 2018.

Second, the MATS 2014 used stratified sampling within the landline frame and cell phone frame to allow the data user to better understand tobacco use, quitting, and second-hand smoke exposure at the regional level and the differences between the regions. Differential sampling rates were applied to telephone numbers associated with different regions in Minnesota (i.e., counties grouped by geography). MATS 2018 did not sample by region, but over-sampled phone numbers with high incidence of minority race and ethnic groups. In the landline sample, Westat oversampled phone numbers that were matched to a household with a possible Hispanic or Asian surname. In the cell sample, Westat sampled phone numbers from exchanges in urban areas that had substantially higher incidence of blacks compared to the overall statewide population.

6.1.2 Reducing Potential Non-response Bias Through Weighting

Potential non-response bias can occur when a survey fails to obtain response from all the sampled units, although lower response rate does not necessarily equate to higher non-response bias. As discussed in Section 4.3, the response rate for the MATS 2018 was lower than the response rate for the MATS 2014. The decrease in response propensity of the adult residents in Minnesota was largely due to a changing environment for the telephone RDD surveys, which has been observed in other RDD studies. Telephone still remains as a good data collection mode for administering a survey when the questionnaire involves complex skip patterns, as in the MATS 2018 questionnaire. At the same time, telephone data collection has become less effective as a way to contact target respondents and solicit participation.

The weighting adjustment accounts for the discrepancies in the response propensities of the target respondents based on demographic characteristics such as age, education, and race/ethnicity. This can eliminate potential non-response bias to some extent because some of the demographic characteristics, such as age and education, are highly correlated to key survey measures such as smoking prevalence.

Due to strong interest in trend analysis, the MATS 2018 weighting methodology was kept as consistent as possible to the MATS 2014 methodology unless the regional differentials played an important role. For example, a single compositing factor was used to combine the cell-mostly cases from the landline sample and cell phone sample regardless of the regional information. This is because choosing different compositing factors by region would increase the variance without reducing bias significantly, due to the very small sample sizes associated with the cell-mostly respondents in some regions.

6.1.3 Data Collection

All of the MATS survey data were collected using computer-assisted telephone interviewing. They all used standard survey research interviewer training and interviewing protocols. All data collection protocols for MATS 2018 were essentially identical to those used in MATS 2014, with the only difference being that the MATS 2018 data collection period was slightly longer to accommodate the larger scope and response rate challenges.

6.1.4 Questionnaire Design and Specification

There are two main areas where questionnaire design may affect comparability. The first area is the questionnaire content, which refers to the selection of questions, response categories, and the formulation of their specific wording and ordering. This area also includes the introductory text and transition phrases, as well as prompts, probes, and instructions to be used by the interviewers.

The second area is the determination of which respondents are administered each question and, for some questions, an alternative, more suitable phrasing of the question. This concept is commonly referred to as the "skip patterns" for the questionnaire. Some

questions will not apply to certain groups because of who they are (questions about quitting smoking are not relevant to never smokers) or how they answered a specific question (if a person has not seen a health care provider in the past 12 months, it is logical to skip the questions about their experiences with health care providers in the past 12 months). The group who receives each question is usually referred to as the "base" for that question. In administering the questionnaire, the skip instructions determine and control who receives each question. All of these concepts are captured in detailed questionnaire specifications and in the programming instructions for CATI questionnaires.

Section 3.1 described the general questionnaire design process and general issues and factors considered in formulating the question items, wording, and response categories. As noted there, there are a number of questions that are newly added for MATS 2018. Such questions, by definition, have no comparable items for trend comparison across the survey rounds. When previous items were omitted from the MATS 2018 questionnaire, the resulting absence of trend data was consciously anticipated in the design, either because the items were no longer of interest or had not been useful in the past, or because some items needed to be eliminated as a trade-off to accommodate new items. In addition, new items were added to address new or changing research objectives. While historical trends cannot currently be analyzed for new MATS 2018 items, MATS may choose to retain such items in the future and monitor the trend from MATS 2018 forward. All questionnaire changes from MATS 2014 to MATS 2018 consisted of adding or deleting entire questions. All common items between the two questionnaires were unchanged and there are no comparability issues for these common items.

By design, all major skip patterns and conditions in MATS 2018 were preserved from MATS 2014 for items and sections common to both questionnaires. The removal of some MATS 2014 questions included the removal of skip patterns that pertained to those removed questions while some new questions for MATS 2018 included skip conditions. However, there were no changes to skip patterns from MATS 2014 to MATS 2018 that would affect the comparability.

6.2 Potential Limitations of the Data

All of the Minnesota Adult Tobacco Surveys yield data that provide highly accurate and detailed representations of the smoking-related attitudes, beliefs and behaviors of Minnesota's adult residents at various points in time. However, statistics produced from sample surveys are subject to two general types of error, technically referred to as sampling error and nonsampling error. The term "error" does not refer to a mistake or a known error but to the fact there may be some difference between the survey statistic and the actual statistic for the entire population that the sample survey is meant to represent. It is for this reason that statistics produced from a sample are referred to as "estimates": they estimate what the actual statistics are for the entire population, or for any subgroup in the population.

6.2.1 Sampling Error

Sampling error is a purely statistical phenomenon, resulting from the fact that the data are collected from a sample that represents the entire population, rather than from everyone in the population, as in the case of a census. Sampling "error" is a technical term; it does not refer to any known error, but rather to the fact that an estimate produced from a sample has some amount of uncertainty associated with it.

It is possible to quantify the uncertainty of an estimate produced from the survey sample data, to the extent that the uncertainty is caused by the use of sample with a known probability of being selected for the survey. There is no one number that can be assigned to every survey statistic to indicate the uncertainty; rather, it depends on the type of statistic (percentage, mean, ratio, difference, etc.), the size of the sample used to calculate the estimate, and the effects of complex sampling designs such as those used for MATS.

Common measures of uncertainty include standard errors and confidence intervals. The MATS technical reports utilize confidence intervals, which express the likely range of the actual value of a population statistic, around the "point" estimate produced from the survey data. For example, the statement that MATS 2018 found the 2018 smoking prevalence among adult Minnesotans to be 13.8±1.2 percent means the expectation is that the true value falls somewhere within the confidence interval ranging from

12.6 percent to 15.0 percent. The confidence interval is commonly expressed as a "half-width," plus or minus around the point estimate, as in this smoking prevalence example. Like nearly all sample surveys, MATS reports the 95 percent confidence interval, which means that there is a 95 percent certainty that the interval for any given estimate contains the true value.

All statistics presented in the MATS technical reports use weighted data. The survey weights reflect the complex MATS 2018 sample design, as described in Chapter 5. This means that the reported statistics are reflective of the entire population or subgroup for which they are calculated. The weighted estimates for the MATS 2018 technical report and their associated confidence intervals were all calculated using SAS, a widely used statistical software package that accounts for the complex sample design and sample weights.

6.2.2 Potential Sources of Nonsampling Error

As in the case of sampling error, it is nearly impossible for a survey to avoid other sources of error. Unlike sampling error, it is not typically possible to quantify potential nonsampling errors in a specific survey.

6.2.2.1 Coverage Issues

In addition to the sampling error that is common to all sample surveys, MATS 2018 was also subject to a form of nonsampling error known as coverage error. All survey samples use a "frame" from which to draw the sample. Ideally, the frame "covers" the same population about which the survey seeks to provide information, but frames seldom perfectly cover the population. Those in the population who are not covered by the frame may be different from those who are covered by it, in terms of the characteristics, behaviors, attitudes, and beliefs that the survey addresses. The greater this difference is (if any), the greater the likelihood that there is some error in the reported statistics, in terms of their ability to accurately reflect the entire population of interest.

While the number of people without landline phones has been increasing steadily, MATS began sampling cell phones in MATS 2010. However, the cell phone RDD

sample only selected numbers with area codes and exchanges in Minnesota. Minnesota residents who only have a cell phone with an out-of-state area code were not covered by the MATS 2018 sample design because this would have required a nationwide sample of cell phones where very few would be found to live in Minnesota. Unfortunately, there is no way to accurately estimate the extent of this coverage error.

An estimated 3.8 percent of Minnesota residents have neither a landline nor a cell phone,[6] meaning that coverage error due to the sample frame for MATS 2018 is minimal. As with previous MATS efforts, MATS 2018 was conducted in English only. The vast majority of Minnesota residents speak English to some degree; U.S. Census data estimate that 0.7 percent of Minnesota adults do not speak English at all and about 4.9 percent of Minnesota adults speak English "less than very well" (2017 American Community Survey). These non-English speakers were excluded by the design of MATS 2018 and are thus another source of coverage error.

6.2.2.2 Measurement Error

Nonsampling errors in surveys may be attributed to a variety of sources, many of which fall under the type called measurement error. These sources of potential error may result from how the survey was designed, how respondents interpret questions, how able and willing respondents are to provide correct answers, and how accurately the answers are recorded and processed. MATS 2018 took several steps to minimize these types of errors. Important ones for MATS 2018, as described throughout this methodology report, include the careful and deliberate design of the questionnaire with review by multiple individuals and organizations; continuing improvement to the clarity of several questions, balanced against possible effects on comparability of the responses across survey rounds; the use of a CATI system to administer the questionnaire and record responses; the internal testing of the CATI questionnaire; the pilot test of the instrument and survey procedures; the monitoring of the sample and of the collected data throughout data collection; and the thorough review of that data prior to finalizing the file for analysis.

[6] Blumberg S.J., and Luke, J.V., Wireless substitution: state-level estimates from the National Health Interview Survey, 2017. National Center for Health Statistics.

The weighting process – especially the raking/post-stratification adjustments – partially corrects for bias due to minor discrepancies in the representativeness of the sample. During the weighting process, extensive diagnostic examination of the effects of the weighting design and of draft weights on the weighted estimates of demographics, smoking prevalence, and other characteristics further supported the "calibration" of the sample into closer conformity with the overall Minnesota population. Biases may be present when people who are missed in the survey differ from those interviewed in ways other than the categories used in weighting. People who are missed in the survey include those missed because of the frame coverage issue or because sampled individuals did not respond to the survey. As with most surveys that rely on telephone interviewing, it is likely that some subgroups, such as specific racial and ethnic minority communities, are under-represented; again, the use of race/ethnicity in the raking process helps reduce this effect.

