


MINNESOTA ADULT TOBACCO SURVEY

TOBACCO USE IN MINNESOTA

MATS 2018 TECHNICAL REPORT

2018 UPDATE

MINNESOTA
ADULT
TOBACCO
SURVEY



TOBACCO USE IN MINNESOTA: 1999-2018

MINNESOTA
ADULT
TOBACCO
SURVEY



TOBACCO USE IN MINNESOTA: 1999-2018

Tobacco Use in Minnesota:

2018 Update

January 2019

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ClearWay MinnesotaSM

Minnesota Department of Health

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1. The Minnesota Adult Tobacco Survey 2018: Methodology

The Minnesota Adult Tobacco Survey (MATS) project collects and analyzes data to monitor the effects of tobacco-related policies and programs and to support the planning and design of future interventions. Researchers, public health officials, policy makers, health care providers and others can use this information to evaluate the progress made by tobacco control interventions in changing health behavior on a statewide basis.

1.1 Study Design

MATS 2018 is a telephone survey designed to collect public health and tobacco-related data about the general adult population of Minnesota. The survey design incorporated the following principal components.

Survey Sample

Based on requirements specified by ClearWay Minnesota, Westat designed and drew scientific samples that are representative of the Minnesota adult population in 2017. The sample design called for a random-digit dialing (RDD) sample of the adult Minnesota population, drawn from two telephone sample frames, one of landline telephone numbers and the other of cell phone telephone numbers.

Because non-white and Hispanic populations are usually under-represented in simple RDD sampling, MATS 2018 used a stratified sampling approach designed to increase the inclusion of these populations. In both the landline and cell RDD samples, a disproportionately higher number of phone numbers were included from metro areas known to have higher concentrations of non-white/non-Hispanics (especially blacks). Also, the landline RDD sample included strata of phone numbers matched to households with Asian and Hispanic surnames.

As in MATS 2014, in the MATS 2018, calls placed to cell phones began with several screener questions. In addition to confirming that the respondent lived in Minnesota,

these questions determined whether the respondent also had a landline and if so, the frequency of cell phone use compared to their landline. For people called on cell phones, only those who only had a cell phone or used their cell phone for at least most of their calls were eligible to continue the interview. This screening process reduced frame overlap and reduced the possibility that the same individual would be contacted at both a landline and cell number.

The precision of the survey estimates is largely dependent on the size of the sample. When a survey sample is more complex than a simple random sample, as in the case of MATS 2018, larger sample sizes are needed to achieve the same overall precision than would be needed from a simple random sample. To meet the survey's precision goals, the sample design targeted 6,050 adults, 2,730 from the landline sample and 3,320 from the cell phone sample.

Questionnaire Development

With ClearWay Minnesota and the Minnesota Department of Health (MDH), Westat developed a questionnaire that would obtain all the data items needed to support the planned analyses for MATS 2018 and to compare key statistics from MATS 2018 with the previous MATS surveys. The questionnaire covered general physical health, cigarette smoking and other tobacco use including e-cigarette use, smoking cessation, attitudes and beliefs related to smoking, experience with health care provider smoking interventions, exposure to secondhand smoke in various settings, rules on smoking behaviors, risk perceptions and social influences, and demographic information. Most survey questions were derived from previous MATS questionnaires, from standard questions developed by the CDC, and from questions tested and used in other tobacco surveillance surveys. The same questionnaire was administered to both landline and cell phone respondents.

ClearWay Minnesota, MDH and Westat sought to strike a balance between maintaining continuity with previous MATS questionnaires and making two types of changes that would improve the data for current and future analyses. These two types of changes were the addition of new questions to address emergent tobacco and public health issues, and the elimination of questions that were no longer relevant or were of less

interest from policy and research standpoints compared to newer issues and research questions.

Before implementing data collection, a live pilot test of the instrument was conducted January 15-28, 2018 with a survey of 193 test respondents drawn from both landline and cell telephone sample frames, resulting in only minor changes.

Data Collection

Data collection took place in 2018, between February 12 and July 29. The questionnaire was administered using a computer-assisted telephone interviewing (CATI) system. The sample was identified and selected using standard RDD survey procedures, which include conducting a screener interview to identify residential phone numbers and then selecting one adult at that number for the MATS interview. In addition to confirming that the sampled number was residential, the screener confirmed residence in Minnesota. Additionally, the screener for cell sample excluded respondents who had a landline and did not use their sampled cell phone number for at least most of their calls.

Most sample records were worked using a protocol requiring a minimum of 7 call attempts (unless each sampled case resulted in a completed interview or reached another final resolution in fewer attempts). Some sample records released late in the survey field period did not receive the full protocol. Non-hostile refusals (except refusals incurred during the last few days of data collection) were re-attempted for refusal conversion by specially trained data collectors. Supporting measures included an informational website, a toll-free number, and letters sent to those who initially declined to respond to the survey and those who were not contacted during the first 5 call attempts (in both situations, letters were only sent to landline cases where the phone number was matched to an address). Additionally, Westat sent informational letters to respondents who requested written information about the study.

The final sample size of 6,055 interviews slightly exceeded the sample plan of 6,050. The 2,789 landline interviews were more than the 2,730 originally planned and the 3,266 cell phone interviews were slightly less than the 3,320 originally planned. The American Association for Public Opinion Research (AAPOR) methodology was used to calculate the weighted landline sample and cell phone sample response rates of 17.5 percent and

13.4 percent, respectively, which reflect net response rates across both the screener questionnaire and the MATS questionnaire.

ClearWay Minnesota and Westat made every effort to ensure the confidentiality of respondents and to inform them of the features of the survey, its voluntary nature and the confidentiality of their responses. RDD phone numbers were not retained in the analytical data files. Reports cite only aggregate data.

The MATS 2018 questionnaire, data collection and data security plan were reviewed and approved by the Minnesota Department of Health Institutional Review Board and by the Westat Institutional Review Board. An institutional review board (IRB) is a specially constituted review body established to protect the welfare of human subjects recruited to participate in biomedical and behavioral research. Westat's IRB's responsibilities are detailed in the regulations concerning human subject protection and the Multiple Project Assurance granted to Westat by the U.S. Department of Health and Human Services, Office for Protection from Research Risks, Division of Human Subject Protection.

Sample Weighting

Sample weights are created so that unbiased population estimates can be calculated using the results of a survey from a sample of a finite population. The sample weighting process included four major steps: (1) adjust for the probability of selection due to the sampling plan, (2) apply screener and extended non-response adjustments, (3) compute dual-frame composite weighting adjustment to combine the overlapping cell-mostly landline¹ and cell phone samples, and (4) post-stratify to estimated population totals through a calibration process to adjust for remaining non-response and coverage error. MATS 2018 incorporated the demographic characteristics of gender, age, race, and education from the 2016 American Community Survey (ACS) into the calibration characteristics dimensions.

¹ There is a possibility that members of the landline sample were cell-mostly phone users who did happen to answer their landline phone when the MATS interviewers called that phone number. Thus, it was possible that a given cell-mostly phone user could have been sampled through either the cell phone or the landline sample. Because of this, combining the two samples into a single weighted file for analysis required weighting adjustments for this "overlap" group, to adjust for the dual probability of selection.

The goal of the MATS 2018 weighting was to yield unbiased state-level estimates without significantly inflating the variance of the estimates. Due to the strong interest in trend analysis, Westat attempted to keep the 2018 methodology as consistent as possible to the 2014 methodology. The merged, weighted data set is used in producing the Minnesota statewide estimates presented in this report. The combined data can be used to produce estimates for the entire adult Minnesota population and subgroups of that population.

The MATS 2018 survey methodology is fully described in the *Minnesota Adult Tobacco Survey 2018 Methodology Report*, available at www.clearwaymn.org/MATS.

Potential Limitations of the Data

All of the MATS 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. Statistics produced from a sample are referred to as "estimates" because they estimate what the actual statistics are for the entire population or for any subgroup in the population. Because there may be some difference between the survey statistic and the actual value for the entire population that the sample survey is meant to represent, statistics produced from sample surveys are subject to two general types of error, technically referred to as "sampling error" and "nonsampling error."

Sampling error is a purely statistical phenomenon. Data are collected from a sample that represents the entire population, rather than from everyone in the population, resulting in an estimate that has some uncertainty associated with it. The uncertainty of an estimate produced from the survey sample data can be quantified. Common measures of uncertainty include standard errors and confidence intervals. See Section 1.2 for additional information.

Other sources of error, which are typically not possible to quantify, are potential nonsampling errors. One type of nonsampling error to which MATS 2018 was subject is coverage error: the extent to which the frame used to draw the sample does not fully include every member of the population. While the combination of the landline and cell phone frames substantially reduces coverage error, there is still a small percentage of Minnesota adults who would not be found through these two frames, e.g., those who

have no telephone at all and those who have telephones but do not speak English well enough. The weighting process—especially the benchmarking process—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 to more closely conform to the overall Minnesota population. Biases also may be present when people who are missed in the survey differ from those interviewed in ways other than the categories used in weighting. As with most surveys that rely on telephone interviewing, some subgroups, such as specific racial or ethnic minority communities, are likely to be under-represented.

Other nonsampling errors may result from the survey design, how respondents interpreted questions, how able and willing respondents were to provide accurate answers, and how accurately the answers were recorded and processed. The MATS design process took several steps to minimize these types of errors, including careful questionnaire design, use of existing validated questions, and having multiple individuals review new questions; use of a CATI system to administer the questionnaire and record responses; internal testing of the CATI questionnaire; pilot testing of the instrument and survey procedures; monitoring of the sample and of the collected data throughout data collection; and thorough review of the data file to finalize it for analysis.

1.2 Analysis Methodology

There are two main goals of the analysis: first, to describe Minnesota in 2018 based on the MATS 2018 data; second, to describe tobacco-related trends in Minnesota from 1999 to 2018, with the main focus on changes from 2014 to 2018.

The tabulations have the following features.

MATS 2018 Analysis

The analysis generated frequencies of all key study outcomes, principally in the form of percentage distributions. In a few instances, means have been calculated for continuous variables, such as the number of cigarettes smoked per day in the past 30 days.

Bivariate analyses generated tables displaying the major outcomes by demographic subgroups. Subgroup estimates are presented for age groups, gender, education, income and smoking status (when appropriate). All estimates are also presented with 95 percent confidence interval half-widths.

Other bivariate analysis tested the relationship between intermediate outcomes, such as a policy exposure and a key outcome of interest, such as smoking prevalence, quitting behavior or exposure to secondhand smoke. Most of these associations have been previously established in the literature. The purpose of the analysis is not to re-establish these associations but to show their existence in Minnesota. For this reason, the associations presented in this report were not adjusted for demographics or other confounders.

Every estimate has a 95 percent confidence interval half-width, a standard measure of statistical precision that captures the degree of statistical uncertainty associated with various forms of sampling error. A 95 percent confidence interval is likely to contain the real population value 95 percent of the time.

In a few instances, the report refers to numbers of people who fall into a specific group (such as the total number of smokers in Minnesota or all smokers who made a quit attempt) rather than percentages. These counts use the sample weights. The weighting process produces weights that add up to totals for the Minnesota adult population and for the various combinations of gender, age, race and educational level to which the weights were benchmarked. When analyzing any group, it is valid to add up the weights for the survey respondents who fall into the group, to produce a total of all those in the entire state of Minnesota who belong to that group. As in the case of any statistic produced from a sample survey, these weighted counts are survey estimates with associated sampling error.

In some cases, data are suppressed because of small sample size to prevent over analysis of statistics. Any estimate based on a sample of less than 10 is suppressed. Data suppression is indicated as “S” in some tables.

MATS Trend Analysis

For selected measures, estimates from earlier MATS (1999, 2003, 2007, 2010, and 2014) are presented along with estimates from 2018. The amount of change between 2014 and 2018 is presented for all such estimates. In a few instances, means have been calculated for continuous variables, such as the number of cigarettes smoked per day in the past 30 days.

When appropriate, subgroup estimates are presented for age groups, gender, education, income and smoking status for some trend analyses. Subgroups are only presented where the importance of the question warrants or where subgroups are particularly salient. All such subgroup estimates include estimates of change between 2014 and 2018.

Interpretation of Trend Results

MATS is a series of repeated cross-sectional surveys. This means that every MATS survey draws a new sample of the Minnesota population. Repeated cross-sectional surveys are an efficient and useful way to describe characteristics of a population over time, especially for planning population-level programs and policies. Care is needed, however, when interpreting the results of such surveys. For example, people can and will move in or out of the state, will die and will be born. A repeated cross-sectional survey does not account for the possibility that the changes observed over time could be due to differences in the composition of the population between the survey administrations.

Testing of Differences

A key feature of this report is that statistically significant differences are clearly indicated. A difference between two groups or two time points is statistically significant when it is unlikely to have occurred by chance. The differences are always between two

groups, for example, men and women, or people with a high school degree and people with a college degree.

A significance test provides a threshold of confidence, a level at which researchers commonly agree that the population values represented by the survey estimates are reliably different from one another. In this report, that threshold is always the 95 percent confidence level.

This report uses two different significance tests. The first test is for examining differences between different subgroups (for example, between men and women). The second test is for examining differences between different survey years; for example, between MATS 2014 and MATS 2018.

MATS 2018 Significance Testing. In the analysis, estimates are compared from independent subgroups within the sample. As described above, one group is always compared with one other group (for example, men compared with women) or multiple series of groups (for example, less than high school education with high school education; less than high school education with some college; less than high school education with college graduates). If the confidence intervals around the two estimates do not overlap, then the difference between the two is statistically significant at the 95 percent level. Significance is not indicated on the table, because there are too many possible comparisons in any given table (as in the education example above). It would be difficult to note all significant differences among all possible pairs in a straightforward way. Significant differences therefore are mentioned in the text only. This is a conservative test, which may miss a few statistically significant results that could be detected by tests that focus on specific predicted relationships, such as pairwise t-tests.

Results that meet the 95 percent confidence level are the focus of this report.

MATS Trend Significance Testing. In the trend analysis, MATS compares the results from 2014 and 2018. To assess whether the difference between years is significant, an estimate of the amount of change between the two years is calculated and is expressed

in the same units as the two estimates (e.g., percentage points in most instances; counts of the analytical unit, such as mean days smoked, in a few instances).