All of these considerations affect comparisons across different surveys or data sources. Although most of these limitations are inherent in all surveys, MATS 2018 made every effort to minimize these limitations. In summary, the goal of the MATS 2018 weighting was to yield unbiased state-level estimates without significantly inflating the variance of the estimates. The weighting approach was chosen to maintain the comparability between the MATS 2014 and MATS 2018 estimates to the greatest extent possible.

Appendix A

MATS 2018 Questionnaire

SECTION A: INTRO, CONSENT, AND INITIAL DEMOGRAPHIC ITEMS

BOX A1

IF CELL PHONE CASE, INSERT STATEMENT IN BRACKETS.

A1. Hello, may I speak with {FIRST NAME}?

My name is {INTERVIEWER NAME} and I am calling on behalf of the Minnesota Department of Health.

[IF CELL: If you are currently driving a car or doing any activity that requires your full attention, I need to call you back at a later time.]

A2. We are conducting general health interviews with Minnesota residents. You have been randomly chosen to be interviewed about attitudes and behaviors related to health and tobacco use. Your responses will represent thousands of other Minnesotans and will be used to help all Minnesotans live healthier lives. Your input is very important for the results to be accurate.

The interview is completely voluntary and there are no penalties if you decide not to participate. You don't have to answer any question you don't want to, and you can end the interview at any time. The interview generally takes about 10 to 15 minutes, depending on your answers. Any information you give will be kept confidential, your name and phone number will be separated from your responses and only researchers working in the study will see your answers.

[IF NEEDED: THE WESTAT TOLL FREE NUMBER IS 1-855-819-2365]

BOX A5

IN A5, ALLOW RESPONSES OF 18 – 110, -7 AND -8.
HARD RANGE IS 18-110; SOFT RANGE IS 18-85.

A5. Before we begin, I need to put your age into the computer. The computer will then skip questions that are not relevant to your age group. What is your age?

_____ YEARS OLD

BOX A6

IF A VALID AGE IS ENTERED IN A5, GO TO A7. ELSE CONTINUE WITH A6 TO COLLECT AGE RANGE.

IF A5 ≠ MISSING SKIP TO A7, ELSE CONTINUE WITH A6.

A6. If it's okay, I would like to record the range in which your age falls. Are you…

18 to 24,	1
25 to 29,	2
30 to 34,	3
35 to 44,	4
45 to 54,	5
55 to 64, or	6
65 or older	7
REFUSED	-7
DON'T KNOW	-8

BOX A6 END BOX

IF NO AGE OR AGE RANGE RECORDED IN A5 AND A6, CODE INTERVIEW AS A REFUSAL AND GO TO THANK SCREEN.

IF A6 = -7 OR -8, ASSIGN CASE RESULT CODE = 2 (REFUSAL) AND GO TO THANK SCREEN.

BOX A7

ALLOW 1, -7. -8, AND ALPHABETIC VALUES IN A7L.

IF A7L = 1, SKIP TO WRGST (RESPONDENT DOES NOT LIVE IN MINNESOTA).

IF LETTER ENTERED IN A7L, GO TO COUNTY LOOKUP TABLE AND DISPLAY ALL COUNTIES BEGINNING WITH THE LETTER ENTERED, ALONG WITH THEIR RESPECTIVE ALPHABETICAL SEQUENCE NUMBER, 1-87.

IF A7L = -7 OR -8, RECORD THE SAME VALUE IN A7.

ALLOW INTERVIEWER TO ENTER COUNTY ALPHABETICAL SEQUENCE NUMBER BETWEEN 1 – 87 IN A7.

DELIVERY FILE WILL MATCH FIPS CODE TO COUNTY SELECTED AND WILL DELIVER COUNTY NAME AND FIPS CODE.

A7. What Minnesota county do you live in?

_____ ENTER FIRST LETTER OF COUNTY NAME

R DOES NOT LIVE IN MINNESOTA	1	**SKIP TO WRGST**
REFUSED	-7	
DON'T KNOW	-8	

_____ ENTER COUNTY NUMBER

A8. What is your zip code?

|__|__|__|__|__| ENTER ZIP CODE

J14. INDICATE SEX OF RESPONDENT. ASK ONLY IF NECESSARY

MALE	1
FEMALE	2
REF	-7
DK	-8

SECTION B: GENERAL HEALTH

B1. Now I have a few questions about your health. In general, would you say that your health is…

Excellent,	1
Very good,	2
Good,	3
Fair, or	4
Poor?	5
REF	-7
DK	-8

SECTION D: CIGARETTE SMOKING AND OTHER TOBACCO PRODUCT USE

D1. D1. Have you ever smoked a cigarette, even 1 or 2 puffs?

YES	1	
NO	2	SKIP TO BOX D7
REF	-7	SKIP TO BOX D7
DK/NOT SURE	-8	SKIP TO BOX D7

D2. D2. Do you consider yourself a smoker?

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

D3. Have you smoked at least 100 cigarettes in your entire life?

YES	1	
NO	2	SKIP TO BOX D6
REF	-7	SKIP TO BOX D6
DK/NOT SURE	-8	SKIP TO BOX D6

D4. Do you now smoke cigarettes every day, some days, or not at all?

EVERY DAY	1	
SOME DAYS	2	SKIP TO BOX D6
NOT AT ALL	3	SKIP TO BOX D6
REF	-7	SKIP TO BOX D7
DK	-8	SKIP TO BOX D7

BOX D5

IN D5, HARD RANGE IS 0 – 99, SOFT RANGE IS 0 – 40.

D5. On average, about how many cigarettes per day do you smoke?

|__|__| ENTER NUMBER OF CIGARETTES

REF -7

DK/NOT SURE -8

BOX D6

IF D4 = 1, SKIP TO BOX D7.

DISPLAY INSTRUCTION:
IF D4 = 3, USE FIRST DISPLAY IN D6, ELSE USE SECOND DISPLAY

IN D6 ALLOW RESPONSES OF 0-30, -7 AND -8.

D6. {Just to be clear about what you just said, during/During} the past 30 days, on how many days did you smoke cigarettes?

|__|__| ENTER NUMBER OF DAYS

NONE

REF -7

DK/NOT SURE -8

BOX D7SMOKING STATUS BOX

DEFINITIONS OF SMOKING STATUS GROUPS:

C1 IS A CURRENT ESTABLISHED, DAILY SMOKER [SMOKED AT LEAST 100 CIGS AND SMOKES EVERY DAY].

C2 IS A CURRENT ESTABLISHED, SOME DAYS BUT NOT IN PAST 30 DAYS, SMOKER [SMOKED AT LEAST 100 CIGS, SMOKES ON SOME DAYS, BUT NOT IN PAST 30 DAYS INCLUDING REF & DK].

C3 IS A CURRENT ESTABLISHED, SOME DAYS WHO HAS SMOKED AT LEAST 1 DAY IN PAST 30 DAYS, SMOKER [SMOKED AT LEAST 100 CIGS, SMOKES ON SOME DAYS, AND HAS SMOKED IN PAST 30 DAYS].

F1 IS A FORMER ESTABLISHED SMOKER, NOT AT ALL AND NOT IN THE PAST 30 DAYS, SMOKER [SMOKED AT LEAST 100 CIGS, DOES NOT SMOKE AT ALL NOW AND HAS NOT SMOKED IN PAST 30 DAYS (INCLUDING REF & DK)].

F2 IS A FORMER ESTABLISHED SMOKER, NOT AT ALL, WHO HAS SMOKED IN THE PAST 30 DAYS, SMOKER [SMOKED AT LEAST 100 CIGS, DOES NOT SMOKE AT ALL NOW AND HAS SMOKED IN PAST 30 DAYS].

X1 IS A CURRENT EXPERIMENTER WHO HAS SMOKED IN THE PAST 30 DAYS [HAS NOT SMOKED AT LEAST 100 CIGS BUT HAS SMOKED IN PAST 30 DAYS].

X2 IS A CURRENT EXPERIMENTER WHO HAS NOT SMOKED IN THE PAST 30 DAYS [HAS NOT SMOKED AT LEAST 100 CIGS, HAS NOT SMOKED IN PAST 30 DAYS (INCLUDING REF & DK), BUT HAS SMOKED AT LEAST A PUFF].

NS IS A NEVER SMOKER [HAS NOT SMOKED EVEN A PUFF].

CREATE SSTAT (SMOKING STATUS GROUPS) HERE:

IF D3 = 1 AND D4 = 1, SSTAT = C1.
IF D3 = 1 AND D4 = 2 AND D6 = 0, -7 OR -8, SSTAT = C2.
IF D3 = 1 AND D4 = 2 AND D6 > 0, SSTAT = C3.
IF D3 = 1 AND D4 = 3 AND D6 = 0, -7 OR -8, SSTAT = F1.
IF D3 = 1 AND D4 = 3 AND D6 > 0, SSTAT = F2.
IF D3 = 2, -7 OR -8 AND D6 > 0. SSTAT = X1.
IF D3 = 2, -7 OR -8 AND D6 = 0, -7 OR -8, SSTAT = X2.
IF D1 = 2, -7 OR -8 OR IF D4 = -7 OR -8, SSTAT = NS.

DESCRIPTIVE NOTE: D7 is asked of anyone who has smoked in the past 30 days and is not a current daily (every day) smoker (SSTAT = C3, F2, or X1).

CURRENT DAILY SMOKERS (SSTAT = C1), AND CURRENT, FORMER, AND EXPERIMENTAL SMOKERS WHO HAVE NOT SMOKED IN THE PAST 30 DAYS (SSTAT = C2, F1, X2), AND NEVER SMOKERS (SSTAT = NS) SKIP D7, AS FOLLOWS:

IF SSTAT = NS, SKIP TO D32A
ELSE IF SSTAT = C1, C2, F1, or X2, SKIP TO BOX D8

IN D7, HARD RANGE IS 1 – 99, SOFT RANGE IS 1 – 40.

D7. During the past 30 days, *on the days when you smoked*, about how many cigarettes did you smoke on average?

|__|__| ENTER NUMBER OF CIGARETTES

REF	-7
DK/NOT SURE	-8

BOX D8

DESCRIPTIVE NOTE: ASK D8 OF ALL CURRENT SMOKERS (SSTAT = C1, C2, OR C3), FORMER SMOKERS WHO HAVE SMOKED IN THE PAST 30 DAYS (SSTAT = F2), AND EXPERIMENTERS WHO HAVE SMOKED IN THE PAST 30 DAYS (SSTAT = X1):

IF SSTAT = F1 OR X2, SKIP TO BOX D11.

NOTE: NEVER SMOKERS (SSTAT = NS) SKIPPED TO D32A FROM BOX D7.

DISPLAY INSTRUCTION:
IF SSTAT = C1, USE THE FIRST DISPLAY IN D8, ELSE USE SECOND DISPLAY.

D8. {How/On the days that you smoke, how} soon after you wake up do you smoke your first cigarette? Would you say…

Within 5 minutes,	1
6-30 minutes,	2
31-60 minutes, or	3
After 60 minutes?	4
REF	-7
DK/NOT SURE	-8

BOX D11

DESCRIPTIVE NOTE: DAILY SMOKERS (SSTAT = C1) AND EXPERIMENTERS WHO HAVE NOT SMOKED IN THE PAST 30 DAYS (SSTAT = X2) SKIP TO BOX D15.

[PROGRAMMER NOTE: NEVER SMOKERS (SSTAT = NS) ARE ALREADY SKIPPED FROM BOX D7 TO D32A.]

IF SSTAT = C1 OR X2, SKIP TO BOX D15

D11. Have you ever smoked cigarettes daily, that is, at least one cigarette every day for 30 days?

YES	1	
NO	2	SKIP TO BOX D15
REF	-7	SKIP TO BOX D15
DK/NOT SURE	-8	SKIP TO BOX D15

BOX D12

DESCRIPTIVE NOTE: ASK D12 TO:
(ALL FORMER SMOKERS WHO HAVE NOT SMOKED IN THE PAST 30 DAYS ([SSTAT = F1]), AND
((FORMER SMOKERS WHO HAVE SMOKED IN THE PAST 30 DAYS [SSTAT = F2] AND CURRENT EXPERIMENTERS WHO HAVE SMOKED IN THE PAST 30 DAYS [SSTAT = X1])

[PROGRAMMER NOTE: C1, X2, AND NS SKIPPED D12 FROM PREVIOUS BOXES.]

IF (SSTAT = C2 OR C3) SKIP TO BOX D15.

IN D12, IF UNIT = 1 ALLOW 1-90; IF UNIT = 2 ALLOW 1-104; IF UNIT = 3 ALLOW 1-48; IF UNIT = 4 ALLOW 1-50.

D12. About how long has it been since you last smoked cigarettes regularly?

[IF NEEDED: "Regularly" is whatever that means to you.]
[IF NEVER SMOKED REGULARLY ENTER 999]

|__|__|__| ENTER UNIT

|__|__| ENTER NUMBER

DAYS	1	SKIP TO BOX D15
WEEKS	2	SKIP TO BOX D15
MONTHS	3	SKIP TO BOX D15
YEARS	4	SKIP TO BOX D15
NEVER	999	SKIP TO BOX D15
REF	-7	
DK	-8	

BOX D13a

ASK D13a ONLY OF THOSE WHO ANSWERED -7 (REFUSED) OR -8 (DON'T KNOW) TO D12.

SKIP OUT OF D13a THROUGH h SEQUENCE WHEN THE FIRST "YES" (1) RESPONSE IS GIVEN. IF D13h IS ASKED AND THERE IS NOT A "YES" RESPONSE TO D13h, CONTINUE TO BOX D15.

D13. Would you say the last time you smoked cigarettes regularly was…

[IF NEEDED:"REGULARLY" IS WHATEVER "REGULARLY" MEANS TO THE RESPONDENT]

		YES	NO	REF	DK	
a.	10 or more years ago?	1	2	-7	-8	IF D13a = 1 SKIP TO BOX D15
b.	More than 5 years ago, but less than 10 years ago?	1	2	-7	-8	IF D13b = 1 SKIP TO BOX D15
c.	More than 2 years ago, but less than 5 years ago?	1	2	-7	-8	IF D13c = 1 SKIP TO BOX D15
d.	More than 1 year ago, but less than 2 years ago?	1	2	-7	-8	IF D13d = 1 SKIP TO BOX D15
e.	More than 6 months ago, but less than 1 year ago?	1	2	-7	-8	IF D13e = 1 SKIP TO BOX D15
f.	More than 3 months ago, but less than 6 months ago?	1	2	-7	-8	IF D13f = 1 SKIP TO BOX D15
g.	More than 1 month ago, but less than 3 months ago?	1	2	-7	-8	IF D13g = 1 SKIP TO BOX D15
h.	Less than 1 month ago?	1	2	-7	-8	

BOX D15

DESCRIPTIVE NOTE: ASK D15 TO CURRENT SMOKERS (SSTAT = C1, C2, OR C3) , FORMER ESTABLISHED SMOKERS WHO HAVE SMOKED IN THE LAST 30 DAYS (SSTAT = F2), AND CURRENT EXPERIMENTERS WHO HAVE SMOKED IN THE LAST 30 DAYS (SSTAT = X1).

IF SSTAT = F1, X2, OR NS, SKIP TO D32A

DISPLAY INSTRUCTION:
IF SSTAT = F2 USE SECOND DISPLAY IN D15, ELSE USE FIRST.

D15. {Do/Did} you usually buy your cigarettes…

In Minnesota,	1	
Out of state,	2	
On an American Indian Reservation,	3	
Over the internet,	4	SKIP TO D30
Through mail order, or	5	SKIP TO D30
Through an 800 number?	6	SKIP TO D30
HAVE NOT BOUGHT ANY CIGARETTES IN PAST 12 MONTHS	7	SKIP TO D30
REF	-7	
DK	-8	

IF THEY SAY THEY DON'T USUALLY BUY THEIR OWN CIGARETTES, ASK BEFORE CODING: Just to confirm, you have not bought any cigarettes for yourself in the past 12 months, is that correct?

IF THEY HAVE BOUGHT CIGARETTES, RE-READ THE QUESTION AND SELECT ONE OF THE CHOICES 1-6; OTHERWISE, USE CHOICE 7.

D46. During the past 30 days, where did you usually buy your cigarettes? Would you say…

IF THEY ROLL THEIR OWN CIGARETTES, ASK WHERE THEY USUALLY BOUGHT THEIR TOBACCO, PAPERS, OR MATERIALS.

A gas station,	1
A convenience store,	2
A store that sells only tobacco products,	3
A grocery store, or	4
Some other place	5
HAVE NOT BOUGHT ANY CIGARETTES IN THE LAST 30 DAYS	7
REF	-7
DK	-8

D30. Is your usual cigarette brand menthol or non-menthol?

MENTHOL	1
NONMENTHOL	2
NO USUAL BRAND	3
REFUSED	-7
DON'T KNOW	-8

D32A. Have you ever used a hookah water pipe?

IF NEEDED]: A HOOKAH IS ALSO KNOWN AS A SHISHA (ARABIC) OR NARGILA (TURKISH). A HOOKAH OR WATER PIPE IS A DEVICE FOR SMOKING THAT USES WATER TO COOL AND MOISTEN THE SMOKE. IT IS OFTEN MADE OF GLASS. IT SOMETIMES HAS SEVERAL MOUTHPIECES, SO THAT PEOPLE CAN SHARE IT.

YES	1	
NO	2	SKIP TO D32B
REF	-7	SKIP TO D32B
DK	-8	SKIP TO D32B

D33A. During the past 30 days, how many days did you use a hookah water pipe?

|__|__| ENTER NUMBER OF DAYS

REF	-7
DK	-8

E-CIGARETTES

D32B. The next questions are about electronic cigarettes or other vaping devices, often called e-cigarettes. These products are battery-powered and produce vapor instead of smoke.

Have you ever used an electronic cigarette or vaping device even just one time in your entire life?

YES	1	
NO	2	SKIP TO BOX D58
REF	-7	SKIP TO BOX D58
DK	-8	SKIP TO BOX D58

D33B. During the past 30 days, on how many days did you use e-cigarettes or a vaping device?

|__|__| ENTER NUMBER OF DAYS

REF	-7
DK	-8

D33C Do you currently use an e-cigarette or vaping device…

Every day,	1
Some days, or	2
Not at all	3
REFUSED	-7
DON'T KNOW	-8

BOX D58

IF (D4=1 or D4=2 or D6 >0) AND D32B=2 (currently smoke every day or some days or smoked in last 30 days and never tried vaping) THEN CONTINUE WITH D58

ELSE IF D32B=2 OR -7 OR -8 THEN SKIP TO BOX D18

ELSE SKIP TO BOX D38

D58. Can you tell me why you have not tried e-cigarettes or vaping devices?

Would you say. . .

CODE ALL YES RESPONSES.

They are too expensive	1
They are too much trouble to use	2
They might leak, catch fire, or explode	3
You have health concerns about using them	4
Your family or friends would not approve	5
You are just not interested	6
Are there any other reasons? (Specify)	91
REFUSED	-7
DON'T KNOW	-8

ALL RESPONSES TO D58 SKIP TO BOX D18

BOX D38

IF D33B=-7 or -8 AND D33C= -7 or -8 THEN SKIP TO BOX D59

ELSE IF D33B=0 OR -7 OR -8, USE "you have used" IN D38 DISPLAY and "enjoyed" in D38i
ELSE IF D33B>0 USE "you use" in D38 DISPLAY and "enjoy" in D38i.

D38. Next I'm going to read you a list of common reasons people use e-cigarettes. For each, please tell me whether or not it's a reason {you have used/you use} e-cigarettes.

[RANDOMIZE ORDER OF QUESTIONS]

	YES	NO	DK/NOT SURE	REF
a. {You have used/You use} e-cigarettes to quit other tobacco products	1	2	-8	-7
b. {You have used/You use} e-cigarettes to cut down on other tobacco products	1	2	-8	-7
c. {You have used/You use} them because they are affordable	1	2	-8	-7
d. {You have used/You use} them because they come in menthol flavor	1	2	-8	-7
e. {You have used/You use} them because they come in flavors other than menthol	1	2	-8	-7
f. {You have used/You use} them in places other tobacco products are not allowed	1	2	-8	-7
g. {You have used/You use} them because you were curious about e-cigarettes	1	2	-8	-7
h. {You have used/You use} them because you think they might be less harmful than other tobacco products	1	2	-8	-7
i. {You have used/You use} them because you enjoy(ed) them	1	2	-8	-7
j. {You have used/You use} e-cigarettes for some other reason	1	2	-8	-7

D38OS. IF YES TO (D38j): What is the other reason you use/have used e-cigarettes?

_____ (VERBATIM TEXT)

REFUSED -7

DON'T KNOW -8

BOX D59

IF (D4=1 or D4=2 or D6 >0) AND D33B=0 AND D33C=3 (currently smoke every day or some days or smoked in last 30 days and currently vapes not at all and not in past 30 days) THEN CONTINUE WITH D59.