To test the statistical significance of the amount of change between two years, this report uses a one-tailed t-test. A one-tailed t-test is a standard statistical test that is appropriately used when there is only one direction of interest (either positive or negative) for the test. For all the MATS trend analyses, it is possible to hypothesize a direction of change between 2014 and 2018 (for example, that cigarette smoking will decline or that quitting attempts will increase). These hypotheses were made before the data was analyzed, to prevent any bias, and were based on the known trends in Minnesota tobacco use as published in the MATS 2014 report. The individual hypothesis for each comparison – positive or negative – is explicitly stated on each table in this report that presents trend data.

A one-tailed test can be used only to test in the hypothesized direction. Changing the direction of the test after the data is analyzed violates the key assumption that the test is based on – that the direction of the change is known. However, there is nothing to preclude conducting a two-tailed test after a one-tailed test. MATS 2018 uses a two-tailed test in a small number of analyses, where the one-tailed test failed because the observed direction of change between 2014 and 2018 was in the opposite direction of the hypothesis, and where the size of the change was large.

Because these analyses always compare one thing to one other thing, rather than one thing to multiple other things as with the MATS 2018 analyses (for example, a 2014 estimate and a 2018 estimate), it is straightforward and useful to denote statistically significant changes, based on one-tailed tests of the trend analyses, with an asterisk on the table. Statistically significant results of two-tailed tests are not shown on the tables but are discussed in the text.

Strength of Association

There are some tests of association presented for MATS 2018 results. These tests are designed to determine the extent to which the distribution of one factor is associated with the distribution of another. For example, to test the hypothesis that the distribution of quit attempts is associated with the distribution of home smoke-free rules, one might

test for the strength of association between the two distributions. This differs from the MATS 2018 significance tests, which examine whether two groups (defined by their characteristics) differ from one another on some common measure (such as quit attempts). The test that is used in MATS to test the strength of association is the Pearson chi-square goodness-of-fit test. When this test is significant, it means that the two distributions under discussion are associated. It does not mean that there is any causal relationship between them; it simply means that they vary together in a predictable way. Significance of these tests is indicated in the text with a statement in parentheses ($p < 0.05$) that indicates that the test was significant at the 95 percent confidence level.

1.3 How This Report Is Organized

Technical Report

This report presents findings from MATS with a focus on results from MATS 2018. Chapter 2 discusses the prevalence of cigarette smoking among Minnesota adults, and perceptions of tobacco use and characteristics of smokers. Chapter 3 examines the use of various forms of tobacco other than cigarettes. Chapter 4 addresses quitting smoking. Chapter 5 focuses on Minnesotans' exposure to secondhand smoke.

Website

This technical report and other related materials are available at:
www.clearwaymn.org/MATS

2. Cigarette Smoking Among Minnesota Adults

2.1 Introduction

This chapter examines cigarette use in Minnesota, the characteristics of cigarette smokers, and individual level influences on smoking behavior. The next chapter looks at the various forms of tobacco other than cigarettes. In this report, the terms “smoking” and “smoker” apply to cigarette smoking unless otherwise noted.

2.2 Cigarette Use in Minnesota

This report looks at tobacco use by adults in Minnesota from several perspectives. The initial focus is on cigarette smoking because the overwhelming majority of adult tobacco users are cigarette smokers. This chapter first describes cigarette use by adults in Minnesota in 2018 and then discusses changes between 2014 and 2018. Changes are not discussed if the comparisons are not feasible (e.g., the same data were not collected at the different time points) or if the comparisons are not directly tied to the primary research questions.

2.2.1 Use of Cigarettes

This section presents a general profile of cigarette smoking by adults in Minnesota by comparing current smokers, former smokers and never smokers.

Smoking Status

In this report, adult smoking status is defined according to the standard definition used by the CDCⁱ and most smoking studies:

- A **current smoker** has smoked at least 100 cigarettes in his or her lifetime and now smokes every day or some days.
- A **former smoker** has smoked at least 100 cigarettes in his or her lifetime but now does not smoke at all.
- A **never smoker** has not smoked at least 100 cigarettes in his or her lifetime.

Never smokers and former smokers are sometimes collectively referred to as **nonsmokers** in this report.

Survey Questions

- Have you smoked at least 100 cigarettes in your entire life?
- Do you now smoke cigarettes every day, some days or not at all?

Past 30-day Smokers

A 30-day smoker smokes every day or has smoked on at least one day out of the past 30 days. No accounting is made of how many cigarettes a person has smoked in his or her lifetime. Past 30-day smokers could be current or former smokers.

Survey Questions

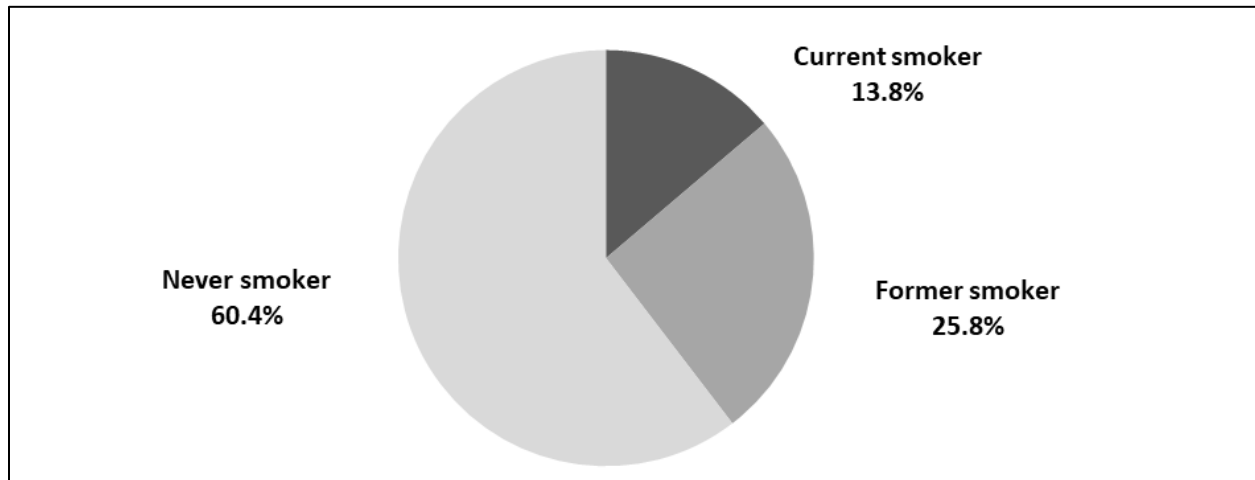
- Do you now smoke cigarettes every day, some days or not at all?
- During the past 30 days, on how many days did you smoke cigarettes?

Among all adult Minnesotans, 13.8±1.2 percent are current smokers, 25.8±1.4 percent are former smokers and 60.4±1.6 percent are never smokers (Figure 2-1). Detailed statistics for the following discussions of these three groups appear in Table 2-1.

Current Smokers

Overall, 13.8±1.2 percent of adult Minnesotans (about 574,000 adults) are current smokers (Table 2-1). This prevalence aligns with the 13.8 percent smoking prevalence for all states as of the first half of 2018, as reported by the National Health Interview Survey.ⁱⁱ

Figure 2-1. Smoking status of Minnesota adults, 2018



Source: Minnesota Adult Tobacco Survey, 2018

Table 2-1. Smoking status of Minnesota adults, by selected demographic characteristics

Characteristics	Current smoker	Former smoker	Never smoker	Row Total
	%	%	%	%
Overall	13.8 ± 1.2	25.8 ± 1.4	60.4 ± 1.6	100
Age				
18 to 24	8.5 ± 3.1	5.8 ± 2.4	85.7 ± 3.8	100
25 to 44	18.1 ± 2.5	20.6 ± 2.4	61.3 ± 3.0	100
45 to 64	16.3 ± 2.2	26.5 ± 2.5	57.2 ± 2.8	100
65 or older	4.7 ± 1.1	46.4 ± 3.0	48.9 ± 3.0	100
Gender				
Female	12.6 ± 1.7	22.9 ± 1.9	64.5 ± 2.2	100
Male	15.0 ± 1.8	28.9 ± 2.1	56.1 ± 2.4	100
Education				
Less than high school	33.4 ± 8.0	27.9 ± 7.4	38.7 ± 8.2	100
High school graduate/GED	17.8 ± 2.6	29.4 ± 3.1	52.8 ± 3.4	100
Some college or technical school	15.5 ± 2.1	26.5 ± 2.4	58.0 ± 2.8	100
College graduate or beyond	4.5 ± 1.0	21.5 ± 1.9	74.0 ± 2.1	100
Household income				
\$35,000 or less	24.4 ± 3.5	25.1 ± 3.1	50.5 ± 3.9	100
\$35,001 to \$50,000	16.4 ± 3.9	32.4 ± 4.7	51.2 ± 5.1	100
\$50,001 to \$75,000	13.0 ± 3.1	26.7 ± 3.7	60.3 ± 4.1	100
\$75,001 or more	8.4 ± 1.5	24.9 ± 2.2	66.7 ± 2.4	100

Source: Minnesota Adult Tobacco Survey, 2018

Current adult smokers in Minnesota display the commonly observed demographic patterns that are consistently noted in the literature.ⁱⁱⁱ Higher smoking rates occur among those who are male, less well educated and have lower incomes.

In Minnesota, 25-44 year olds have the highest current smoking rate among all age groups, at 18.1±2.5 percent. Smoking rates are also relatively high among 45-64 year olds, at 16.3±2.2 percent. Only 8.5±3.1 percent of 18-24 year olds are smokers, and 4.7±1.1 percent of those 65 or older are smokers. Statistically significant differences occur between this oldest group and both the 45-64 year old and the 25-44 year old age groups.

Smoking rates decline distinctly as education increases, ranging from 33.4±8.0 percent for those with less than a high school education to 4.5±1.0 percent for those with at least a college degree. The differences between the lowest education group and each of the other three education groups are statistically significant and the differences between the highest education group and each of the other three education groups are statistically significant.

Smoking rates also decline as income increases. Among Minnesota adults with annual household incomes of \$35,000 or less, 24.4±3.5 percent are current smokers, steadily declining to 8.4±1.5 percent of those with household incomes above \$75,000. The differences between the lowest income group and each of the other three income groups are statistically significant.

While this report generally employs the standard definition of current smoking as described in the Smoking Status box at the beginning of this section, another useful measure of current smoking activity is past 30-day smoking, defined as having smoked a cigarette on at least one day out of the past 30 days. Using the criterion of any smoking in the previous 30 days is especially relevant to young adults (18-24 year olds) who may be on the path to established smoking but are overlooked when using the traditional definition of a current adult smoker. As noted above, 8.5±3.1 percent of young adults are current smokers according to the standard adult definition; however, 16.8±4.1 percent of young adults smoked in the past 30 days (Table 2-2). The difference between these two percentages is statistically significant. The percentage of the 45-64

year old age group who are 30-day smokers (16.8±2.2 percent) is identical to that of the youngest group (18-24 year olds). Between the two older groups, there is very little difference between the percentage who are current smokers and those who are 30-day smokers: as noted above, 16.8±2.2 percent of 45-64 year olds are 30-day smokers vs. 16.3±2.2 percent who are current smokers; 5.3±1.2 percent of those 65 years old or older are 30-day smokers vs. 4.7±1.1 percent who are current smokers.

Table 2-2. Smoking status definitions, by age group

Age groups	Past 30-day smoker	Current smoker
	%	%
18 to 24	16.8 ± 4.1	8.5 ± 3.1
25 to 44	19.0 ± 2.5	18.1 ± 2.5
45 to 64	16.8 ± 2.2	16.3 ± 2.2
65 or older	5.3 ± 1.2	4.7 ± 1.1

Source: Minnesota Adult Tobacco Survey, 2018

Former Smokers

Surveillance studies such as MATS use the term “former smoker” to describe someone who has smoked at least 100 cigarettes in his or her lifetime but who is not currently smoking. This definition does not consider the length of time that the person has gone without smoking a cigarette. The term also ignores the psychological, physical, behavioral and environmental factors that may weaken or support maintenance of the quit status, which will be discussed in Chapter 4. The present section focuses on the demographic characteristics of former smokers.

Overall, 25.8±1.4 percent of adult Minnesotans (about 1,075,000 adults) are former smokers (Table 2-1). There is a statistically significant difference between the percentages of men and women who are former smokers: 28.9±2.1 percent of men are former smokers, compared to 22.9±1.9 percent of women. As in the case of current smokers, there is a clear pattern across the age groups: 5.8±2.4 percent of 18-24 year olds are former smokers, ranging up to 46.4±3.0 percent of those 65 or older. All differences between age groups are statistically significant. The percentage of those with only a high-school degree who are former smokers (29.4±3.1 percent) is higher than for any of

the other educational levels. The difference between this group and the group with at least a college degree (21.5 ± 1.9 percent) is statistically significant. The lowest percentage of former smokers occurs among those with at least a college degree. Across the income groups, the lowest percentage of former smokers occurs among the highest income group, at 24.9 ± 2.2 percent. The highest percentage of former smokers occurs among the group with incomes of \$35,000-50,000, at 32.4 ± 4.7 percent.

Interpreting the Data about Former Smokers: the Quit Ratio. Drawing conclusions about quitting behaviors within demographic subgroups based on the prevalence of former smokers poses challenges. To be a former smoker, it is necessary to have once been a smoker. Thus, the percentage of former smokers in any group is partly a function of the number of people in the group who have ever been smokers. Viewed in isolation, relative percentages of former smokers across groups can be misleading. A smaller percentage in one group compared with another may be due to a smaller percentage of individuals who have ever been smokers and not to a lower quit rate. For example, those with the highest incomes have the lowest smoking rates and highest rates of never smoking, yet the rate of former smokers among this group is lower than those with lower incomes. These findings alone cannot be interpreted to mean that those with higher incomes quit smoking at a lower rate than the other groups. Since fewer smokers exist among the highest income group, fewer can become former smokers.

Unless the lifetime incidence of ever smoking is consistent across the groups being compared, the better comparison is the quit ratio.

Ever Smoker and Quit Ratio

Ever smokers are defined as the sum total of current smokers and former smokers.

Quit ratio is defined as the proportion (expressed as a percentage) of ever smokers who are former smokers at a given time. This ratio can be calculated for the entire population or for any subgroup.

The quit ratio is calculated as:

The total number of former smokers, divided by the sum of the total number of current smokers plus the total number of former smokers.

The quit ratio is a snapshot of whether those who have ever smoked are currently smoking or not. When compared over different points in time, the quit ratio characterizes the smoking or former smoking status of the total ever-smoking population and provides better information to monitor cessation trends.

The quit ratio is a simple concept, but is somewhat confounded by survivor bias in the case of age groups. Smokers die at younger ages than nonsmokers, an effect realized mainly in later years. Consequently, the pool of smokers (and therefore of ever smokers) will tend to diminish faster in older age groups than in younger age groups. Therefore, former smokers tend to dominate in the pool of ever smokers as an age cohort grows older.

Overall, younger people are less likely to be successful quitters than older smokers, in part because successful quitting usually requires repeated quit attempts. The quit ratio for adult ever smokers in Minnesota is 65.2±2.6 percent (Table 2-3). Men and women only differ by about 1 percentage point. Predictably, the quit ratio increases with age, education and income, consistent with the decreasing smoking rates associated with these characteristics.

Table 2-3. Quit ratios of ever smokers, by selected demographic characteristics

Characteristics	Quit ratio
	%
Overall	65.2 ± 2.6
Age	
18 to 24	40.5 ± 13.8
25 to 44	53.3 ± 5.1
45 to 64	61.9 ± 4.4
65 or older	90.8 ± 2.2
Gender	
Female	64.5 ± 3.9
Male	65.7 ± 3.6
Education	
Less than high school	45.6 ± 10.3
High school graduate/GED	62.3 ± 4.7
Some college or technical school	63.2 ± 4.2
College graduate or beyond	82.6 ± 3.6
Household income	
\$35,000 or less	50.8 ± 5.4
\$35,001 to \$50,000	66.5 ± 7.1
\$50,001 to \$75,000	67.2 ± 6.6
\$75,001 or more	74.7 ± 4.0

Source: Minnesota Adult Tobacco Survey, 2018

Never Smokers

Overall, 60.4±1.6 percent of adult Minnesotans (about 2,511,000 people) have not smoked at least 100 cigarettes in their lifetime and are defined as never smokers (Table 2-1). Few people take up smoking after the years of young adulthood.^{iv}

With the exception of age, never smoking rates generally mirror those for current smoking when examined within various groups, in the following way: the lower the current smoking rate, the higher the rate of never smoking. A higher percentage of women (64.5±2.2 percent) are never smokers compared with men (56.1±2.4 percent), a statistically significant difference.

The prevalence of never smoking decreases as age increases. Young adults have the highest rate of never smoking among all age groups, at 85.7±3.8 percent. Among Minnesotans 65 or older, 48.9±3.0 percent have maintained their status as never smokers. All differences between age groups for never smoking are statistically

significant except for the difference between the 25-44 year old and the 45-64 year old age groups. Never smoking rates decline as age increases, while the percentage of former smokers increases, as discussed previously.

The lowest rate of never smoking among educational levels is among those with less than a high school degree, at 38.7 ± 8.2 percent. The college graduate group has by far the highest rate of never smoking, at 74.0 ± 2.1 percent. All the differences between the educational levels are statistically significant except for the difference between high school graduates and those with some college.

2.2.2 Cigarette Use in Minnesota, 1999 to 2018

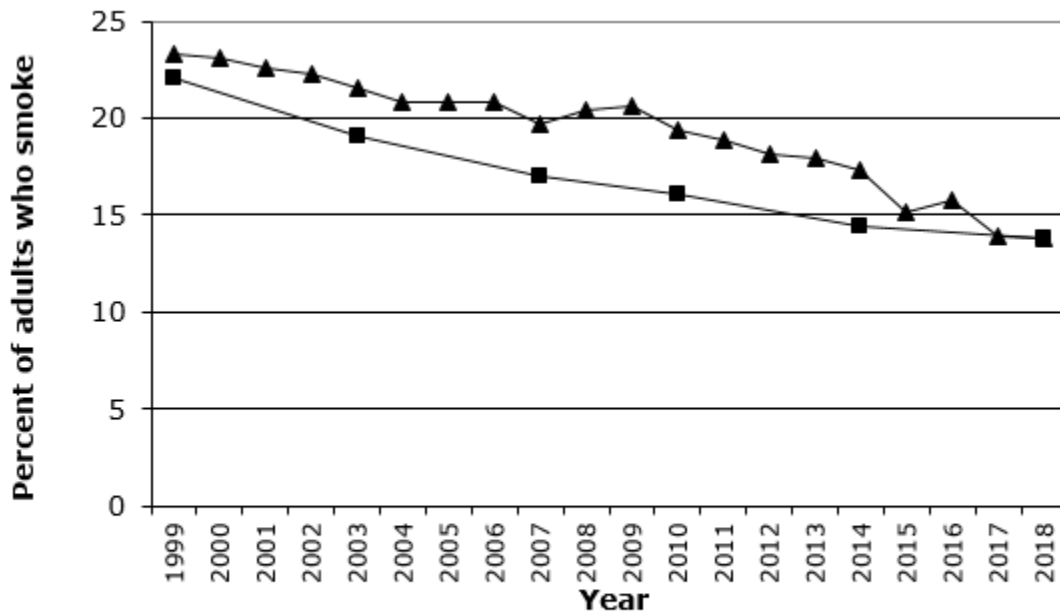
Trends in Minnesota and the United States

This section discusses the changes in smoking prevalence over time in the Minnesota adult population, using the MATS data. Measurements were taken at 1999, 2003, 2007, 2010, 2014, and 2018. As noted in Chapter 1, these are six repeated cross-sections, or snapshots, of the population at each time point, rather than a longitudinal cohort following the same people over time. Comparisons between an age subgroup, for example, will include a different group of respondents of the same age during each year.

In general, tables and figures in this section will present statistics from all six time points, but the discussions in this section will focus only on the changes from 2014 to 2018. Consistent with this approach, significance tests are performed only for the changes from 2014 to 2018. Readers interested in intermediate changes between 1999, 2003, 2007, 2010, and 2014 can find them presented and discussed in the 2003, 2007, 2010, and 2014 MATS reports.

As illustrated in Figure 2-2, both national and Minnesota smoking prevalence rates are declining over time. Minnesota's smoking rate has declined significantly from 1999 through 2018, from 22.1 ± 1.7 percent to 13.8 ± 1.2 percent, a change of 8.3 percentage points.

Figure 2-2. Smoking prevalence rates in U.S. and Minnesota surveillance studies, from 1999 to 2018



Survey	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
▲ U.S.	23.3	23.1	22.6	22.3	21.5	20.8	20.8	20.8	19.7	20.4	20.6	19.4	18.9	18.1	17.9	17.3	15.1	15.8	13.9	13.8
■ Minnesota	22.1				19.1				17.0			16.1				14.4				13.8

Source: National Health Interview Surveys, 1999 to 2018; Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018.

Use of Cigarettes, 2014 to 2018

Between 2014 and 2018, the percentage of adults in Minnesota who are current smokers declined from 14.4±1.0 percent to 13.8±1.2 percent (Table 2-4); the total number of current smokers fell from 596,000 in 2014 to 574,000 in 2018. This reduction of 0.6 percentage points, or about 22,000 smokers, is not statistically significant. The percentage of Minnesota adults who have never smoked increased, by 2.6 percentage points, from 57.8±1.4 percent in 2014 to 60.4±1.6 percent; this change is statistically significant (Table 2-7). There was a decrease in the percentage of Minnesota adults who are former smokers, from 27.8±1.2 percent in 2014 to 25.8±1.4 percent in 2018 (Table 2-5). This change is statistically significant when a two-tailed test is applied. As discussed previously, this statistic is better interpreted by use of the quit ratio in the overall population, rather than as an isolated number. Detailed statistics for the following discussions of current, former, and never smokers appear in Tables 2-4, 2-5, and 2-7.

Current Smokers. Over the four-year time period from 2014 to 2018, young adults showed a large, statistically significant decrease in smoking prevalence of nearly 7 percentage points, from 15.3±3.3 percent in 2014 to 8.5±3.1 percent in 2018 (Table 2-4). However, smoking rates increased by 2.1 percentage points for the 45-64 year old age group, though this and the changes for other age groups were not statistically significant.

Smoking rates for men declined by 1.4 percentage points, while rates for women increased by 0.2 percentage points, though these changes were not statistically significant.

Table 2-4. Current smokers among all Minnesota adults from 1999 to 2018, by selected demographic characteristics

Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Overall	22.1 ± 1.7	19.1 ± 1.5	17.0 ± 1.4	16.1 ± 1.2	14.4 ± 1.0	13.8 ± 1.2	-0.6
Age							
18 to 24	34.2 ± 6.5	29.3 ± 4.0	21.5 ± 4.4	21.8 ± 4.0	15.3 ± 3.3	8.5 ± 3.1	-6.8 *
25 to 44	25.7 ± 2.7	22.0 ± 2.9	19.5 ± 2.7	19.7 ± 2.3	18.7 ± 2.0	18.1 ± 2.5	-0.6
45 to 64	20.1 ± 2.9	17.7 ± 2.4	17.6 ± 2.0	14.9 ± 1.7	14.2 ± 1.5	16.3 ± 2.2	2.1
65 or older	6.9 ± 2.5	6.5 ± 1.6	6.0 ± 1.3	5.4 ± 1.2	5.4 ± 1.1	4.7 ± 1.1	-0.7
25 or older	20.3 ± 1.7	17.7 ± 1.6	16.4 ± 1.5	15.2 ± 1.2	14.3 ± 1.0	14.5 ± 1.3	0.2
Gender							
Female	20.3 ± 2.2	16.9 ± 2.0	15.5 ± 1.8	14.5 ± 1.6	12.4 ± 1.3	12.6 ± 1.7	0.2
Male	24.0 ± 2.6	21.5 ± 2.3	18.6 ± 2.1	17.7 ± 1.8	16.5 ± 1.5	15.0 ± 1.8	-1.4
Education							
Less than high school	24.0 ± 5.5	20.4 ± 4.8	26.3 ± 7.0	21.1 ± 5.3	28.6 ± 5.6	33.4 ± 8.0	4.8
High school graduate/GED	28.0 ± 3.3	26.1 ± 3.1	24.3 ± 3.1	21.7 ± 2.7	20.1 ± 2.2	17.8 ± 2.6	-2.3
Some college or technical school	24.8 ± 3.3	20.5 ± 3.0	17.7 ± 2.2	20.0 ± 2.1	15.6 ± 1.7	15.5 ± 2.1	-0.1
College graduate or beyond	10.4 ± 2.2	9.4 ± 1.6	5.9 ± 1.2	4.8 ± 1.0	5.1 ± 0.9	4.5 ± 1.0	-0.6

Hypothesis: The percentage of current smokers will decline from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Among educational groups, there is some dispersion of the smoking trend from 2014 to 2018. Among those who had less than a high school education, there was a noticeable increase of 4.8 percentage points; while this is relatively large, it is not statistically significant. The other educational groups had non-statistically significant declines in smoking rates.

Former Smokers. There was an overall decrease of 2.0 percentage points for former smokers from 2014 to 2018, which was statistically significant when applying a two-

tailed test (Table 2-5). Using a two-tailed test, statistically significant decreases occurred among adults ages 45-64 and males.

Table 2-5. Former smokers among all Minnesota adults from 1999 to 2018, by selected demographic characteristics

Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Overall	25.8 ± 1.8	25.5 ± 1.4	25.1 ± 1.3	27.3 ± 1.3	27.8 ± 1.2	25.8 ± 1.4	-2.0
Age							
18 to 24	10.8 ± 5.0	8.6 ± 2.3	5.5 ± 2.4	6.3 ± 2.3	6.4 ± 2.1	5.8 ± 2.4	-0.6
25 to 44	17.6 ± 2.3	16.5 ± 2.0	17.9 ± 2.2	21.9 ± 2.2	22.0 ± 2.0	20.6 ± 2.4	-1.4
45 to 64	36.7 ± 3.6	35.1 ± 2.8	31.8 ± 2.1	33.4 ± 2.2	31.0 ± 2.1	26.5 ± 2.5	-4.5
65 or older	38.6 ± 4.8	42.5 ± 3.3	43.9 ± 2.4	44.0 ± 2.8	48.0 ± 2.7	46.4 ± 3.0	-1.6
Gender							
Female	22.7 ± 2.3	22.4 ± 1.8	23.6 ± 1.6	25.0 ± 1.7	23.9 ± 1.6	22.9 ± 1.9	-0.9
Male	29.0 ± 2.8	28.7 ± 2.2	26.7 ± 2.0	29.7 ± 1.9	31.9 ± 1.8	28.9 ± 2.1	-3.1
Education							
Less than high school	29.6 ± 5.7	26.3 ± 5.7	26.1 ± 4.8	29.4 ± 5.6	28.0 ± 5.5	27.9 ± 7.4	-0.1
High school graduate/GED	26.8 ± 3.2	27.5 ± 2.7	27.9 ± 2.7	29.9 ± 2.8	33.1 ± 2.6	29.4 ± 3.1	-3.7
Some college or technical school	23.9 ± 3.1	24.5 ± 2.4	24.1 ± 2.2	27.9 ± 2.1	27.8 ± 2.0	26.5 ± 2.4	-1.3
College graduate or beyond	25.5 ± 3.5	24.2 ± 2.3	23.2 ± 1.9	23.5 ± 1.9	23.1 ± 1.8	21.5 ± 1.9	-1.6

Hypothesis: The percentage of former smokers will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Quit Ratio. As noted in Section 2.2.1, the quit ratio characterizes the smoking or former smoking status of the total ever smoking population and provides some information to monitor trends in cessation.

From 2014 to 2018, the quit ratio decreased slightly by 0.7 percentage points, from 65.9±2.0 percent in 2014, to 65.2±2.6 percent in 2018 (Table 2-6). However, the quit ratio increased considerably by 11 percentage points among the 18-24 year old age group, from 29.5±8.4 percent in 2014, to 40.5±13.7 percent in 2018. None of the changes in quit ratio from 2014 to 2018 were statistically significant using a one-tailed test. A significant decrease of nearly 7 percentage points, from 68.6±3.1 percent in 2014 to 61.9±4.4 percent in 2018, occurred among adults ages 45-64 using a two-tailed test. As previously discussed, numerous complex factors affect the quit ratio and, even more, its change over time. Changes in both individuals' smoking behavior and the population composition over time may affect the ratio.