ELSE SKIP TO BOX D47

D59. Can you tell me why you did not continue to use e-cigarettes or vaping devices?

Would you say. . .

CODE ALL YES RESPONSES.

They weren't as satisfying as smoking cigarettes	1
They didn't help you quit smoking cigarettes	2
They were too expensive	3
They were too much trouble to use	4
They were too harsh	5
They might leak, catch fire, or explode	6
You had health concerns about using them	7
You didn't like the taste	8
You didn't like the way they made you feel	9
You prefer cigarettes,	10
Your family or friends did not approve	11
Are there any other reasons (Specify)?	91
REFUSED	-7
DON'T KNOW	-8

BOX D47

IF D33B=0 or -7 or -8 AND D33C=3 or -7 or -8 THEN SKIP TO BOX D18
IF D33B=0, USE "did" IN D47 DISPLAY
ELSE IF D33B>0 USE "do" in D47 DISPLAY

D47. {Do/Did} you usually buy your e-cigarettes or e-juice…

[IF NEEDED: e-juice is the liquid used in e-cigarettes. It is sometimes called e-cigarette liquid, nicotine juice, or nicotine liquid]

In Minnesota,	1
Out of state,	2
On an American Indian Reservation,	3
Over the internet,	4
Through mail order, or	5
Through an 800 number?	6
HAVE NOT BOUGHT ANY E-CIGARETTES IN PAST 12 MONTHS	7
REF	-7
DK	-8

BOX D48

IF D33B=0 OR -7 OR -8 THEN SKIP TO BOX D53

D48. During the past 30 days, where did you usually buy your e-cigarettes, vaping devices, and e-juice?

Would you say at. . .

A gas station,	1
A convenience store,	2
A vape shop	8
A store that sells only tobacco products,	3
A grocery store, or	4
Some other place	5
HAVE NOT BOUGHT ANY E-CIGARETTES /VAPING DEVICES/E-JUICE IN THE LAST 30 DAYS	7
REF	-7
DK	-8

BOX D53

IF D33B = 0 or -7 or -8AND D33C=3 or -7 or -8, SKIP TO BOX D18

D53. Think about the e–cigarette, vaping device or e-juice that you use most often. Does it contain nicotine?

YES	1
NO	2
REFUSED	-7
DK	-8

D49. s your usual e-cigarette or e-juice flavored to taste like menthol, mint, clove, spice, fruit, chocolate, alcoholic drinks, candy or other sweets?

YES	1
NO	2 SKIP TO BOX D18
REFUSED	-7 SKIP TO BOX D18
DK/NOT SURE	-8 SKIP TO BOX D18

D50. Is your usual e-cigarette or e-juice menthol or mint flavored?

YES	1
NO	2
REFUSED	-7
DK/NOT SURE	-8

BOX D18

DESCRIPTIVE NOTE: D18, D20, D22 ARE ASKED OF ALL RESPONDENTS.

D18. Now I have a few questions about pipes and cigars. Have you smoked tobacco in a pipe at least 20 times in your life?

YES	1	
NO	2	SKIP TO D20
REF	-7	SKIP TO D20
DK/NOT SURE	-8	SKIP TO D20

BOX D19

IN D19, D21, AND D23, ALLOW RESPONSES OF 0-30, -7 AND -8.

D19. During the past 30 days, on how many days did you smoke tobacco in a pipe?

|__|__| ENTER NUMBER OF DAYS

REF	-7
DK/NOT SURE	-8

D20. Have you smoked cigars, cigarillos, or little filtered cigars that look like cigarettes, at least 20 times in your life?

[IF NEEDED: Cigarillos are little filtered cigars that look like cigarettes. Cigarillos and filtered cigars are smaller than traditional cigars. They are usually brown. Some are the same size as cigarettes, and some come with tips or filters. Some common brands are Black & Milds, Swisher Sweets, Dutch Masters, Phillies Blunts, Prime Time, and Winchester.]

YES	1	
NO	2	SKIP TO D22
REF	-7	SKIP TO D22
DK/NOT SURE	-8	SKIP TO D22

D21. During the past 30 days, how many days did you smoke cigars, cigarillos or little filtered cigars that look like cigarettes?

|__|__| ENTER NUMBER OF DAYS

REF	-7
DK/NOT SURE	-8

D51. Is your usual cigar, cigarillo or little filtered cigar flavored to taste like menthol, mint, clove, spice, fruit, chocolate, alcoholic drinks, candy or other sweets?

YES	1	
NO	2	SKIP TO D22
REFUSED	-7	SKIP TO D22
DON'T KNOW	-8	SKIP TO D22

D52. Is your usual cigar, cigarillo or little filtered cigar brand menthol or mint flavored?

YES	1
NO	2
REFUSED	-7
DON'T KNOW	-8

D22. Have you used any kind of smokeless tobacco such as chewing tobacco, snuff, or snus at least 20 times in your life?

[IF NEEDED: Snuff is a smokeless tobacco product made from ground or pulverized tobacco leaves and is usually flavored or scented. Snuff is usually inhaled or "snuffed" through the nose.]

YES	1	
NO	2	SKIP TO M1
REF	-7	SKIP TO M1
DK/NOT SURE	-8	SKIP TO M1

D23. During the past 30 days, how many days did you use any kind of smokeless tobacco?

|__|__| ENTER NUMBER OF DAYS

REF	-7
DK/NOT SURE	-8

SECTION M: MARIJUANA USE

M1. Now we have some questions about marijuana use.

[IF NEEDED: As a reminder, any information you provide will be kept confidential and your survey responses will not be attached to any identifying information that identifies you personally in any reporting of the survey data.]

[IF NEEDED: We're asking about marijuana because some people mix marijuana with tobacco products and the study is trying to understand all the ways people in Minnesota use tobacco.]

During the past 30 days, have you used marijuana?

YES	1	
NO	2	SKIP TO BOX E1
REF	-7	SKIP TO BOX E1
DK/NOT SURE	-8	SKIP TO BOX E1

M2. When you used marijuana in the past 30 days, how did you use it? Did you…

	YES	NO	DK/NOT SURE	REF
a. Smoke it? [IF NEEDED: in a joint, blunt, or waterpipe]	1	2	-8	-7
b. Vape it? [IF NEEDED: in an e-cigarette or vaping device]	1	2	-8	-7
c. Eat it? [IF NEEDED: in food, such as in a cookie, candy, mint or cracker]	1	2	-8	-7
d. Use it in some other way?	1	2	-8	-7

M3. [IF M2b=1 /Vape it] During the past 30 days, when you vaped marijuana, did you mix the marijuana with an e-juice containing nicotine?

[IF NEEDED: e-juice is the liquid used in e-cigarettes that sometimes contains nicotine. It is often called nicotine juice or e-cigarette liquid]

YES	1	
NO	2	SKIP TO M5
REF	-7	SKIP TO M5
DK/NOT SURE	-8	SKIP TO M5

M4. During the past 30 days, when you vaped marijuana, did you mix the marijuana with an e-juice containing nicotine. . .

Every time,	1
Most of the time,	2
Sometimes	3
Rarely	4
REFUSED	-7
DON'T KNOW	-8

M5. [IF M2a=1/Smoke it] Sometimes people take tobacco out of a traditional cigar, cigarillo or filtered cigar and replace it with marijuana, or marijuana mixed with tobacco. This is often called a blunt or spliff. During the past 30 days, when you smoked marijuana, did you smoke it as a blunt or spliff?

YES	1	
NO	2	SKIP TO BOX E1
REF	-7	SKIP TO BOX E1
DK/NOT SURE	-8	SKIP TO BOX E1

M6. During the past 30 days, when you smoked marijuana, did you smoke it as a blunt or spliff …

Every time,	1
Most of the time,	2
Sometimes	3
Rarely	4
REFUSED	-7
DON'T KNOW	-8

Section E: Smoking Cessation

Quit Attempts

BOX E1

DESCRIPTIVE NOTE: ASK C1 TO:
ALL CURRENT SMOKERS (SSTAT = C1, C2, C3) AND OTHERS WHO SMOKED REGULARLY WITHIN THE PAST YEAR;
FORMER SMOKERS WHO SMOKED IN PAST 30 DAYS (SSTAT = F2);
CURRENT EXPERIMENTERS WHO SMOKED IN THE PAST 30 DAYS (SSTAT = X1) ;
AND FORMER SMOKERS WHO HAVE NOT SMOKED IN THE PAST 30 DAYS (SSTAT = F1) BUT SMOKED REGULARLY WITHIN THE PAST YEAR (BASED ON RESPONSES TO D12/D13)

PROGRAMMER NOTE: FOR USE IN BOXES E1, E4, AND G3, FIRST REPROCESS D12 INTO A STANDARD MEASURE EQUIVALENT TO YEARS (D12YR)

IF D12 = 999, D12YR = 99.9 [NEVER SMOKED REGULARLY]
ELSE IF D12 = -7 OR -8, OR SKIPPED [BLANK], D12YR = -9 [NOT ASCERTAINED]
ELSE DERIVE YEAR EQUIVALENT: DIVIDE D12 NUMBER BY 365/52/12/1 FOR D12 UNIT = 1 (DAYS)/2 (WEEKS)/3 (MONTHS)/ 4 (YEARS), RESPECTIVELY. CARRY OUT CALCULATION TO ONE DECIMAL PLACE

IF (SSTAT = X2 OR NS) OR (SSTAT = F1 AND ((1 < D12YR ≤ 99.9) OR (D13a = 1 OR D13b = 1 OR D13c = 1 OR D13d = 1) [i.e., LAST SMOKED REGULARLY MORE THAN ONE YEAR AGO]))), SKIP TO BOX E4.

NOTE: FOR THE FORMER SMOKERS WHO HAVE NOT SMOKED IN THE PAST 30 DAYS (SSTAT = F1), C1 WILL BE ASKEDTOTHOSE WHO REPORTED IN D12 THAT THEY NEVER SMOKED REGULARLY BUT C1 WILL NOT BE ASKED TO THOSE WHO DID NOT SMOKE REGULARLY WITHIN THE PAST YEAR, BASED ON YEARS REPORTED IN D12 OR RELEVANT QUESTIONS IN D13.

C1. Around this time 12 months ago, were you smoking cigarettes every day, some days, or not at all?