Table 2-6. Quit ratios from 1999 to 2018 among ever smokers, by selected demographic characteristics

Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	
Overall	53.9 ± 2.9	57.1 ± 2.6	59.6 ± 2.6	62.9 ± 2.2	65.9 ± 2.0	65.2 ± 2.6	-0.7
Age							
18 to 24	24.0 ± 10.0	22.7 ± 5.6	20.4 ± 8.3	22.4 ± 7.6	29.5 ± 8.4	40.5 ± 13.7	11.0
25 to 44	40.7 ± 4.4	42.8 ± 4.8	48.0 ± 5.3	52.6 ± 4.4	54.1 ± 3.9	53.3 ± 5.1	-0.8
45 to 64	64.6 ± 4.7	66.6 ± 3.9	64.4 ± 3.5	69.1 ± 3.2	68.6 ± 3.1	61.9 ± 4.4	-6.7
65 or older	84.9 ± 5.2	86.7 ± 3.1	88.0 ± 2.5	89.0 ± 2.3	89.9 ± 2.1	90.8 ± 2.2	0.9
Gender							
Female	52.8 ± 4.2	57.1 ± 3.8	60.4 ± 3.7	63.3 ± 3.2	65.8 ± 3.0	64.5 ± 3.9	-1.2
Male	54.8 ± 4.1	57.2 ± 3.5	58.9 ± 3.6	62.6 ± 3.1	66.0 ± 2.7	65.8 ± 3.6	-0.2
Education							
Less than high school	55.2 ± 8.3	56.4 ± 8.1	49.8 ± 9.6	58.1 ± 8.6	49.5 ± 7.9	45.6 ± 10.2	-3.9
High school graduate/GED	48.9 ± 4.8	51.3 ± 4.4	53.5 ± 4.6	57.9 ± 4.3	62.2 ± 3.6	62.3 ± 4.7	0.1
Some college or technical school	49.1 ± 5.3	54.4 ± 4.8	57.7 ± 4.0	58.3 ± 3.5	64.1 ± 3.3	63.2 ± 4.2	-1.0
College graduate or beyond	71.0 ± 5.7	72.1 ± 4.2	79.7 ± 3.7	82.9 ± 3.1	82.0 ± 3.0	82.6 ± 3.6	0.6

Hypothesis: The quit ratio will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Never Smokers. An increase over time in the percentage of Minnesota adults who have never smoked is inherently desirable because smoking-related morbidity and mortality in the population as a whole, along with associated social and economic impacts, decrease as the percentage of never smokers increases. Minnesota’s programmatic efforts that affect the prevalence of never smoking include maintaining adult never smokers as never smokers and encouraging young people not to start smoking.

The percentage of Minnesota adults who are never smokers increased by 2.6 percentage points, from 57.8±1.4 percent to 60.4±1.6 percent between 2014 and 2018 (Table 2-7). This 2.6 percentage point increase is statistically significant.

Table 2-7. Never smokers among all Minnesota adults from 1999 to 2018, by selected demographic characteristics

Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Overall	52.1 ± 2.1	55.4 ± 1.8	57.9 ± 1.6	56.6 ± 1.5	57.8 ± 1.4	60.4 ± 1.6	2.6 *
Age							
18 to 24	55.0 ± 7.0	62.1 ± 4.3	73.0 ± 4.7	72.0 ± 4.4	78.3 ± 3.7	85.7 ± 3.8	7.4 *
25 to 44	56.7 ± 3.1	61.6 ± 3.2	62.6 ± 3.0	58.4 ± 2.7	59.2 ± 2.4	61.3 ± 3.0	2.1
45 to 64	43.1 ± 3.6	47.2 ± 3.2	50.6 ± 2.3	51.7 ± 2.3	54.8 ± 2.3	57.2 ± 2.8	2.4
65 or older	54.5 ± 5.0	51.0 ± 3.4	50.0 ± 2.4	50.6 ± 2.8	46.6 ± 2.6	48.9 ± 3.0	2.3
Gender							
Female	57.0 ± 2.7	60.7 ± 2.4	61.0 ± 2.0	60.6 ± 2.0	63.7 ± 1.8	64.5 ± 2.2	0.8
Male	47.0 ± 3.2	49.8 ± 2.8	54.7 ± 2.5	52.6 ± 2.2	51.6 ± 2.0	56.1 ± 2.4	4.5 *
Education							
Less than high school	46.5 ± 6.8	53.3 ± 7.2	47.6 ± 6.4	49.5 ± 6.4	43.4 ± 6.4	38.7 ± 8.2	-4.7
High school graduate/GED	45.2 ± 3.8	46.4 ± 3.5	47.8 ± 3.3	48.4 ± 3.1	46.8 ± 2.8	52.8 ± 3.4	6.0 *
Some college or technical school	51.3 ± 3.8	55.0 ± 3.5	58.2 ± 2.8	52.1 ± 2.5	56.6 ± 2.3	58.0 ± 2.8	1.4
College graduate or beyond	64.1 ± 3.7	66.4 ± 2.6	70.9 ± 2.1	71.7 ± 2.0	71.9 ± 1.9	74.0 ± 2.1	2.2

Hypothesis: The percentage of never smokers will increase from 2014 to 2018.

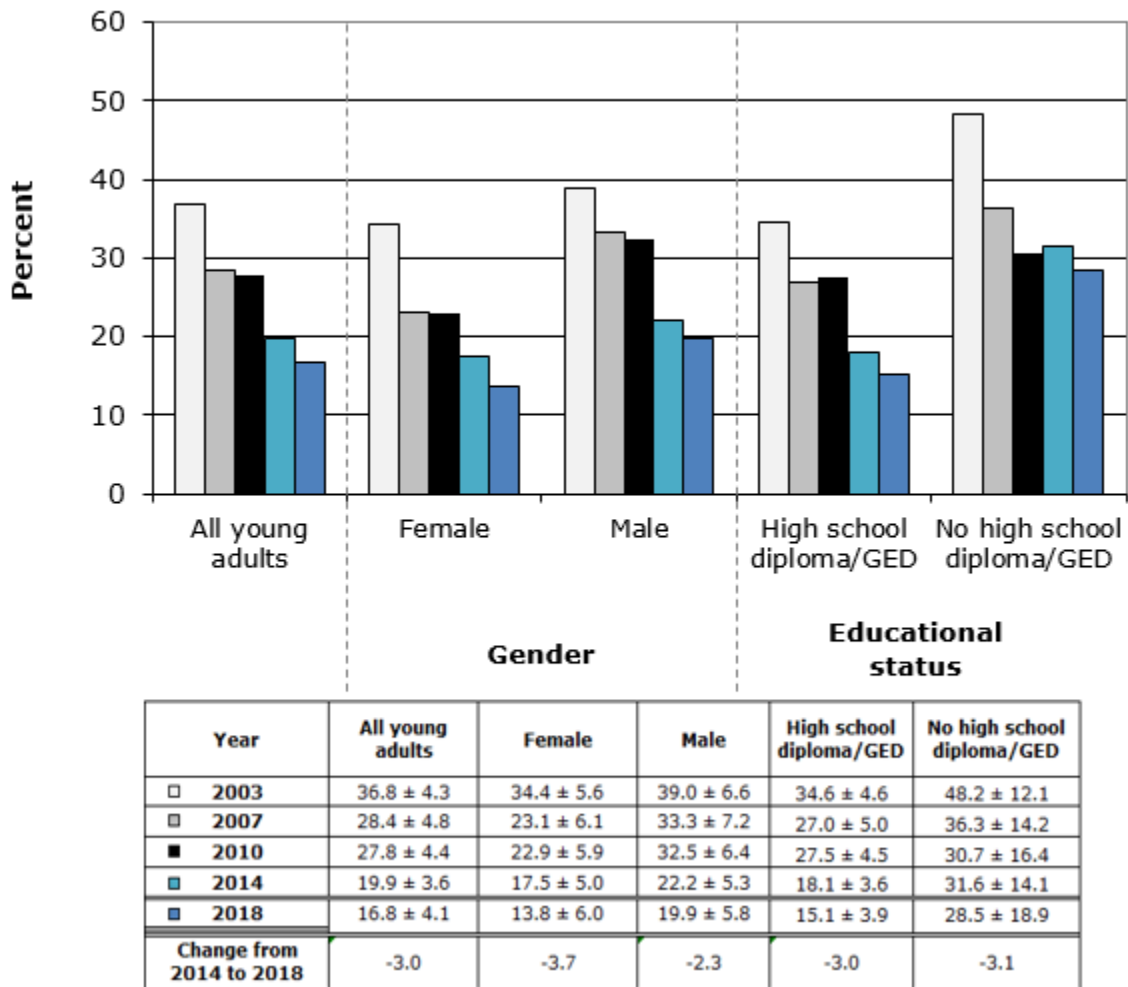
*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Nearly all the demographic subgroups experienced an increase in the percentage of never smokers from 2014 to 2018. For the one-tailed significance tests, all changes in the prevalence of never smokers were hypothesized to be positive (increases). Similar to the trend for former smokers, the largest increase in never smokers was among 18-24 year olds, from 78.3±3.7 percent who were never smokers in 2014, to 85.7±3.8 percent in 2018, a statistically significant increase. A statistically significant increase of 6 percentage points occurred among high school graduates. The percentage of males who were never smokers in 2018 increased significantly over 2014 by 4.5 percentage points. The only decrease in the percentage of never smokers occurred among those with less than a high school degree (4.7 percentage points), though this was not a statistically significant decrease.

Young Adult Smokers. Overall, young adult smoking (defined as 30-day smokers, as described in Section 2.2.1) declined by 3.0 percentage points, from 19.9±3.6 percent in 2014 to 16.8±4.1 percent in 2018 (Figure 2-3), though the decline is not statistically significant. Declines occurred among both men and women of 2.3 and 3.7 percentage points, respectively. There were nearly equal declines for those with and without a high school diploma/GED of about 3 percentage points. However, none of the decreases are statistically significant.

Figure 2-3. Prevalence of young adult 30-day smoking, by selected demographic characteristics, from 2003 to 2018



Hypothesis: The 30-day smoking prevalence will decline from 2014 to 2018 for all groups.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

2.3 Characteristics of Smokers

This section focuses on the characteristics of smokers in terms of their demographic characteristics, health status, and physiological aspects such as addiction level and smoking intensity, with some comparisons to former smokers and never smokers. The term “nonsmokers” refers to former and never smokers combined. This section first describes the characteristics of smokers in 2018, and then explores changes in smoking intensity from 2014 to 2018.

2.3.1 Demographic Characteristics of Smokers

Minnesota’s adult smokers tend to have lower educational levels and lower household incomes than former smokers or never smokers (Table 2-8). About 11 percent (10.5 ± 2.4 percent) of smokers have a college degree, compared with 27.0 ± 2.5 percent of former smokers and 39.6 ± 2.0 percent of never smokers. The differences in college graduation among the smoking status groups are all statistically significant. At the other extreme, 17.9 ± 4.8 percent of smokers have not completed high school, compared with 8.1 ± 2.4 percent of former smokers and only 4.8 ± 1.2 percent of never smokers; the differences between current smokers and both former and never smokers are statistically significant. Current smokers are more likely to have a high school degree as their highest level of education and less likely to be college graduates than never smokers; these differences are statistically significant.

Minnesota’s adult current smokers tend to have lower household incomes than former smokers or never smokers: 47.9 ± 5.8 percent of smokers have incomes of \$35,000 or less, compared to approximately 30 percent of both former and never smokers. Meanwhile, 15.0 ± 4.0 percent of smokers have incomes greater than \$75,000, compared to 22.9 ± 3.1 percent of former smokers and 25.8 ± 2.5 percent of never smokers. All of these income differences between smokers and each of the other two smoking status groups are statistically significant.

Table 2-8. Selected demographic characteristics, by smoking status

Characteristics	Current smoker	Former smoker	Never smoker
	%	%	%
Education			
Less than high school	17.9 ± 4.8	8.1 ± 2.4	4.8 ± 1.2
High school graduate/GED	32.4 ± 4.4	28.8 ± 2.9	22.0 ± 1.8
Some college or technical school	39.2 ± 4.8	36.2 ± 3.0	33.7 ± 2.1
College graduate or beyond	10.5 ± 2.4	27.0 ± 2.5	39.6 ± 2.0
Total	100	100	100
Household income			
\$35,000 or less	47.9 ± 5.8	30.7 ± 3.6	29.9 ± 2.7
\$35,001 to \$50,000	16.4 ± 4.0	20.2 ± 3.2	15.5 ± 2.0
\$50,001 to \$75,000	20.6 ± 4.7	26.3 ± 3.5	28.9 ± 2.6
\$75,001 or more	15.0 ± 4.0	22.9 ± 3.1	25.8 ± 2.5
Total	100	100	100
Marital status			
Married	35.5 ± 4.6	60.2 ± 3.0	55.6 ± 2.1
A member of an unmarried couple	11.7 ± 3.3	7.4 ± 1.8	6.0 ± 1.0
Divorced	15.6 ± 3.5	11.8 ± 1.9	6.0 ± 0.9
Widowed	3.1 ± 1.3	8.1 ± 1.3	4.3 ± 0.6
Separated	2.8 ± 1.5	1.0 ± 0.7	0.6 ± 0.3
Never married	31.4 ± 4.7	11.5 ± 2.0	27.6 ± 2.0
Total	100	100	100

Source: Minnesota Adult Tobacco Survey, 2018

2.3.2 Individual Health and Behavioral Characteristics of Smokers

Health Status of Smokers

Health Status Indicator

MATS used one simple, standard measure of physical health status that is well documented as correlating with clinically determined health status.

Survey Question

- In general, would you say your health is excellent, very good, good, fair or poor?

On average, smokers are in poorer health than nonsmokers (Table 2-9). Only 9.3±3.1 percent of smokers consider their health to be excellent, compared to 25.2±1.9 percent of never smokers, with former smokers falling in the middle (16.5±2.4 percent). All of these differences are statistically significant. The complementary pattern occurs at the other extreme: those who consider their health to be poor comprise 8.6±2.8 percent of smokers, 4.0±1.4 percent of former smokers, and only 1.9±0.6 percent of never smokers, with all differences being statistically significant.

Table 2-9. Selected health status indicators, by smoking status

Health status indicator	Current smoker	Former smoker	Never smoker
	%	%	%
Health rating			
Excellent	9.3 ± 3.1	16.5 ± 2.4	25.2 ± 1.9
Very good	28.8 ± 4.4	37.4 ± 3.0	40.9 ± 2.1
Good	33.2 ± 4.7	30.5 ± 2.8	25.0 ± 1.9
Fair	20.1 ± 4.0	11.7 ± 2.2	7.0 ± 1.1
Poor	8.6 ± 2.8	4.0 ± 1.4	1.9 ± 0.6
Total	100	100	100

Source: Minnesota Adult Tobacco Survey, 2018

Smoking Intensity

MATS assessed two of the principal measures of the degree of addiction that may hinder smokers' chances of quitting: the number of cigarettes smoked per day, and the amount of time between waking and smoking the first cigarette.

Cigarettes per Day and Smoking Intensity

When using self-reported smoking data, calculating the number of cigarettes that a person smokes per day examines smoking behavior in the 30 days immediately preceding the date the person completed the survey. The typical approach is to ask the respondent to estimate the average number of cigarettes smoked each day. If the person smoked every day, then it is simply necessary to ask how many cigarettes he or she smoked on average. However, if the person smoked only some days, it is unfeasible to ask for an average number smoked, considering all 30 days in the period. The standard way of handling these two scenarios is to ask the questions differently.

Survey Questions

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

For everyday smokers, ask:

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

For some day smokers, ask:

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

Cigarettes per Day

The average across all 30 days is calculated as: the number of days smoked multiplied by the number of cigarettes smoked on days smoked divided by 30. This measure captures smoking intensity as a standardized daily exposure to inhaled cigarette smoke.

Smoking Intensity

MATS employs the measure of cigarettes per day in two ways.

In the first way, MATS classifies each smoker by the number of cigarettes smoked per day into one of five-categories: 1 cigarette or less, 2 to 5 cigarettes, 6 to 10, 11 to 20, and 21 or more. This allows calculating the percentages of smokers who fall into each of these categories, whether for smokers overall or for subgroups, such as age and gender subgroups.

In the second way, MATS calculates the average (mean) number of cigarettes per day smoked for any group of interest, again for smokers overall or for subgroups, such as age and gender subgroups.

Overall, adult Minnesota current smokers smoke an average of 11.8 ± 1.0 cigarettes per day, averaged across the past 30 days (Table 2-10). The average number of cigarettes smoked increases steadily with increasing age, from 8.7 ± 2.2 cigarettes for 18-24 year olds to 13.6 for both 45-64 year olds and 65 year olds or older, but the differences are not statistically significant. The average number of cigarettes smoked decreases steadily but not significantly with increasing education, from 13.3 ± 3.5 cigarettes for those with less than a high school degree, to 8.9 ± 1.8 cigarettes for those with a college degree. Men smoke slightly more cigarettes per day than do women: 13.0 ± 1.5 vs. 10.4 ± 1.2 cigarettes, but the differences are not statistically significant.

Table 2-10. Mean cigarettes smoked per day (averaged across 30 days) for current smokers, by selected demographic characteristics

Characteristics	Mean cigarettes per day
Overall	11.8 ± 1.0
Age	
18 to 24	8.7 ± 2.2
25 to 44	10.3 ± 1.6
45 to 64	13.6 ± 1.5
65 or older	13.6 ± 1.9
Gender	
Female	13.0 ± 1.5
Male	10.4 ± 1.2
Education	
Less than high school	13.3 ± 3.5
High school graduate/GED	13.0 ± 1.5
Some college or technical school	10.7 ± 1.3
College graduate or beyond	8.9 ± 1.8

Source: Minnesota Adult Tobacco Survey, 2018

For the MATS analyses, smokers are grouped by the number of cigarettes they smoke per day. Most cigarette smokers consume between one-half and one full pack of cigarettes every day (a pack usually contains 20 cigarettes), falling into either the 6-10 cigarettes per day category (28.8±4.5 percent) or the 11-20 cigarettes per day category (32.9±4.6 percent). Slightly less than one-third smoke fewer cigarettes than that, with 12.7±3.3 percent smoking 1 cigarette or less per day, and 17.1±3.9 smoking 2-5 cigarettes per day. Overall, only 8.5±3.1 percent smoke 21 or more cigarettes per day (Table 2-11).

There are few statistically significant differences among the age groups. The 65 or older age group tends to smoke the most cigarettes, with nearly 50 percent smoking between 11 and 20 cigarettes per day. Around 40 percent of adults ages 45-64 smoke 11-20 cigarettes per day, which is statistically significantly greater than the 23.8 percent of adults ages 25-44 who smoke this amount.

Table 2-11. Smoking intensity (averaged across past 30 days), for current smokers

Characteristics	Smoking Intensity					Row total
	1 cig or less	2-5 cigs	6-10 cigs	11-20 cigs	21+ cigs	
	%	%	%	%	%	
Overall	12.7 ± 3.3	17.1 ± 3.9	28.8 ± 4.5	32.9 ± 4.6	8.5 ± 3.1	100
Age						
18 to 24	15.0 ± 11.0	25.8 ± 17.0	25.8 ± 15.6	31.0 ± 18.4	2.4 ± 3.3	100
25 to 44	17.1 ± 5.9	19.5 ± 6.5	31.7 ± 7.2	23.8 ± 6.6	7.9 ± 5.0	100
45 to 64	8.4 ± 4.1	13.6 ± 4.8	27.0 ± 6.7	40.6 ± 7.3	10.4 ± 5.1	100
65 or older	8.7 ± 7.1	13.5 ± 7.1	23.3 ± 9.9	47.4 ± 12.3	7.1 ± 5.0	100
Gender						
Female	11.8 ± 4.6	20.3 ± 6.2	31.2 ± 6.8	32.3 ± 6.8	4.5 ± 3.0	100
Male	13.5 ± 4.8	14.4 ± 4.8	26.7 ± 6.0	33.4 ± 6.2	12.0 ± 5.1	100
Education						
Less than high school	9.0 ± 9.5	20.2 ± 13.2	26.6 ± 14.8	27.6 ± 14.2	16.6 ± 12.2	100
High school graduate/GED	11.8 ± 5.7	13.7 ± 5.0	24.1 ± 6.4	40.8 ± 7.8	9.6 ± 4.9	100
Some college or technical school	12.4 ± 4.8	18.1 ± 5.8	33.0 ± 7.0	31.4 ± 6.9	5.2 ± 3.4	100
College graduate or beyond	22.7 ± 10.0	18.8 ± 9.2	31.5 ± 11.2	23.9 ± 9.7	3.2 ± 4.8	100
Household income						
\$35,000 or less	6.4 ± 4.3	18.4 ± 6.6	31.5 ± 8.0	35.5 ± 8.1	8.1 ± 5.0	100
\$35,001 to \$50,000	18.5 ± 11.0	19.6 ± 11.2	22.8 ± 11.2	33.6 ± 11.6	5.5 ± 5.1	100
\$50,001 to \$75,000	14.8 ± 10.0	20.5 ± 10.5	21.5 ± 10.0	30.5 ± 11.6	12.7 ± 10.5	100
\$75,001 or more	21.2 ± 7.9	11.8 ± 6.0	28.6 ± 8.1	34.0 ± 9.3	4.5 ± 4.1	100

Source: Minnesota Adult Tobacco Survey, 2018

Smokers with a college degree smoke fewer cigarettes per day on average, with 22.7±10.0 percent smoking 1 cigarette or less per day, compared to 9.0±9.5 percent of those with less than a high school education. Only 3.2±4.8 percent of smokers with a college degree smoke 21 or more cigarettes per day, compared to 16.6±12.2 percent of smokers with less than a high school education. These differences are not statistically significant. Generally speaking, smoking intensity appears to be inversely related to educational level.

Time to First Cigarette After Waking

MATS measures the typical length of time between waking and smoking the first cigarette, a strong indicator of nicotine addiction.

Level of Addiction

Among various measures, smoking within 30 minutes of waking is indicative of strong addiction.

Survey Question

- How soon after you wake up do you smoke your first cigarette? Would you say within 5 minutes, 6-30 minutes, 31-60 minutes or after 60 minutes?

Nearly half (49.1±5.0 percent) of Minnesota adult smokers smoke their first cigarette of the day within 30 minutes of waking (Table 2-12). As age increases, this addiction measure tends to increase. The percentages of each of the two older age groups who smoke within 30 minutes of waking (55.3±7.5 percent of 45-64 year olds and 67.0±10.9 percent of those 65 years old or older) are higher than the percentages of each of the two younger age groups (37.2±18.2 percent of 18-24 year olds and 42.5±7.7 percent of 25-44 year olds), but the differences are not statistically significant. Similar to smoking prevalence, smokers with the highest educational and income levels are least likely to smoke within 30 minutes of waking, at 32.6±10.5 percent and 41.1±9.1 percent, respectively. Income shows a pattern in relation to this indicator: immediate smoking after waking declines steadily as income increases. The 56.4±8.6 percent of those with incomes of \$35,000 or less who smoke within 30 minutes of waking is higher than for the other income categories, but the differences between these groups are not statistically significant.

Table 2-12. Time to first cigarette after waking, for current smokers

Characteristics	Time to first cigarette		
	30 minutes or less	More than 30 minutes	Row Total
	%	%	%
Overall	49.1 ± 5.0	50.9 ± 5.0	100
Age			
18 to 24	37.2 ± 18.2	62.8 ± 18.2	100
25 to 44	42.5 ± 7.7	57.5 ± 7.7	100
45 to 64	55.3 ± 7.5	44.7 ± 7.5	100
65 or older	67.0 ± 10.9	33.0 ± 10.9	100
Gender			
Female	47.6 ± 7.3	52.4 ± 7.3	100
Male	50.4 ± 6.9	49.6 ± 6.9	100
Education			
Less than high school	51.8 ± 17.0	48.2 ± 17.0	100
High school graduate/GED	61.7 ± 7.7	38.3 ± 7.7	100
Some college or technical school	42.2 ± 7.2	57.8 ± 7.2	100
College graduate or beyond	32.6 ± 10.5	67.4 ± 10.5	100
Household income			
\$35,000 or less	56.4 ± 8.6	43.6 ± 8.6	100
\$35,001 to \$50,000	45.5 ± 12.8	54.5 ± 12.8	100
\$50,001 to \$75,000	43.0 ± 13.0	57.0 ± 13.0	100
\$75,001 or more	41.1 ± 9.1	58.9 ± 9.1	100

Source: Minnesota Adult Tobacco Survey, 2018

Usual Cigarette Brand is Menthol or Non-menthol

In 2010, MATS began to measure menthol cigarette use by Minnesota adult smokers. This section of the report characterizes menthol cigarette use by current smokers.

Menthol Cigarette Use

A chemical compound extracted from the peppermint plant, menthol is thought to help mask the harshness of cigarette smoke due to its characteristic cooling effects on the mouth and throat. Some cigarettes use menthol in greater quantities as a flavoring additive and market and advertise these brands as “menthol” cigarettes.

MATS 2010 introduced a broad and simple measure of menthol cigarette use. It did not seek to quantify the amount or frequency of menthol cigarette use, or to characterize smokers’ mixed use of menthol and non-menthol cigarettes. Rather, it sought to identify each smoker’s usual cigarette brand as menthol or non-menthol. MATS 2018 continues this measure.

Survey Question

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

Table 2-13 shows the percentage of smokers whose usual brand is menthol, overall and for the standard demographic subgroups. Overall, 27.5±4.3 percent of smokers usually smoke menthol cigarettes. The highest use by age is 34.0±7.3 percent of 25-44 year olds, closely followed by the 32.2±17.4 percent of the 18-24 year olds. A greater percentage of women than men usually smoke menthol cigarettes (33.8±6.7 percent vs. 22.0±5.4 percent, respectively), but the difference is not statistically significant. Those with less than a high school degree are the most frequent smokers of menthol cigarettes among the educational attainment groups, at 37.2±14.9 percent. A very similar percent of adults in the other three educational categories smoke menthol cigarettes, at around 25 percent in each group. The highest use by income level is 30.5±7.6 percent among the lowest income group. Across all the subgroups, the only statistically significant difference occurs between 25-44 year olds and 45-64 year olds (34.0±7.3 percent vs. 20.2±5.6 percent, respectively).

Table 2-13. Usual cigarette brand is menthol or non-menthol among current smokers, by selected demographic characteristics

Characteristics	Menthol	Non-menthol	No usual brand	Row Total
	%	%	%	%
Overall	27.5 ± 4.3	71.7 ± 4.4	0.8 ± 0.7	100
Age				
18 to 24	32.2 ± 17.4	66.4 ± 17.5	1.4 ± 2.2	100
25 to 44	34.0 ± 7.3	65.2 ± 7.3	0.8 ± 1.1	100
45 to 64	20.2 ± 5.6	79.4 ± 5.6	0.4 ± 0.6	100
65 or older	23.3 ± 10.8	72.9 ± 11.3	3.8 ± 5.1	100
Gender				
Female	33.8 ± 6.7	65.7 ± 6.7	0.5 ± 0.7	100
Male	22.0 ± 5.4	76.9 ± 5.5	1.1 ± 1.1	100
Education				
Less than high school	37.2 ± 14.9	62.8 ± 14.9	0.1 ± 0.2	100
High school graduate/GED	25.7 ± 6.1	72.5 ± 6.2	1.8 ± 1.9	100
Some college or technical school	25.4 ± 6.1	74.2 ± 6.1	0.3 ± 0.7	100
College graduate or beyond	24.3 ± 10.1	75.5 ± 10.1	0.3 ± 0.5	100
Household income				
\$35,000 or less	30.5 ± 7.6	69.1 ± 7.7	0.4 ± 0.7	100
\$35,001 to \$50,000	29.3 ± 11.3	69.8 ± 11.4	1.0 ± 1.9	100
\$50,001 to \$75,000	27.6 ± 10.4	72.5 ± 10.4	0.0 ± 0.0	100
\$75,001 or more	23.1 ± 8.2	75.5 ± 8.2	1.4 ± 1.6	100

Source: Minnesota Adult Tobacco Survey, 2018

2.3.3 Individual Behavioral Characteristics of Smokers, 2014 to 2018

Smoking Intensity

As noted in Section 2.3.2, a key measure of smoking intensity is the number of cigarettes smoked per day. As shown in Table 2-14, there was a small increase in the average number of cigarettes per day smoked by Minnesota adult smokers from 11.5±0.6 cigarettes in 2014 to 11.8±1.0 cigarettes in 2018, which was not statistically significant. However, it was statistically significant when applying a two-tailed test. For the various demographic subgroups, there were small decreases or increases in the average number of cigarettes smoked per day, and there were small yet statistically significant decreases for the 25-44 year old age group and the 65 or older age group.