EVERY DAY	1
SOME DAYS	2
NOT AT ALL	3
REFUSED	-7
DK/NOT SURE	-8

E1. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?

YES	1	
NO	2	SKIP TO BOX E4
REF	-7	SKIP TO BOX E4
DK	-8	SKIP TO BOX E4

BOX E2

IN E2, HARD RANGE IS 1 – 99, SOFT RANGE IS 1 – 9.

E2. How many times in the past 12 months did you try to quit smoking?
[PROBE AS NEEDED: Your best guess is fine.]

|__|__| ENTER NUMBER OF TIMES

REF	-7
DK/NOT SURE	-8

Methods of Quitting

BOX E4

DESCRIPTIVE NOTE: ASK E4, E4F, AND E20 TO:
CURRENT SMOKERS WHO HAVE TRIED TO QUIT DURING THE PAST 12 MONTHS (SSTAT = (C1, C2 OR C3) AND E1 = 1) AND
FORMER SMOKERS (SSTAT = F1 OR F2) WHO QUIT IN THE PAST 10 YEARS, LOOSELY DEFINED AS THOSE WHO LAST SMOKED REGULARLY WITHIN THE PAST 10 YEARS (D12YR ≤ 10 YEARS OR D13b = 1 OR D13c = 1 OR D13d = 1 OR D13e = 1 OR D13f = 1 OR D13g = 1 OR D13h = 1)).
PROGRAMMER NOTE: FOR THE FOLLOWING INSTRUCTION, USE D12YR CALCULATED IN BOX E1.

IF ((SSTAT = C1 OR C2 OR C3) AND E1 ≠ 1)
OR ((SSTAT = F1 OR F2) AND ((10 < D12YR ≤ 99.9) OR D13a = 1)
OR (SSTAT = X1 OR X2 OR NS), SKIP TO BOX G1.

NOTE: FOR THE FORMER SMOKERS (SSTAT = F1 OR F2), THIS SKIP WILL EXCLUDE THOSE WHO REPORTED IN D12 THAT THEY NEVER SMOKED REGULARLY AND THOSE WHO DID NOT SMOKE REGULARLY WITHIN THE PAST 10 YEARS, BASED ON YEARS REPORTED IN D12 OR RELEVANT QUESTIONS IN D13.

DISPLAY INSTRUCTION: IF SSTAT = F1 OR F2 (FORMER SMOKER), USE FIRST DISPLAY IN E4, E4F, E20, AND E4G, ELSE USE THE SECOND DISPLAY.

E4. {When you quit smoking/The last time you tried to quit smoking} did you use **any** of the following products – a nicotine patch or gum, a nicotine lozenge or a nicotine nasal spray or inhaler?

YES	1
NO	2
REF	-7
DK	-8

E4f. {When you quit smoking/The last time you tried to quit smoking} did you use a prescription medication like Zyban, Wellbutrin, or Chantix to help you quit smoking?

YES	1
NO	2
REF	-7
DK	-8

E20. {When you quit smoking/The last time you tried to quit smoking} did you use a stop-smoking clinic or class, a quit-smoking telephone help line, a one-on-one counseling from any doctor, or other health professional, or an on-line or web-based counseling service?

YES	1
NO	2
REF	-7
DK	-8

BOX E4G

ASK E4g ONLY IF THEY HAVE EVER USED E-CIGARETTES (D32B=1); ELSE SKIP TO BOX G1

E4g. {When you quit smoking /The last time you tried to quit smoking} did you use e-cigarettes to help you quit?

YES	1
NO	2
REF	-7
DK	-8

SECTION G: Health Care Provider Smoking Intervention

BOX G1

PROGRAMMER CHECK NOTE: ASK G1 OF ALL RESPONDENTS.

G1. In the past 12 months, did you visit any doctor or other health care provider about your own health?

YES	1	
NO	2	SKIP TO BOX H8
REF	-7	SKIP TO BOX H8
DK	-8	SKIP TO BOX H8

BOX G2

DESCIPTIVE NOTE: ASK G2 TO RESPONDENTS WHO HAVE SEEN A HEALTH CARE PROVIDER IN THE PAST 12 MONTHS (G1 = 1)

G2. In the past 12 months, did a doctor or other health care provider ask if you smoke?

YES	1
NO	2
REF	-7
DK	-8

BOX G3

DESCRIPTIVE NOTE: ASK G3 TO CURRENT SMOKERS (SSTAT = C1, C2, C3), FORMER SMOKERS WHO HAVE SMOKED IN PAST 30 DAYS (SSTAT = F2), AND FORMER SMOKERS WHO HAVE NOT SMOKED REGULARLY IN PAST 30 DAYS (SSTAT = F1) BUT HAVE SMOKED REGULARLY WITHIN THE PAST YEAR (D12YR ≤ 1 YEAR OR (D13e = 1 OR D13f =1 or d13g = 1 OR D13h = 1)).

PROGRAMMER NOTE: FOR THE FOLLOWING INSTRUCTION, USE D12YR CALCULATED IN BOX E1.

IF (SSTAT = X1 OR X2 OR NS) OR (SSTAT = F1 AND (1 < D12YR ≤ 99.9 OR D13a = 1 OR D13b =1 OR D13c = 1 OR D13d = 1)), SKIP TO BOX H8

NOTE: FOR THE FORMER SMOKERS WHO HAVE NOT SMOKED IN PAST 30 DAYS (SSTAT = F1), THIS SKIP WILL EXLCUDE THOSE WHO REPORTED IN D12 THAT THEY NEVER SMOKED REGULARLY AND THOSE WHO DID NOT SMOKE REGULARLY WITHIN THE PAST YEAR, BASED ON YEARS REPORTED IN D12 OR RELEVANT QUESTIONS IN D13.

G3. In the past 12 months, did any doctor or other health care provider advise you to quit smoking?

YES	1
NO	2
REF	-7
DK	-8

G4a. In the past 12 months, was medication recommended or discussed by a doctor or other health care provider to help you quit? Examples of medication are: nicotine gum, patch, lozenge, or prescription medication.

YES	1
NO	2
REF	-7
DK	-8

G4b. In the past 12 months, did your doctor or other health care provider discuss or offer services other than medication to help you quit? Examples are: telephone helplines, individual or group counseling, or cessation programs.

YES	1
NO	2
REF	-7
DK	-8

EXPOSURE TO SHS

BOX H8

IF LANDLINE CASE AND A ONE-ADULT HH, SKIP TO BOX H9.

DISPLAY NOTE: IF SSTAT = C1, C2, C3, F2, X1 OR X2 USE FIRST DISPLAY IN H8, ELSE USE SECOND DISPLAY.

H8 HARD RANGE IS 0 – 15.

H8. {Not including yourself, how/How} many of the adults who live in your household smoke cigarettes, cigars or pipes?

|__|__| ENTER NUMBER OF ADULTS WHO SMOKE

REF -7

DK/NOT SURE -8

BOX H9

IN H9 HARD RANGE 0-7, -7 AND -8.

H9. During the past 7 days, how many days did anyone smoke cigarettes, cigars, or pipes anywhere inside your home?

[ANYONE INCLUDES THE RESPONDENT.]

_____ ENTER NUMBER OF DAYS

REF -7

DK -8

H10. Which statement best describes the rules about smoking inside your home? Do not include decks, garages, or porches.

Smoking is not allowed anywhere inside your home, 1

Smoking is allowed in some places or at some times or, 2

Smoking is allowed anywhere inside the home? 3

REF -7

DK/NOT SURE -8

H22. In the past seven days, have you been in a car with someone who was smoking?

[SOMEONE MEANS A PERSON OTHER THAN THE RESPONDENT.]

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

H34. Not counting motorcycles, in the vehicles that you or family members who live with you own or lease, is smoking…

Always allowed in vehicles,	1
Sometimes allowed in at least one vehicle, or	2
Never allowed in any vehicle?	3
NO ONE IN FAMILY OWNS A VEHICLE	4
REFUSED	-7
DK/NOT SURE	-8

BOX H23

SKIP TO H38 IF CURRENT SMOKER (SSTAT=C1, C2, C3, F2, OR X1)

H23. In Minnesota, in the past 7 days, has anyone smoked near you at any place besides your home or car?

YES	1	
NO	2	SKIP TO H38
REF	-7	SKIP TO H38
DK	-8	SKIP TO H38

H24. The last time this happened, in Minnesota, where were you? Were you at...

A restaurant or bar outdoor patio,	12
An outdoor shopping mall or strip mall,	6
A community sports event,	7
A gambling venue,	8
A park,	4
A bus stop,	13
A parking lot,	14
A building entrance,	5
Another person's home,	9
Another person's car,	10
Somewhere else outdoors, or	15
Some other place?	11
REF	-7
DK/NOT SURE	-8

H37. How much total time in the past seven days were you exposed to other people's tobacco smoke in… [fill with location from H24]?

|__|__| ENTER NUMBER [RANGE IS 0-168]
HOURS
|__|__| ENTER NUMBER [RANGE IS 0-60]
MINUTES

REF	-7
DK	-8

H38. Now, I'd like to know if you have rules about using e-cigarettes or vaping devices in your home.
[IF NEEDED: These products are battery-powered and produce vapor instead of smoke.]
Which statement best describes the rules about using e-cigarettes or vaping devices inside your home? Do not include decks, garages, or porches. Would you say…

Using these products is not allowed anywhere inside your home,	1
Using these products is allowed in some places or at some times or,	2
Using these products is allowed anywhere inside the home?	3
REF	-7
DK/NOT SURE	-8

Section I: Risk Perception and Social Influences

Risk Perception

I1. Next I'd like to ask your opinion about some tobacco and health related issues.
Do you believe there is any harm in having an occasional cigarette?

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

I3. Now I am going to ask about smoke from other people's cigarettes.
Do you think that breathing smoke from other people's cigarettes is...

Very harmful to one's health,	1
Somewhat harmful to one's health,	2
Not very harmful to one's health or,	3
Not harmful at all to one's health?	4
REF	-7
NO OPINION/DK/NOT SURE	-8

I21. Do you agree or disagree with the following statements about menthol cigarettes?

IF NEEDED: Menthol cigarettes are cigarettes that taste like mint.

IF NEEDED: We're interested in everyone's perceptions about menthol cigarettes even if you have never smoked them or are not that familiar with them

a. Menthols are better for a sore throat than nonmenthols.

1 AGREE
2 DISAGREE
-7 REFUSED
-8 DON'T KNOW

b. Menthols are healthier than nonmenthols.