Table 2-14. Mean cigarettes smoked per day (averaged across 30 days) for current smokers, from 2014 to 2018, by selected demographic characteristics

Characteristics	2014	2018	Change from 2014 to 2018
Overall	11.5 ± 0.6	11.8 ± 1.0	0.3
Age			
18 to 24	7.6 ± 1.6	8.7 ± 2.2	1.1
25 to 44	10.6 ± 0.9	10.3 ± 1.6	-0.3 *
45 to 64	13.6 ± 1.0	13.6 ± 1.5	0.0
65 or older	14.2 ± 2.0	13.6 ± 1.9	-0.6 *
Gender			
Female	10.2 ± 0.7	10.4 ± 1.2	0.1
Male	12.5 ± 0.9	13.0 ± 1.5	0.5
Education			
Less than high school	13.0 ± 2.2	13.3 ± 3.5	0.4
High school graduate/GED	12.5 ± 1.0	13.0 ± 1.5	0.5
Some college or technical school	10.7 ± 0.9	10.7 ± 1.3	0.0
College graduate or beyond	8.5 ± 1.4	8.9 ± 1.8	0.4

Hypothesis: The mean of cigarettes smoked per day will decline from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2014 and 2018

From 2014 to 2018, there were no significant changes in the percentages of smokers falling into the five categories of cigarettes smoked per day (Table 2-15). The three lower categories (1 cigarette or less, 2-5 cigarettes, 6-10 cigarettes) had very little to no change. The top two categories (11-20 cigarettes, 21 or more cigarettes) showed changes of approximately 3 percentage points, but in opposite directions. There was a decrease of 3.3 percentage points in the percentage of smokers who smoked 11-20 cigarettes per day, and there was increase of 2.8 percentage points in the percentage of smokers who smoked 21 or more cigarettes per day.

Table 2-15. Smoking intensity and time to first cigarette after waking, among smokers from 1999 to 2018

Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Smoking intensity							
1 cig or less	NA	NA	1.8 ± 1.0	3.2 ± 1.3	3.4 ± 1.6	4.0 ± 2.0	0.6
2-5 cigs	NA	NA	18.6 ± 3.4	22.4 ± 3.6	22.6 ± 3.2	22.5 ± 4.2	-0.1
6-10 cigs	NA	NA	28.1 ± 4.2	31.0 ± 3.8	31.8 ± 3.6	31.7 ± 4.6	0.0
11-20 cigs	NA	NA	40.5 ± 4.7	36.7 ± 4.0	36.6 ± 3.7	33.3 ± 4.6	-3.3
21+ cigs	NA	NA	11.0 ± 2.8	6.8 ± 2.0	5.7 ± 1.6	8.5 ± 3.1	2.8
Time to first cigarette							
30 minutes or less	46.8 ± 4.4	47.5 ± 4.5	46.2 ± 4.7	44.8 ± 4.1	48.2 ± 3.8	49.1 ± 5.0	0.9
More than 30 minutes	53.2 ± 4.4	52.5 ± 4.5	53.8 ± 4.7	55.2 ± 4.1	51.8 ± 3.8	50.9 ± 5.0	-0.9

Hypotheses: Smoking Intensity will decline from 2014 to 2018; the percentage of smokers smoking their first cigarette 30 minutes or less after waking will decline from 2014 to 2018; the percentage of smokers smoking their first cigarette more than 30 minutes after waking will increase from 2014 to 2018.

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Time to First Cigarette After Waking

The percentage of smokers who smoke their first cigarette within 30 minutes of waking increased by 0.9 percentage points between 2014 and 2018, but this is not statistically significant (Table 2-15). The trend for this measure of addiction in Minnesota's adult smokers has been quite stable since 1999, with small changes up and down over the years. The percentages ranged between a low of 44.8±4.1 percent in 2010 and a high of 49.1±5.0 percent in 2018.

Menthol Cigarette Smoking

The percentage of current cigarette smokers whose usual cigarette brand is menthol increased by 2.4 percentage points between 2014 and 2018, though this is not statistically significant (Table 2-16). This upward trend is similar to the increase of 3.1 percentage points between 2010 and 2014.

There were no statistically significant changes across the demographic subgroups from 2014 to 2018, yet there were large increases of over 8 percentage points for the 65 or older age group, 13.5 percentage points for those with less than a high school education, and over 8 percentage points for those with at least a college degree.

Table 2-16. Usual cigarette brand is menthol, among current cigarette smokers from 2010 to 2018, by selected demographic characteristics

Characteristics	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%
Overall	22.0 ± 3.6	25.1 ± 3.4	27.5 ± 4.3	2.4
Age				
18 to 24	22.3 ± 8.9	31.6 ± 11.4	32.2 ± 17.4	0.6
25 to 44	21.9 ± 5.9	29.2 ± 5.5	34.0 ± 7.3	4.8
45 to 64	23.7 ± 5.9	19.3 ± 4.5	20.2 ± 5.6	1.0
65 or older	11.3 ± 6.4	15.0 ± 7.2	23.3 ± 10.8	8.2
25 or older	22.0 ± 4.0	24.1 ± 3.5	27.1 ± 4.5	3.0
Gender				
Female	27.1 ± 5.7	29.2 ± 5.2	33.8 ± 6.7	4.6
Male	17.8 ± 4.6	21.9 ± 4.3	22.0 ± 5.4	0.1
Education				
Less than high school	19.6 ± 11.9	23.7 ± 10.0	37.2 ± 14.9	13.5
High school graduate/GED	27.3 ± 6.7	26.1 ± 5.5	25.7 ± 6.1	-0.5
Some college or technical school	19.9 ± 5.0	27.2 ± 5.6	25.4 ± 6.1	-1.8
College graduate or beyond	13.4 ± 6.7	16.0 ± 6.3	24.3 ± 10.1	8.2

Hypothesis: The percentage of current smokers whose usual brand is menthol flavored will increase from 2014 to 2018.

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

2.4 Influences of Social Environment on Smoking Behavior

This section explores the influence of the social environment on smoking behavior.

Living with a Smoker

Living with a smoker lends social support for one's own smoking behaviors by supporting the idea that smoking is normal and by creating a context where smoking is acceptable. Living with a smoker is a predictor of one's own smoking status, motivation for quitting and potential success in quitting.^v

Living with a Smoker

Survey Question

- Not including yourself, how many of the adults who live in your household smoke cigarettes, cigars or pipes?

Nearly 16 percent (15.8 ± 1.4 percent) of Minnesota adults live with a smoker (Table 2-17). Current smokers (45.5 ± 5.0 percent) are far more likely to live with a smoker than never smokers (10.0 ± 1.4 percent) or former smokers (13.7 ± 2.4 percent). This statistically significant relationship demonstrates the likely role of the home environment in supporting smoking behavior.

Young adults (20.5 ± 4.6 percent) are more likely to live with a smoker than 25-44 year olds (18.5 ± 2.5 percent), 45-64 year olds (15.4 ± 2.2 percent) and those 65 or older (9.1 ± 2.1 percent). The differences between the oldest age group and the other age groups are statistically significant.

Those with college degrees are much less likely to live with a smoker (7.7 ± 1.4 percent) than those with less than a high school degree (42.3 ± 8.5 percent), those with only a high school degree (17.8 ± 2.7 percent), and those with some college (16.4 ± 2.2 percent). All of these differences between college graduates and the other educational levels are statistically significant. A similar pattern emerges for the income level subgroups: those with household incomes above \$75,000 are less likely to live with a smoker (13.3 ± 1.9 percent) than those with incomes of \$35,000 or less (19.0 ± 3.4 percent), \$35,001 to \$50,000 (19.7 ± 4.3 percent) and \$50,001 to \$75,000 (17.6 ± 3.6 percent). The differences between the highest income group and both the \$35,000 or less and the \$35,001 to \$50,000 income levels are statistically significant.

Table 2-17. Living with a smoker, by selected demographic characteristics and smoking status

Characteristics	Lives with a smoker
	%
Overall	15.8 ± 1.4
Age	
18 to 24	20.5 ± 4.6
25 to 44	18.5 ± 2.5
45 to 64	15.4 ± 2.2
65 or older	9.1 ± 2.1
Gender	
Female	16.2 ± 1.9
Male	15.5 ± 1.9
Education	
Less than high school	42.3 ± 8.5
High school graduate/GED	17.8 ± 2.7
Some college or technical school	16.4 ± 2.2
College graduate or beyond	7.7 ± 1.4
Household income	
\$35,000 or less	19.0 ± 3.4
\$35,001 to \$50,000	19.7 ± 4.3
\$50,001 to \$75,000	17.6 ± 3.6
\$75,001 or more	13.3 ± 1.9
Smoking status	
Never smokers	10.0 ± 1.4
Current smokers	45.5 ± 5.0
Former smokers	13.7 ± 2.4

Source: Minnesota Adult Tobacco Survey, 2018

2.5 Influences of Social Environment on Smoking Behavior, 1999-2018

Living with a Smoker

MATS also examined the trends from 1999 to 2018 in living with a smoker. There was a statistically significant decrease in the percentage of adults who lived with a smoker from 2014 to 2018, from 17.8±1.1 percent to 15.8±1.4 percent (not shown in table).

2.6 Key Findings

Some of the most important findings from this chapter are summarized below. All differences presented in this summary are statistically significant at the 0.05 confidence level unless otherwise noted.

Key Smoking Prevalence Findings for 2018

- About 574,000 adult Minnesotans, or 13.8±1.2 percent, are current smokers. Adults between the ages of 25 and 64, those with lower educational levels and those with lower household income levels are more likely to be smokers.
- Overall, 16.8±4.1 percent of young adults 18-24 years old have smoked in the past 30 days.
- About 1,075,000 adult Minnesotans, or 25.8±1.4 percent, are former smokers, and the quit ratio among those who have ever smoked is 65.2±2.6 percent.
- About 2,511,000 adult Minnesotans, or 60.4±1.6 percent, have not smoked 100 cigarettes in their lifetime and are considered never smokers. Younger people, women, those with higher educational levels, and those with higher household income levels are more likely to be never smokers.
- Minnesota adult smokers tend to have lower educational levels and lower household incomes than former smokers or never smokers.
- Compared with nonsmokers, smokers are in poorer health.
- Minnesota's adult smokers smoked an average of 11.8±1.0 cigarettes per day over the past 30 days.
- Overall, 27.5±4.3 percent of smokers usually smoke menthol cigarettes.
- Slightly less than 16 percent (15.8±1.4 percent) of Minnesotans live with a smoker. Current smokers (45.5±5.0 percent) are far more likely to live with a smoker than never smokers (10.0±1.4 percent) or former smokers (13.7±2.4 percent).

Key Smoking Prevalence Findings Over Time

- Although there was little change in the overall percentage of current smokers from 2014 to 2018, there was a notable and statistically significant decline of nearly 7 percentage points in the young adult smoking rate, from 15.3±3.3 percent to 8.5±3.1 percent. Between 2014 and 2018, the percentage of never smokers increased by 2.6 percentage points, from 57.8±1.4 percent to 60.4±1.6 percent. It is encouraging that the never smoking rate among 18-24 year olds showed a large and statistically significant increase of 7.4 percentage points, from 78.3±3.7 to 85.7±3.8 percent.
- The percentage of former smokers decreased by 2.0 percentage points between 2014 and 2018; the change is not statistically significant. This decrease is likely due to the large increase in the percentage of never smokers. The quit ratio, a more accurate indicator of former smoking prevalence, decreased slightly, from 65.9±2.0 percent to 65.2±2.6 percent. This change was also not statistically significant.
- From 2014 to 2018, young adult smoking (defined as smoking during the past 30 days) declined by 3.0 percentage points, from 19.9±3.6 percent to 16.8±4.1 percent, though the decline is not statistically significant.
- There was little change from 2014 to 2018 in the average number of cigarettes per day smoked by Minnesota adult smokers. The overall average went up very slightly, from 11.5±0.6 cigarettes to 11.8±1.0 cigarettes, but the difference is not statistically significant.
- The percentage of current cigarette smokers whose usual cigarette brand is menthol increased by 2.4 percentage points from 2014 to 2018, but the difference was not statistically significant. The percentage of menthol smokers has slowly been rising since 2010, when 22.0±3.6 percent of adult smokers smoked menthol cigarettes. In 2018, 27.5±4.3 smoked menthol cigarettes.

Sources

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- ii. Early Release of Selected Estimates Based on Data From the January – June 2018 National Health Interview Survey. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. December, 2018. Accessed December 2018.
- iii. Centers for Disease Control and Prevention. Current Cigarette Smoking Among Adults – United States, 2005-2012. *MMWR*. 2014; 63(02): 29-34.
- iv. U.S. Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1994.
- v. Derby, C.A., Lasater, T.M., Vass, K., Gonzalez, S., and Carleton, R.A. (1994). Characteristics of smokers who attempt to quit and of those who recently succeeded. *American Journal of Preventive Medicine*. 10(6):327-334.

3. Use of Non-Cigarette Tobacco Products

3.1 Introduction

MATS monitors the use of all commonly available tobacco products in Minnesota. Chapter 2 focused on cigarettes. This chapter examines the use of any tobacco product and the use of specific forms of tobacco other than cigarettes.

3.2 Use of Cigarette and Non-Cigarette Products

Another way to look at the prevalence of tobacco use is to consider how many adults use tobacco in *any* form. This measure provides a clear picture of the full extent of tobacco use among adult Minnesotans.