1 AGREE
2 DISAGREE
-7 REFUSED
-8 DON'T KNOW

c. Menthols contain fewer chemical additives than nonmenthols

1 AGREE
2 DISAGREE
-7 REFUSED
-8 DON'T KNOW

d. Menthols are less harmful [to smokers] than nonmenthols.

1 AGREE
2 DISAGREE
-7 REFUSED
-8 DON'T KNOW

Section J: Closing Demographic Items

J1d. Let me remind you that all your answers are confidential. The last few questions will help us make sure that we have a representative sample of respondents.

Are there any children under age 18 living in this household?

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

J2. Are you currently. . .

Married,	1
A member of an unmarried couple,	2
Divorced,	3
Widowed,	4
Separated, or	5
Never married?	6
REF	-7
DK/NOT SURE	-8

J3. Are you Hispanic or Latino?

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

J4. Which one or more of the following would you say is your race? Are you…

[READ ALL RESPONSE OPTIONS-SELECT ALL THAT APPLY]

		YES	NO	REF	DK/NOT SURE
a.	White	1	2	-7	-8
b.	Black or African American	1	2	-7	-8
c.	Asian	1	2	-7	-8
d.	Native Hawaiian or Other Pacific Islander	1	2	-7	-8
e.	American Indian or Alaska Native, or	1	2	-7	-8
f.	Some other race?	1	2	-7	-8
J4fOS	If J4f = 1: What is that other race?	[SPECIFY] _____			

BOX J5

DESCRIPTIVE NOTE: ASK J5 TO RESPONDENTS WHO REPORT THAT THEIR RACIAL BACKGROUND IS MIXED (MORE THAN ONE RACE), THAT IS, MORE THAN ONE RESPONSE IN J4a-f = 1. J5 ASKS WHICH RACE BEST REPRESENTS HIS/HER RACE.

IF ONLY ONE RESPONSE IN J4a-f = 1, SKIP TO J15.

DISPLAY NOTE: IN J5 DISPLAY ONLY THOSE RACE CATEGORY LABELS CORRESPONDING TO THOSE WHERE J4a THROUGH J4f = 1; ALWAYS DISPLAY OPTION 7. FOR OPTION 6, DISPLAY J4fOS VERBATIM TEXT.

J5. Which one of these would you say *best* represents your race? Would you say…

{White},	1
{Black or African American},	2
{Asian},	3
{Native Hawaiian or Other Pacific Islander},	4
{American Indian or Alaska Native}, or	5
J4OS {VERBATIM TEXT}	6
RACIAL BACKGROUND EQUALLY DIVIDED	7
REF	-7
DK	-8

J15. Do you live in an apartment building, condo, townhome, or other building with shared walls?

YES	1	
NO	2	SKIP TO J10
REF	-7	SKIP TO J10
DK/NOT SURE	-8	SKIP TO J10

BOX J16

SKIP TO J10 IF SSTAT=C1, C2, C3, F2, X1, ELSE CONTINUE TO J16

J16. During the past 7 days, have you smelled smoke from cigarettes, cigars or pipes anywhere inside the building, including your own apartment?

YES	1
NO	2
REF	-7
DK/NOT SURE	-8

J10. In studies like this, households are sometimes grouped according to income. Please tell me which group best describes an estimate of the total combined income of all persons in this household over the past year. Please include money income from all sources, such as salaries, interest, retirement, or any other source for all household members. Would you say...

[IF NECESSARY PROBE: Include income from all sources such as: earnings; social security and public assistance payments; dividends, interest and rent; unemployment and worker's compensation; government and private employee pensions.]

Less than $10,000,	1
$10,001 - $20,000,	2
$20,001 - $25,000,	3
$25,001 - $35,000,	4
$35,001 - $50,000,	5
$50,001 - $75,000, or	6
$75,001-$$100,000, or	7
More than $100,000?	8
REF	-7
DK	-8

J11. What is the highest level of school you completed?

COMPLETED 8TH GRADE OR LESS	1
SOME HIGH SCHOOL BUT NO DIPLOMA	2
COMPLETED HIGH SCHOOL (DIPLOMA)	3
EARNED GED	4
SOME COLLEGE BUT NO DEGREE (INCLUDES TECHNICAL OR TRADE SCHOOL AFTER RECEIVING A HIGH SCHOOL DIPLOMA / GED.)	5
COMPLETE A TWO YEAR COLLEGE DEGREE (AA OR AS DEGREE)	6
COMPLETED A FOUR YEAR COLLEGE DEGREE (BA, BS, RN DEGREE)	7
SOME GRADUATE OR PROFESSIONAL SCHOOL AFTER COLLEGE BUT NO DEGREE	8
COMPLETED GRADUATE OR PROFESSIONAL SCHOOL AFTER COLLEGE (MA, MS, PHD, MD, DDS, OR HIGHER)	9
REF	-7
DK	-8

BOX K1

QUESTIONS SC30 TO K3 ARE TO BE ASKED ONLY OF LAND LINE RESPONDENTS. ELSE, IF CELL PHONE RESPONDENT, GO TO J17.

IF RESPONDENT BREAKS OFF IN SECTION K, FINALIZE AS COMPLETED INTERVIEW; THERE WILL BE NO CALL BACK.

SC30. Because we are conducting this study by phone, I have some questions about the telephone numbers in your household.

Besides the number I called, do you have other telephone numbers in your household, not including cell phones?

YES	1
NO	2
REFUSED	-7
DK/NOT SURE	-8

SC31. Including computer and fax phone numbers, how many of these additional phone numbers are for home use?

[IF NEEDED: Do not include cell phones.]

ONE	1	
TWO	2	
THREE	3	
FOUR	4	
FIVE	5	
SIX OR MORE	6	
DK/NOT SURE	-8	
REFUSED	-7	

K1. Do you have a working cell phone?

Yes	1	
No	2	SKIP TO J17
Share cell phone	3	
REFUSED	-7	SKIP TO J17
DON'T KNOW	-8	SKIP TO J17

K2. Is that cell phone for personal use or business use?

Personal use only	1	
Business use only	2	SKIP TO J17
Both personal and business use	3	
REFUSED	-7	SKIP TO J17
DON'T KNOW	-8	SKIP TO J17

K3. Of all the telephone calls that you receive, are...

All or almost all calls received on cell phone	1
Some received on cell phones and some on regular phones, or	2
Very few or none received on cell phones?	3
REFUSED	-7
DON'T KNOW	-8

J17. Do you consider yourself to be straight, lesbian or gay, bisexual or something else?

[IF NEEDED: Straight means heterosexual]

Straight	1	
Lesbian or gay	2	
Bisexual	3	
Something else	4	
REFUSED	-7	SKIP TO GOODBYE
DON'T KNOW	-8	

J18. Some people describe themselves as transgender when they experience a different gender identity from their sex at birth. For example, a person born into a male body, but who feels female or lives as a woman would be transgender. Do you consider yourself to be transgender?

YES	1
NO	2
REFUSED	-7
DK/NOT SURE	-8

GOODBYE That's my last question. Thank you very much for your time and cooperation.

PRESS ANY KEY TO COMPLETE INTERVIEW

WRGST I'm sorry, but we are only interviewing residences that are in the state of Minnesota. Thank you very much for your time.

PRESS ANY KEY TO TERMINATE

Appendix B

MATS 2018 Landline Screener Questionnaire

SCREENER FOR LANDLINE SAMPLE

L1:

Hello, my name is ____. I am calling on behalf of the Minnesota Department of Health. We are conducting general health interviews with Minnesota residents about health behaviors and tobacco use. Are you a member of this household and at least 18 years old?
NOTE: CALLBACK NAME IS: <FNAME><BDAY2><Q14><Q13>

YES	01	
NO	02	=> S3A
GO TO RESULT	03	=> CODE CALL RESULT

LQ1R:

Do you live in Minnesota?

YES	01	
NO	02	=> CODE AS INELIGIBLE
REFUSED	-7	=> CODE AS INELIGIBLE
DON'T KNOW	-8	=> CODE AS INELIGIBLE

S1B:

Is this phone number used for. . .

Home use	01	=> S5
Home and business use, or	02	=> S5
Business use only?	03	=> CODE AS INELIGIBLE
GO TO RESULT	04	=> CODE CALL RESULT

S3A:

May I please speak with a household member who is at least 18 years old?
[HOUSEHOLD (HH) MEMBERS INCLUDE PEOPLE WHO THINK OF THIS HH AS THEIR PRIMARY PLACE OF RESIDENCE. IT INCLUDES PERSONS WHO USUALLY STAY IN THE HH BUT ARE TEMPORARILY AWAY ON BUSINESS OR IN A HOSPITAL.][COLLEGE STUDENTS AWAY AT SCHOOL ARE CONSIDERED HH MEMBERS IF THEY ARE IN MINNESOTA BUT NOT IF THEY ARE OUT OF STATE].[PART-TIME RESIDENTS OF MINNESOTA ARE ELIGIBLE IF THEY ARE CURRENTLY IN MINNESOTA. IF THEY WILL BE BACK IN MINNESOTA BEFORE JUNE 2018, SET A CALLBACK FOR A DATE WHEN THEY MIGHT BE BACK].

YES	01	=> S4
NO - SET AS CALLBACK OR REFUSAL	02	=> CODE CALL RESULT
THERE ARE NONE	03	=> CODE AS INELIGIBLE

S4:

Hello, I'm ____ with Westat. I'm calling on behalf of the Minnesota Department of Health.
Are you a member of this household and at least 18 years old?

YES	01	=> LQ1R
NO	02	=> S3A
GO TO RESULT	03	=> CODE CALL RESULT

S4RES:

Is this phone number used for. . .
Home use 01
Home and business use, or..... 02
Business use only?..... 03 => CODE AS INELIGIBLE
GO TO RESULT ..... 04 => CODE CALL RESULT

S5:

The study we are conducting is about attitudes and behaviors related to health and tobacco use and will be used to help all Minnesotans live healthier lives. Your participation is voluntary and important to the success of this study.
CONTINUE..... 01
GO TO RESULT ..... 02 => CODE CALL RESULT

SC5A:

Including yourself, how many adults age 18 and older, currently live in your household? Please include students temporarily living away at a school in Minnesota.
[IF NEEDED: Include adults who think of this household as their primary place of residence. Include adults who usually stay in the household but are temporarily away on business, vacation, or in a hospital.]
[HOUSEHOLD (HH) MEMBERS INCLUDE PEOPLE WHO THINK OF THIS HH AS THEIR PRIMARY PLACE OF RESIDENCE. IT INCLUDES PERSONS WHO USUALLY STAY IN THE HH BUT ARE TEMPORARILY AWAY ON BUSINESS OR IN A HOSPITAL.][COLLEGE STUDENTS AWAY AT SCHOOL ARE CONSIDERED HH MEMBERS IF THEY ARE IN MINNESOTA BUT NOT IF THEY ARE OUT OF STATE].
ONE ADULT 1
TWO ADULTS 2
THREE OR MORE ADULTS 3-10
REFUSED ..... -7
DON'T KNOW ..... -8

RIZZO SELECTION BOX:

CONTINUE WITH RIZZO METHOD ACCORDING TO THE FOLLOWING RULES:

IF SC5A = 1 (ONE ADULT) AGE 18 OR OLDER IN THE HOUSEHOLD, SELECT THE SCREENER RESPONDENT AS THE SUBJECT. GO TO Q13.

ELSE IF 2 PERSONS AGE 18 OR OLDER, THEN IF RAND1 <= .5, SELECT THE SCREENER RESPONDENT AS THE SUBJECT. GO TO Q13. ELSE IF RAND1 = .5, SELECT THE OTHER PERSON IN THE HOUSEHOLD. GO TO Q14.

ELSE IF MORE THAN 2 PERSONS AGE 18 OR OLDER, THEN IF RAND1 <= 1/N, SELECT THE SCREENER RESPONDENT. GO TO Q13. ELSE GO TO Q15. AND SELECT A PERSON ACCORDING TO THE NEXT BIRTHDAY METHOD.

ELSE, IF NEXT BIRTHDAY UNDETERMINED, GO TO HOUSEHOLD ROSTER (ENUM) AND ROSTER ALL HOUSEHOLD MEMBERS 18 OR OLDER AND SELECT ONE AT RANDOM. RESPONDENT SELECTION BASED ON SC5A

Q13:

You have been selected to participate in this interview. Please tell me just your first name.[IF FIRST NAME REFUSED OR DON'T KNOW, ASK FOR INITIALS, AGE/SEX, RELATION OR OTHER IDENTIFYING INFORMATION.][PROBE: We need some way to ask for you if we need to call back.]

=> /Q14

if CHOO1>1

S5B1:

[ENTER RESPONDENT'S SEX]
MALE 01
FEMALE 02
DON'T KNOW 03

Q14:

Please tell me just the first name of the other adult in this household.
[IF FIRST NAME REFUSED OR DON'T KNOW, ASK FOR INITIALS, AGE/SEX, RELATION OR OTHER IDENTIFYING INFORMATION.][PROBE: We need some way to ask for this person if we need to call back.]

S5D1:

Is this person male or female?
MALE 01
FEMALE 02
DON'T KNOW 03

RESP2:

May I please speak to <Q14>?

<Q14> AVAILABLE/COMING TO PHONE	01	=> SC30
GO TO RESULT	02	=> CODE CALL RESULT

Q15:

Please tell me just the first name of the adult in this household, other than yourself, who will have the next birthday.[IF NEEDED: We interview only one adult in each household and asking this question helps the computer decide which person that should be.][IF FIRST NAME REFUSED OR DON'T KNOW, ASK FOR INITIALS, AGE/SEX, RELATION OR OTHER IDENTIFYING INFORMATION.][IF NEEDED: We need some way to ask for this person if we need to call back.]

YES - ENTER NAME ON NEXT SCREEN	01	
DON'T KNOW BIRTHDAYS	02	=> ENUM
REFUSED	-7	=> CODE AS REFUSAL
DONT' KNOW	-8	=> CODE AS REFUSAL

BDAY2:

What is this person's first name?
[IF FIRST NAME REFUSED OR DON'T KNOW, ASK FOR INITIALS, AGE/SEX, RELATION OR OTHER IDENTIFYING INFORMATION.]

BDAYS:

ASK IF NEEDED: Is <BDAY2> male or female?

MALE	01
FEMALE	02
DK/RF	03

ENUM:

So that the computer can choose someone to interview, please tell me the first name and gender of the adults currently living in this household.
[IF FIRST NAME REFUSED OR DON'T KNOW, ASK FOR INITIALS, AGE, RELATION OR OTHER IDENTIFYING INFORMATION.]
[CLICK NEXT TO CONTINUE].

FNAME:

What is your first name?/ What is the name of adult number __?

R_SEX:

ENTER RESPONDENT'S SEX.
[IF NEEDED] Is this adult male or female?
MALE 01
FEMALE 02
MALE 1
FEMALE 2

MORE1:

Are there any other adults in the household we haven't listed?
YES ..... 01 => REPEAT FNAME-R_SEX
NO 02

RESP3:

<FNAME> has been selected to participate in this interview.
May I please speak to <FNAME>?
SELECTED RESPONDENT FROM ENUMERATION IS:
ADULT NUMBER: <CHOO3>NAME: <FNAME>SEX: <R_SEX>
<FNAME> AVAILABLE/COMING TO PHONE ..... 01 => SC30
GO TO RESULT ..... 02 => CODE CALL RESULT

SC30:

Because we are conducting this study by phone, I have some questions about the telephone numbers in your household. Besides the number I called, do you have other telephone numbers in your household, not including cell phones?
YES 01
NO ..... 02 => SC34
REFUSED ..... -7 => SC34
DON'T KNOW ..... -8 => SC34

SC31:

Including computer and fax phone numbers, how many of these additional phone numbers are for home use?
[IF NEEDED: Do not include cell phones.]
ENTER NUMBER _____
REFUSED ..... -7
DON'T KNOW ..... -8

SC32:

Is this additional phone number used for a computer or fax machine?
YES ..... 01 => SC35
NO ..... 02 => A2 (CONSENT)
REFUSED ..... -7 => A2 (CONSENT)
DON'T KNOW ..... -8 => A2 (CONSENT)

SC34:

Do you have any additional phone numbers for computers or fax machines?

YES	01	
NO	02	=> A2 (CONSENT)
REFUSED	-7	=> A2 (CONSENT)
DON'T KNOW	-8	=> A2 (CONSENT)

SC35:

Some households have telephone numbers that are used for both talking and for computer or fax. How many of these computer or fax numbers are ever answered for talking?

$E 0 19

REFUSED	-7
DON'T KNOW	-8

CONSENT STATEMENT TO ALL PARTICIPANTS

A2:

We are conducting general health interviews with Minnesota residents. You have been randomly chosen to be interviewed about attitudes and behaviors related to health and tobacco use. Your responses will represent thousands of other Minnesotans and will be used to help all Minnesotans live healthier lives. Your input is very important for the results to be accurate.

The interview is completely voluntary and there are no penalties if you decide not to participate. You don't have to answer any question you don't want to, and you can end the interview at any time. The interview generally takes about 10 to 15 minutes, depending on your answers. Any information you give will be kept confidential, your name and phone number will be separated from your responses and only researchers working in the study will see your answers.

CONTINUE	CT => EXTENDED INTERVIEW
GO TO RESULTS	GT => CODE CALL RESULT

Appendix C

MATS 2018 Cell Phone Screener Questionnaire

SCREENER FOR CELL PHONE SAMPLE

Q1:

Hello, my name is ____. I am calling on behalf of the Minnesota Department of Health. If you are currently driving a car or doing anything that requires your full attention, I need to call back later. We are conducting general health interviews with Minnesota residents about health behaviors and tobacco use. Are you at least 18 years old?
[END CALL IMMEDIATELY IF R IS DRIVING OR DOING AN ACTIVITY AND SET APPOINTMENT.]NOTE: CALLBACK NAME IS: <FNAME><BDAY2><Q14><Q13>

YES	01	
NO	02	=> Q2
NOT A CELL PHONE	03	=> Q18
GO TO RESULT	04	=> CODE CALL RESULT

Q1R:

Do you live in Minnesota?

YES	01	
NO	02	=> CODE CALL RESULT
REFUSED	-7	=> CODE CALL RESULT
DON'T KNOW	-8	=> CODE CALL RESULT

Q1A:

In this part of the study, we are trying to reach people who use cell phone service for their primary telephone. It will take about 2 minutes to see if you qualify for the study.
[CLICK NEXT TO CONTINUE.]

	1	=> Q4

Q2:

Does an adult, 18 years or older ever use this phone?

YES	01	
NO	02	=> CODE AS INELIGIBLE
REFUSED	-7	=> CODE AS REFUSAL
DON'T KNOW	-8	=> CODE AS REFUSAL

Q3:

Can I speak to the adult now?

YES	01	=> Q1
NO	02	=> CODE CALL RESULT
REFUSED	-7	=> CODE CALL RESULT
DON'T KNOW	-8	=> CODE CALL RESULT

Q4:

Is this cell phone your only phone or do you also have a regular telephone at home?
[IF R INDICATES MORE THAN ONE CELL PHONE, BUT NO REGULAR PHONE, CODE "1" FOR CELL IS ONLY PHONE.]

CELL IS ONLY PHONE	01	=> Q9
HAS REGULAR PHONE AT HOME	02	=> Q8
NOT RESPONDENT'S CELL PHONE	03	
NOT A CELL PHONE	04	=> Q18 (ERR)
REFUSED	-7	=> CODE AS REFUSAL
DON'T KNOW	-8	=> CODE AS REFUSAL

Q5:

Do you live in the same household with the person who owns this phone number?

YES	01	=> Q7
NO	02	=> SET CALLBACK
REFUSED	-7	=> CODE AS REFUSAL
DON'T KNOW	-8	=> CODE AS REFUSAL

Q7:

Does your household have a regular telephone at home?

YES	01	
NO	02	=> Q9
REFUSED	-7	=> Q9
DON'T KNOW	-8	=> Q9

Q8:

Of all the telephone calls that you and the people that live with you receive, are ...

all or almost all calls received on cell phones,	01	
some received on cell phones and some on regular phones, or	02	=> CODE AS INELIGIBLE
very few or none received on cell phones?	03	=> CODE AS INELIGIBLE
REFUSED	-7	=> CODE AS INELIGIBLE
DON'T KNOW	-8	=> CODE AS INELIGIBLE

Q9:

Is this cell phone used for ...

Personal use,	01	
Personal and business use,	02	
Business use only?	03	=> CODE AS INELIGIBLE
REFUSED	-7	=> CODE AS INELIGIBLE
DON'T KNOW	-8	=> CODE AS INELIGIBLE

CELL4:

Are you 35 years of age or older?