Current Use of Tobacco

The definition of e-cigarettes has changed since the 2014 MATS. E-cigarettes were not considered to be a tobacco product when MATS 2014 was conducted and reported because scientific and policy perspectives on e-cigarettes were less certain back in 2014. Currently, e-cigarettes are considered a tobacco product. The classifications listed below detail the multiple definitions of current use of tobacco in 2018 while preserving some comparisons with the 2014 findings.

Current use of any tobacco product, not including e-cigarettes, includes cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, and/or smokeless tobacco including chewing tobacco, snuff or snus. E-cigarettes are excluded from the definition to preserve consistency with prior years of MATS.

Current use of any tobacco product including e-cigarettes includes the products listed above plus e-cigarettes.

Current use of non-cigarette tobacco products, not including e-cigarettes is defined as current use of pipes, cigars/cigarillos/little filtered cigars, hookah or smokeless tobacco including chewing tobacco, snuff or snus, as defined above.

Current Use of Combustible Tobacco

For MATS, current use of combustible tobacco is defined as current use of cigarettes, pipes, cigars or hookah.

The matrix below shows which products are included in each definition of current tobacco use.

Definition	Cigarettes	E-cigarettes	Cigars	Hookah	Pipes	Smokeless Tobacco
Current use of any tobacco product, not including e-cigarettes	✓		✓	✓	✓	✓
Current use of any tobacco product including e-cigarettes	✓	✓	✓	✓	✓	✓
Current use of non-cigarette tobacco, not including e-cigarettes			✓	✓	✓	✓
Current use of non-cigarette tobacco, including e-cigarettes		✓	✓	✓	✓	✓
Current use of combustible tobacco	✓		✓	✓	✓	

The following matrix shows which conditions must be met in order to be classified as current users of each product.

Mode of Tobacco Use	Cigarettes	E-cigarettes	Cigars	Hookah	Pipes	Smokeless Tobacco
At least one day in past 30		✓	✓	✓	✓	✓
100+ Lifetime	✓					
20+ Lifetime			✓		✓	✓
Every day/ some days	✓					

Overall, 18.5 ± 1.4 percent of Minnesota adults are current users of any tobacco product (not including e-cigarettes), and 21.3 ± 1.5 percent of Minnesota adults are current users of any tobacco product including e-cigarettes (Table 3-1). As previously mentioned in Chapter 2, 13.8 ± 1.2 percent of Minnesota adults are current cigarette smokers. Further, 6.0 ± 0.9 percent of Minnesota adults are current users of e-cigarettes, and 6.8 ± 0.9 percent use non-cigarette tobacco products (not including e-cigarettes). Table 3-1 shows that 6.0 ± 1.7 percent of former smokers and 5.1 ± 1.0 percent of never smokers are current users of non-cigarette tobacco products (not including e-cigarettes). Current use of e-cigarettes is discussed in more detail in the text accompanying Table 3-2.

Current use of any tobacco product including e-cigarettes declines with age, from 31.1 ± 5.1 percent of 18-24 year olds to 6.4 ± 1.4 percent of those 65 or older, the differences between groups being statistically significant except for that of the 18-24 year olds and the 25-44 year olds. Men are significantly more likely to use any tobacco product including e-cigarettes compared to women (27.0 ± 2.2 percent for men versus 15.8 ± 1.9 percent for women). Among any tobacco product including e-cigarette users, those with a college degree or more are less likely to be current users (9.5 ± 1.5 percent) compared to those with some college (24.6 ± 2.5 percent), high school (24.8 ± 2.9 percent) or less than high school degrees (44.9 ± 8.4 percent). These differences are statistically significant except for that of the high school graduates and those with some college. Similar to education, current use of any tobacco product including e-cigarettes declines as income increases, though the differences are not statistically significant.

Table 3-1. Current use of tobacco, cigarette, e-cigarette, and non-cigarette products, by selected demographic characteristics

Characteristics	Current use of any tobacco product not including e-cigarettes ^a	Current use of any tobacco product including e-cigarettes ^b	Current use of cigarettes ^c	Current use of e-cigarettes ^d	Current use of non-cigarette tobacco products not including e-cigarettes ^e
	%	%	%	%	%
Overall	18.5 ± 1.4	21.3 ± 1.5	13.8 ± 1.2	6.0 ± 0.9	6.8 ± 0.9
Age					
18 to 24	18.9 ± 4.2	31.1 ± 5.1	8.5 ± 3.1	21.8 ± 4.6	12.9 ± 3.6
25 to 44	24.8 ± 2.8	27.2 ± 2.8	18.1 ± 2.5	6.8 ± 1.6	10.6 ± 2.0
45 to 64	18.9 ± 2.3	20.3 ± 2.4	16.3 ± 2.2	2.9 ± 1.1	3.9 ± 1.0
65 or older	6.2 ± 1.4	6.4 ± 1.4	4.7 ± 1.1	0.5 ± 0.4	1.8 ± 0.9
Gender					
Female	13.7 ± 1.7	15.8 ± 1.9	12.6 ± 1.7	4.1 ± 1.1	1.9 ± 0.8
Male	23.5 ± 2.1	27.0 ± 2.2	15.0 ± 1.8	7.9 ± 1.4	12.0 ± 1.6
Education					
Less than high school	40.1 ± 8.1	44.9 ± 8.4	33.4 ± 8.0	14.3 ± 6.5	16.3 ± 6.5
High school graduate/GED	21.2 ± 2.7	24.8 ± 2.9	17.8 ± 2.6	6.4 ± 1.6	5.9 ± 1.5
Some college or technical school	21.6 ± 2.4	24.6 ± 2.5	15.5 ± 2.1	7.3 ± 1.6	7.6 ± 1.6
College graduate or beyond	8.3 ± 1.4	9.5 ± 1.5	4.5 ± 1.0	2.2 ± 0.7	4.6 ± 1.1
Household income					
\$35,000 or less	27.1 ± 3.6	31.5 ± 3.7	24.4 ± 3.5	8.4 ± 2.2	6.6 ± 2.0
\$35,001 to \$50,000	21.7 ± 4.4	27.0 ± 4.8	16.4 ± 3.9	7.8 ± 3.3	6.6 ± 2.8
\$50,001 to \$75,000	17.4 ± 3.4	18.8 ± 3.5	13.0 ± 3.1	4.6 ± 1.9	7.1 ± 2.3
\$75,001 or more	14.6 ± 1.9	16.3 ± 2.0	8.4 ± 1.5	4.3 ± 1.2	7.4 ± 1.4
Cigarette smoking status					
Never smokers	5.1 ± 1.0	8.3 ± 1.3	0.0 ± 0.0	4.4 ± 1.0	5.1 ± 1.0
Current smokers	100.0 ± 0.0	100.0 ± 0.0	100.0 ± 0.0	16.1 ± 3.8	16.3 ± 3.7
Former smokers	6.0 ± 1.7	9.2 ± 2.0	0.0 ± 0.0	4.4 ± 1.4	6.0 ± 1.7

^a Current use of any tobacco including cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, or smokeless tobacco

^b Current use of any tobacco including cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, smokeless tobacco or e-cigarettes

^c Current use of cigarettes (could be users of other products)

^d Current use of e-cigarettes (could be users of other products)

^e Current use of pipes, cigars/cigarillos/little filtered cigars, hookah, or smokeless tobacco

Source: Minnesota Adult Tobacco Survey, 2018

The demographic patterns for current use of any tobacco product, not including e-cigarettes are similar to those for current cigarette smoking because cigarette smokers constitute the largest percentage of all tobacco users. With the exception of 18-24 year olds (18.9±4.2 percent), current use of any tobacco product, not including e-cigarettes, declines across the age groups, from 24.8±2.8 percent of the 25-44 year olds to 6.2±1.4 percent of those 65 or older. The oldest age group is the least likely to use any tobacco product compared to any other age group and the differences are statistically significant. Compared to women, men are more likely be current users of any tobacco product (23.5±2.1 percent for men versus 13.7±1.7 percent for women). This difference also exists in current use of non-cigarette tobacco products, not including e-cigarettes, (12.0±1.6 percent for men versus 1.9±0.8 percent for women), and both differences are statistically significant. Tobacco use rates tend to decline as education level increases. Among current users of any tobacco product, not including e-cigarettes, the differences are more prominent among those with college degrees compared to other educational groups. Those with a college degree or more are significantly less likely to be current users of any tobacco product (8.3±1.4 percent) compared to those with some college (21.6±2.4 percent), high school (21.2±2.7 percent) or less than high school degrees (40.1±8.1 percent).

Similarly, those with college degrees or more are likely to use non-cigarette tobacco products at lower rates (4.6±1.1 percent) compared to those with some college (7.6±1.6 percent), high school (5.6±1.5 percent) or less than high school degree (16.3±6.5 percent); the differences between the college graduate group and both the some college and less than high school group are statistically significant.

Table 3-2. Current use of combusted tobacco, e-cigarettes, and smokeless tobacco, by selected demographic characteristics

Characteristics	Current use of combusted tobacco ^a	Current use of e-cigarettes	Current use of smokeless tobacco
	%	%	%
Overall	16.5 ± 1.3	6.0 ± 0.9	3.2 ± 0.6
Age			
18 to 24	15.7 ± 4.0	21.8 ± 4.6	5.3 ± 2.3
25 to 44	21.8 ± 2.7	6.8 ± 1.6	5.0 ± 1.3
45 to 64	17.6 ± 2.2	2.9 ± 1.1	1.8 ± 0.7
65 or older	5.4 ± 1.2	0.5 ± 0.4	1.0 ± 0.8
Gender			
Female	13.6 ± 1.7	4.1 ± 1.1	0.1 ± 0.1
Male	19.5 ± 2.0	7.9 ± 1.4	6.4 ± 1.2
Education			
Less than high school	38.9 ± 8.1	14.3 ± 6.5	4.8 ± 3.8
High school graduate/GED	19.3 ± 2.6	6.4 ± 1.6	3.3 ± 1.1
Some college or technical school	19.1 ± 2.3	7.3 ± 1.6	3.6 ± 1.1
College graduate or beyond	6.5 ± 1.2	2.2 ± 0.7	2.2 ± 0.7
Household income			
\$35,000 or less	26.4 ± 3.6	8.4 ± 2.2	2.0 ± 1.0
\$35,001 to \$50,000	18.4 ± 4.1	7.8 ± 3.3	4.1 ± 2.3
\$50,001 to \$75,000	15.7 ± 3.3	4.6 ± 1.9	2.8 ± 1.4
\$75,001 or more	11.8 ± 1.8	4.3 ± 1.2	4.2 ± 1.1
Cigarette smoking status			
Never smokers	3.2 ± 0.8	4.4 ± 1.0	2.2 ± 0.6
Current smokers	100.0 ± 0.0	16.1 ± 3.8	6.6 ± 2.2
Former smokers	2.6 ± 1.1	4.4 ± 1.4	3.7 ± 1.4

^a Current use of any combusted tobacco including pipes, cigars/cigarillos/little filtered cigars, or hookah

Source: Minnesota Adult Tobacco Survey, 2018

Table 3-2 presents statistics for current use of combustible tobacco, e-cigarettes, and smokeless tobacco by all Minnesota adults. Overall, 16.5±1.3 percent of adult Minnesotans are current smokers of combustible tobacco products such as cigarettes, pipes, cigars or hookah. Similar to current use of any tobacco product, current use of

combustible tobacco products is lowest among adults age 65 or older. The differences between this age group and all the other age groups are statistically significant. There is also a significant difference in the percentages of men and women who are current users of combustible tobacco, 19.5±2.0 percent of men compared to 13.6±1.7 percent of women. Current use of combustible tobacco also generally decreases with education level, ranging from 6.5±1.2 percent of those with college degrees up to 38.9±8.1 percent of those with less than high school degrees being current users. The differences between education levels are statistically significant except for that of high school graduates and those with some college. Across the income groups, the lowest percentage of current combustible tobacco use occurs among the highest income group at 11.8±1.8 percent. Conversely, the highest percentage of current combustible tobacco use occurs among the lowest income category at 26.4±3.6 percent. The differences between the lowest income group and each of the other three groups are statistically significant.

As discussed above, current use of e-cigarettes is reported by 6.0±0.9 percent of Minnesota adults. Young adults 18-24 years old (21.8±4.6 percent) use e-cigarettes at higher rates than adults in each of the three older age categories. The differences between this group and each of the other groups are statistically significant. Furthermore, a significantly higher percentage of males use e-cigarettes (7.9±1.4 percent) than females (4.1±1.1). Use of e-cigarettes is significantly more common among current cigarette smokers (16.1±3.8 percent) than former and never smokers (4.4±1.4 percent and 4.4±1.0 percent, respectively).

Current use of smokeless tobacco among Minnesota adults is lower than current e-cigarette use (3.2±0.6 percent compared to 6.0±0.9 percent). Smokeless tobacco is almost exclusively used by men (6.4±1.2 percent compared to 0.1±0.1 among women). Current smokers also use smokeless tobacco at a higher rate than never smokers (6.6±2.2 percent versus 2.2±0.6 percent). These differences are statistically significant.

3.3 Use of Non-Cigarette Tobacco Products

In 2018, 6.8±0.9 percent of Minnesota adults were current users of one or more non-cigarette tobacco products, not including e-cigarettes (Table 3-3). This includes adults who use only non-cigarette products and cigarette smokers who also use other tobacco

products. When e-cigarettes are included in the definition, this percentage increases to 11.3 ± 1.2 . MATS has changed its survey questions over time to reflect changes in current tobacco products.

Non-Cigarette Tobacco Use Status

Survey Questions

- During the past 30 days, on how many days did you use e-cigarettes or a vaping device?
- Have you [smoked tobacco in a pipe/smoked cigars, cigarillos or little filtered cigars that look like cigarettes/used any kind of smokeless tobacco] at least 20 times in your life?
- Have you ever used a hookah water pipe?
- During the past 30 days, how many days did you [smoke tobacco in a pipe/smoke cigars, cigarillos or little filtered cigars that look like cigarettes/use a hookah water pipe/use any kind of smokeless tobacco]?