YES	01	
NO	02	=> Q10
REFUSED	-7	=> Q10
DON'T KNOW	-8	=> Q10

AGESUB:

SUB-SAMPLES AGE 35+ BASED ON DESIGNATED SELECTION PROBABILITY

OLDER ADULT SAMPLED	1	=> Q10
OLDER ADULT NOT SAMPLED	2	=> CODE AS INELIGIBLE

Q10:

Including yourself, how many adults age 18 and older, currently live in your household? Please include students temporarily living away at a school in Minnesota.
[IF NEEDED: Include adults who think of this household as their primary place of residence. Include adults who usually stay in the household but are temporarily away on business, vacation, in a hospital.]

ONE ADULT	1 => A2 (CONSENT)
MORE THAN ONE ADULT	2-10
REFUSED	-7 => A2 (CONSENT)
DON'T KNOW	-8 => A2 (CONSENT)

Q11:

Does the other adult/do any of the other adults receive calls on this cell phone number?

YES	01
NO	02
REFUSED	-7
DON'T KNOW	-8

CONSENT STATEMENT TO ALL PARTICIPANTS

A2:

We are conducting general health interviews with Minnesota residents. You have been randomly chosen to be interviewed about attitudes and behaviors related to health and tobacco use. Your responses will represent thousands of other Minnesotans and will be used to help all Minnesotans live healthier lives. Your input is very important for the results to be accurate.

The interview is completely voluntary and there are no penalties if you decide not to participate. You don't have to answer any question you don't want to, and you can end the interview at any time. The interview generally takes about 10 to 15 minutes, depending on your answers. Any information you give will be kept confidential, your name and phone number will be separated from your responses and only researchers working in the study will see your answers.

CONTINUE	CT => EXTENDED INTERVIEW
GO TO RESULTS	GT => CODE CALL RESULT

Appendix D

MATS 2018 Letters

MINNESOTA ADULT TOBACCO SURVEY

TOBACCO USE IN MINNESOTA: 1999-2018

DEPARTMENT OF HEALTH

12345
Minnesota Resident
Address 1
Address 2
City, ST ZIP

Date

Dear Fellow Minnesotans:

I am writing to ask for your help with an important telephone survey about the health practices of adults in Minnesota, with an emphasis on tobacco use. We have made several attempts to reach you by phone, but have been unsuccessful.

The survey is being conducted by the Minnesota Department of Health with the assistance of the independent research company Westat. Your household has been randomly selected for the survey and will represent thousands of Minnesotans. We would like to interview one adult (18 or older) from your household. The survey is relatively brief and held confidential. Most of the people contacted so far have agreed to complete the survey.

Let me assure you that your responses are very important. The survey will be more accurate and balanced if your experiences and beliefs are included along with those who have already taken the survey. We will keep trying, but you could help us greatly by letting us know when would be the best time to call. Please call Westat, the independent research company that is conducting the interviews, directly at their toll-free number at 1-855-868-4818.

Most of all, we want to obtain the best information possible from people across the state. The survey will provide useful information to health care professionals, medical researchers, and others interested in helping Minnesotans live healthier lives.

If you would like more information about the survey, please contact Westat at the number above. You may also go to the survey website at http://www.health.state.mn.us/divs/chs/adulthealthstudy. If you would like to verify the study with someone at the Minnesota Department of Health, please call Sharrilyn Evered, Senior Research Scientist, at 651-201-5942.

Sincerely,

Dan Fernandez-Baca
Director
Center for Health Statistics
Minnesota Department of Health
P.O. Box 64882
Saint Paul, MN 55164-0882

PS: Thank you for considering this request. We hope you choose to take part in this confidential survey about the health of Minnesotans.

MINNESOTA ADULT TOBACCO SURVEY

TOBACCO USE IN MINNESOTA: 1999-2018

DEPARTMENT OF HEALTH

12345

Minnesota Resident
Address 1
Address 2
City, ST ZIP

Date

Dear Fellow Minnesotans:

You may recall that several weeks ago we asked your household to help us with an important telephone survey about the health practices of adults in Minnesota, with an emphasis on tobacco use.

The survey is being conducted by the Minnesota Department of Health with the assistance of the independent research company Westat. Your household has been randomly selected for the survey and will represent thousands of Minnesotans. We would like to interview one adult (18 or older) from your household. The survey is relatively brief and held confidential. Most of the people contacted so far have agreed to complete the survey.

So far, your household has not agreed to participate. Because you represent thousands of people across the state of Minnesota your responses are very important. The survey will be more accurate and balanced if your experiences and beliefs are included along with those who have already taken the survey. We are writing in hopes that we may be able to interview someone from your household by phone. A professional interviewer from Westat, an independent research company, will call you in the next week or two to explain the survey and, hopefully, to begin the interview process.

Most of all, we want to obtain the best information possible from people across the state. The survey will provide useful information to health care professionals, medical researchers, and others interested in helping Minnesotans live healthier lives.

If you would like more information about the survey, please contact Westat at 1-855-868-4818. You may also go the survey website at http://www.health.state.mn.us/divs/chs/adulthealthstudy. If you would like to verify the study with someone at the Minnesota Department of Health, please call Sharrilyn Evered, Senior Research Scientist, at 651-201-5942.

Sincerely,

Dan Fernandez-Baca
Director
Center for Health Statistics
Minnesota Department of Health
P.O. Box 64882
Saint Paul, MN 55164-0882

PS: Thank you for considering this request. We hope you choose to take part in this confidential survey about the health of Minnesotans.

Appendix E

MATS 2018 Web Page Content

MAIN PAGE

The 2018 Minnesota Health Study

The Minnesota Department of Health and ClearWay Minnesota℠ are conducting a comprehensive survey about the health practices of adults in Minnesota, with an emphasis on tobacco use. This telephone survey is being conducted by Westat, an independent research organization. The results of the survey will provide useful information to health care professionals, medical researchers and others interested in helping Minnesotans live healthier lives.

A Study of the Health Practices of Minnesota Adults in 2018

This is a comprehensive survey about the health practices of adults in Minnesota, with an emphasis on tobacco use. Between February and May 2018, we will invite over 6,000 Minnesota residents to participate in this telephone survey. Each person who is interviewed will represent not only themselves but also other adults like them in Minnesota.

It is important that we talk with as many people as we can from those invited to participate so that we can accurately understand important health and tobacco-related issues. We hope that if you are selected for an interview you will choose to participate. The results of the survey will provide useful information to health care professionals, medical researchers and others interested in helping Minnesotans live healthier lives.

The survey is being conducted by Westat, an independent research organization, on behalf of the Minnesota Department of Health and ClearWay Minnesota℠. Any information you provide during the interview is held confidential. Your name will never be used in connection with any study results. The information you provide is released only in statistical, summary form. Your responses are added to the responses of others and published as combined information only. Personal identifying information will not be disclosed or released to anyone outside the research team for any purpose and will be protected.

Click on the links below to find out more about this important study.

- **How participants are selected**
- **How the survey works**
- **Frequently asked questions**
- **Sponsoring agencies**

FIRST LINKED PAGE

How Participants Are Selected

Adult Minnesota residents are randomly selected to participate in the survey from all households in Minnesota. This selection is completely random. The phone numbers are randomly generated from all possible numbers in the state of Minnesota, including both land line and cell phone numbers. We do not know any information about your household before we call. One adult in the household will be asked to be interviewed. These interviews will represent Minnesotans from all across the state.

Your participation in this survey will help achieve our goal of improving the health of all Minnesotans.

SECOND LINKED PAGE

How the Survey Works

Once our professional interviewer has reached you by phone, we will introduce the survey, invite you to participate, and then interview you or the randomly selected person from your household.

This is not a test and we are not selling anything. We want to know about your health practices and opinions. The survey asks about your tobacco use (if any) and exposure to secondhand smoke. We also ask a few general background questions, such as your age and educational background. You will answer the questions over the phone, so you won't need to write anything down or mail anything. For most people, the survey takes about 15-20 minutes. It may be a few minutes longer depending on the answers to certain questions.

After we have conducted all the interviews, we will combine your answers with everyone else's and analyze them all together. You will not be identified individually in any reports or articles about this survey. Your responses will be held confidential.

THIRD LINKED PAGE

Frequently Asked Questions

Q: What is the purpose of this survey?
A: The survey results will be used by health-related organizations in Minnesota to develop effective public health strategies and policies. The survey will supply information to health care providers and others interested in helping Minnesotans live healthier lives.

Q: How long will the survey take?
A: For most people, the survey takes about 15-20 minutes. It may be a few minutes longer depending on the answers to certain questions.

Q: Who is the sponsor of the survey?
A: The Minnesota Department of Health and ClearWay Minnesota℠ are the survey sponsors.

Q: What kinds of questions are asked?
A: This survey asks questions about health behaviors, tobacco use, and exposure to secondhand smoke. We also ask a few general background questions, such as the last grade you completed in school.

Q: Who will see my answers?
A: Survey data will not be shared with anyone outside of the study. The answers you give to this survey will be held confidential. Your answers will be grouped with those of other people who participate in the survey before they are analyzed, so no report of the results will identify you individually. When Westat sends the data back to the survey sponsors, names and identifying information will not be included.

Q: Will I be able to get the results?
A: Reports about the current survey will be available on the web in the beginning of 2019. Please check back for more information at that time.

Q: How did you get my phone number?
A: A computer randomly chooses phone numbers from all the possible telephone numbers in Minnesota, both landline and cell phone numbers. This is a scientific process to choose a random sample of Minnesota residents. This method will select households with both listed and unlisted numbers.

Your telephone number is confidential and will not be given out to anyone. If your number is unlisted, it will remain unlisted.

Q: Why don't you just call someone else?
A: A computer identified your phone number at random and all the people we call make up a scientific sample of Minnesota residents. Replacing you with anyone else will affect the accuracy of the results. Although the survey is strictly voluntary, we hope that, if you are selected, you will take the opportunity to participate. By choosing to participate, you help to insure that the survey is truly representative of adults in Minnesota.

Q: Who is Westat?
A: Westat is an independent research company hired by the survey sponsors to conduct the interviews with those selected for participation.

FOURTH LINKED PAGE

Sponsoring Agencies

The Minnesota Department of Health and ClearWay Minnesota℠ are sponsoring the survey. For more information about the survey, please call one of the following individuals or organizations:

- Westat: toll-free at 1-855-868-4818.
- Minnesota Department of Health: Sharrilyn Evered at 651-201-5942