Table 3-3 presents statistics for current use of non-cigarette tobacco products including e-cigarettes, defined as e-cigarettes, pipes, cigars, hookah and smokeless tobacco, by all adult Minnesotans, by current smokers, former smokers and never smokers. The only important variations in the use of these forms of tobacco occurs among the age groups and between men and women; accordingly, Table 3-3 breaks out the statistics for all Minnesota adults by age and gender. Use of non-cigarette tobacco products including e-cigarettes declines steadily across the age groups, from 27.6 ± 4.9 percent of 18-24 year olds, to 2.2 ± 1.0 percent of adults 65 or older. All differences between age groups are statistically significant. Males are statistically significantly more likely to use non-cigarette tobacco products including e-cigarettes than females: 17.1 ± 1.9 percent versus 5.8 ± 1.3 percent, respectively. use of non-cigarette tobacco products not including e-cigarettes: use declines steadily across the age groups, from 12.8 ± 3.6 percent of the 18-24 year olds to 1.8 ± 0.9 percent of those 65 or older. The differences between the three older age groups are statistically significant. Notably, the percentage of young adults under 25 who are current users of non-cigarette tobacco products not including e-cigarettes is more than 3 times that of the 45-64 and 65 or older age groups. Use of non-cigarette tobacco products occurs almost exclusively among men, 12.0 ± 1.6 percent of whom use some such form of tobacco, compared to 1.9 ± 0.8 percent of women.

Table 3-3. Current use of non-cigarette tobacco products (smokeless tobacco, pipe, cigars or hookah) including and not including E-cigarettes, by all Minnesota adults and by current, former, and never smokers, by age and gender

Population	Any non-cigarette tobacco use including e-cigarettes ^a	Any non-cigarette tobacco use not including e-cigarettes ^b	E-cigarette use	Smokeless tobacco use	Pipe use	Cigar use	Hookah use
	%	%	%	%	%	%	%
Minnesota adults							
Overall	11.3 ± 1.2	6.8 ± 0.9	6.0 ± 0.9	3.2 ± 0.6	0.8 ± 0.3	3.0 ± 0.6	1.1 ± 0.4
Age							
18 to 24	27.6 ± 4.9	12.8 ± 3.6	21.8 ± 4.6	5.3 ± 2.3	1.3 ± 1.4	5.7 ± 2.5	4.2 ± 2.4
25 to 44	15.6 ± 2.3	10.7 ± 2.0	6.8 ± 1.6	5.0 ± 1.3	1.1 ± 0.7	4.6 ± 1.4	1.7 ± 0.8
45 to 64	6.6 ± 1.4	3.8 ± 1.0	2.9 ± 1.1	1.8 ± 0.7	0.6 ± 0.5	1.7 ± 0.7	0.1 ± 0.1
65 or older	2.2 ± 1.0	1.8 ± 0.9	0.5 ± 0.4	1.0 ± 0.8	0.2 ± 0.2	0.7 ± 0.4	0.0 ± 0.1
Gender							
Female	5.8 ± 1.3	1.9 ± 0.8	4.1 ± 1.1	0.1 ± 0.1	0.3 ± 0.3	1.0 ± 0.5	0.8 ± 0.5
Male	17.1 ± 1.9	12.0 ± 1.6	7.9 ± 1.4	6.4 ± 1.2	1.3 ± 0.7	5.1 ± 1.1	1.4 ± 0.6
Current smokers							
Overall	28.6 ± 4.6	16.3 ± 3.7	16.1 ± 3.8	6.6 ± 2.2	3.8 ± 2.2	8.4 ± 2.9	2.4 ± 1.5
Age							
18 to 24	60.2 ± 18.6	30.3 ± 16.2	45.4 ± 19.9	12.9 ± 9.4	12.3 ± 14.8	21.4 ± 15.5	4.9 ± 5.9
25 to 44	37.1 ± 7.6	22.6 ± 6.7	19.8 ± 6.3	9.0 ± 4.1	4.2 ± 3.5	10.4 ± 5.0	4.5 ± 3.2
45 to 64	16.5 ± 5.3	8.5 ± 3.8	8.5 ± 4.0	3.4 ± 2.4	2.4 ± 2.5	4.5 ± 2.9	0.0 ± 0.1
65 or older	11.9 ± 8.5	7.1 ± 7.2	6.9 ± 6.3	2.7 ± 4.3	0.0 ± 0.0	4.4 ± 6.0	0.0 ± 0.0
Gender							
Female	20.6 ± 6.4	7.1 ± 4.2	14.1 ± 5.5	0.0 ± 0.0	1.2 ± 1.4	4.6 ± 3.3	2.1 ± 2.5
Male	35.8 ± 6.5	24.4 ± 5.8	17.8 ± 5.2	12.3 ± 4.0	6.0 ± 3.8	11.7 ± 4.5	2.6 ± 1.8
Former smokers							
Overall	9.2 ± 2.0	6.0 ± 1.7	4.4 ± 1.4	3.7 ± 1.4	0.1 ± 0.2	2.2 ± 1.1	0.3 ± 0.4
Age							
18 to 24	41.6 ± 21.2	19.1 ± 15.2	37.9 ± 20.8	11.4 ± 12.3	0.0 ± 0.0	3.5 ± 6.9	3.7 ± 7.4
25 to 44	18.5 ± 5.3	12.5 ± 4.9	8.7 ± 3.8	8.5 ± 4.0	0.0 ± 0.0	4.3 ± 3.3	0.6 ± 1.1
45 to 64	6.3 ± 2.7	3.5 ± 1.7	2.8 ± 2.1	1.7 ± 1.2	0.1 ± 0.2	1.8 ± 1.2	0.1 ± 0.2
65 or older	2.3 ± 1.6	2.3 ± 1.6	0.1 ± 0.2	1.4 ± 1.5	0.3 ± 0.5	0.9 ± 0.7	0.1 ± 0.1
Gender							
Female	2.8 ± 1.4	0.7 ± 0.7	2.4 ± 1.3	0.3 ± 0.5	0.1 ± 0.1	0.4 ± 0.5	0.0 ± 0.0
Male	14.5 ± 3.3	10.3 ± 2.9	6.1 ± 2.3	6.5 ± 2.4	0.2 ± 0.3	3.7 ± 1.9	0.6 ± 0.7
Never smokers							
Overall	8.3 ± 1.3	5.1 ± 1.0	4.4 ± 1.0	2.2 ± 0.6	0.4 ± 0.3	2.1 ± 0.7	1.1 ± 0.5
Age							
18 to 24	23.4 ± 5.2	10.6 ± 3.7	18.5 ± 4.8	4.1 ± 2.3	0.3 ± 0.5	4.3 ± 2.4	4.1 ± 2.6
25 to 44	8.3 ± 2.1	6.6 ± 1.9	2.2 ± 1.2	2.7 ± 1.1	0.5 ± 0.6	3.0 ± 1.4	1.2 ± 0.8
45 to 64	3.9 ± 1.5	2.7 ± 1.1	1.3 ± 1.1	1.4 ± 0.8	0.4 ± 0.4	0.9 ± 0.6	0.0 ± 0.1
65 or older	1.1 ± 0.9	0.8 ± 0.8	0.3 ± 0.5	0.5 ± 0.7	0.1 ± 0.2	0.1 ± 0.2	0.0 ± 0.0
Gender							
Female	3.9 ± 1.3	1.3 ± 0.8	2.8 ± 1.2	0.0 ± 0.0	0.1 ± 0.3	0.5 ± 0.5	0.9 ± 0.6
Male	13.6 ± 2.3	9.5 ± 1.9	6.2 ± 1.7	4.7 ± 1.3	0.6 ± 0.5	4.0 ± 1.3	1.4 ± 0.9

^aCurrent use of e-cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, or smokeless tobacco

^bCurrent use of pipes, cigars/cigarillos/little filtered cigars, hookah, or smokeless tobacco

Source: Minnesota Adult Tobacco Survey, 2018

Minnesota adults use pipes, cigars, hookah and smokeless tobacco at very low rates, and these are used by men at higher rates than women, the differences all being statistically significant except for hookah.

Use of Non-Cigarette Tobacco Products (Including E-cigarettes) Among Current Cigarette Smokers

Typically, current use of non-cigarette tobacco products is more common among cigarette smokers than nonsmokers (Table 3-3). Possible explanations for this tendency include using e-cigarettes or smokeless tobacco when smoking is not possible or using the alternative forms in hopes of reducing or quitting cigarettes. Caution is advised in using the statistics for current smokers' use of non-cigarette tobacco products in Table 3-3, since prevalence rates are low and the confidence intervals are large relative to the percentages.

Overall, 28.6 ± 4.6 percent of current smokers are also current users of some other form of tobacco, which is more than double the prevalence among all Minnesota adults (11.3 ± 1.2 percent), which means smokers are more likely than non-smokers to use these other forms of tobacco. The patterns of other tobacco use among smokers similar to those among all Minnesota adults, with statistically significant differences by both age and gender. Among current smokers, use of non-cigarette tobacco including e-cigarettes is highest among 18-24 year olds, at 60.2 ± 18.7 percent. This is statistically significantly greater than the percentage of 45-64 year olds— 16.5 ± 5.3 percent—and the percentage of adults 65 or older: 11.9 ± 8.5 percent. Further, a statistically significantly greater percentage of males who are current smokers also use non-cigarette tobacco products including e-cigarettes compared to females, at 35.8 ± 6.5 percent versus 20.6 ± 6.4 percent, respectively.

The patterns observed for current smokers who use non-cigarette tobacco products including e-cigarettes are similar for current smokers who use non-cigarette tobacco products not including cigarettes. Almost 16.3 ± 3.7 percent of cigarette smokers also use some other form of tobacco (not including e-cigarettes), which is more than double the prevalence among all Minnesota adults (6.8 ± 0.9 percent). Statistically significant differences among the demographic groups occur between men and women and among

various age groups. While 24.4±5.8 percent of male smokers use some other form of tobacco (not including e-cigarettes), only 7.1±4.1 percent of female smokers do so. The two youngest age groups of smokers are significantly more likely to also use non-cigarette tobacco products (not including e-cigarettes) (30.3±16.2 percent of 18-24 year olds; 22.6±6.7 percent of 25-44 year olds) than the two older age groups (8.5±3.8 percent of 45-64 year olds; 7.1±7.2 percent of adults 65 or older).

Among current cigarette smokers, 6.6±2.2 percent also use smokeless tobacco, which is statistically significantly greater than the percentage of the overall population that uses smokeless tobacco (3.2±0.6 percent). Current cigarette smokers also smoke pipes at a rate that is greater than that of the overall population: 3.8±3.2 percent versus 0.8±0.3 percent. Smokers use cigars at a rate that is significantly greater than that of the overall population, 8.4±2.9 percent vs. 3.0±0.6 percent, a statistically significant difference. As with other tobacco forms, hookah use is higher among cigarette smokers (2.4±1.5 percent) than in the general population (1.1±0.4) though the difference is not statistically significant (Table 3-3).

Among smokers, the same age and gender patterns for the use of non-cigarette tobacco products appear as in the general population. The higher use of smokeless tobacco and cigars among male smokers compared to female smokers is consistent with earlier reported results.

Minnesota Adults' Use of E-cigarettes

Electronic cigarettes:

An electronic cigarette (or e-cigarette) is a battery-powered device that provides inhaled doses of a vaporized nicotine solution. In addition to nicotine delivery, this vapor may also provide a flavor and physical sensation similar to that of inhaled tobacco smoke, although no smoke or combustion is actually involved in its operation.

E-cigarettes can be considered an alternative nicotine product.

An ever user of an e-cigarette has used it at least once in their lifetime.

A **current user** of an e-cigarette has used it at least one day in the past 30 days.

Survey Questions

- Have you ever used an electronic cigarette even just one time in your entire life?
- During the past 30 days, on how many days did you use e-cigarettes?

Reasons to use e-cigarettes: MATS 2018 examined reasons to use e-cigarettes among Minnesotans who have ever used an e-cigarette.

Survey Questions

For each, please tell me whether or not it's a reason {you have used/you use} e-cigarettes.

- {You have used/You use} e-cigarettes to quit other tobacco products
- {You have used/You use} e-cigarettes to cut down on other tobacco products
- {You have used/You use} them because they are affordable
- {You have used/You use} them because they come in menthol flavor
- {You have used/You use} them because they come in flavors other than menthol
- {You have used/You use} them in places other tobacco products are not allowed
- {You have used/You use} them because you were curious about e-cigarettes
- {You have used/You use} them because you think they might be less harmful than other tobacco products
- {You have used/You use} e-cigarettes for some other reason

Reasons to not continue to use e-cigarettes: MATS 2018 examined reasons to not continue to use e-cigarettes among Minnesota adults who are every day, some day, or past 30-day smokers and who are e-cigarette users who currently use not at all and did not use in the past 30 days.

Survey Questions

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

- They weren't as satisfying as smoking cigarettes
- They didn't help you quit smoking cigarettes
- They were too expensive
- They were too much trouble to use
- They were too harsh
- They might leak, catch fire, or explode
- You had health concerns about using them
- You didn't like the taste
- You didn't like the way they made you feel
- You prefer cigarettes
- Your family or friends would not approve

Reasons for not trying e-cigarettes: MATS 2018 examined reasons for not trying e-cigarettes among Minnesota adults who are every day, some day, or past 30-day smokers and who have never tried e-cigarettes.

Survey Questions

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

- They are too expensive
- They are too much trouble to use
- They might leak, catch fire, or explode
- You have health concerns about using them
- Your family or friends would not approve
- You are just not interested

Whether e-cigarette used most often contains nicotine: MATS 2018 examined whether every day, some day, or past 30 day e-cigarette users' e-cigarette contains nicotine.

Survey Question

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

Use of flavored e-cigarettes: E-cigarettes are sold in a variety of flavors. MATS 2018 included two measures of flavor use, one regarding regular use of flavored e-cigarettes, and added in 2018, one regarding regular use of menthol e-cigarettes.

Survey Questions

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

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

Table 3-4 shows statistics for ever use and past 30-day use of e-cigarettes by all Minnesota adults and by current, former, and never smokers. Ever use of e-cigarettes is reported by 20.7±1.4 percent of Minnesota adults and declines consistently across age groups, ranging from 44.4±5.5 percent for 18-24 year olds to 3.8±1.1 percent for adults 65 or older. All differences between age groups are statistically significant. Males (23.8±2.1 percent) have ever used e-cigarettes at a significantly higher rate than females (17.7±1.9 percent).

Table 3-4. Ever use and past 30 day use of e-cigarettes, by all Minnesota adults and by current, former, and never smokers, by age and gender

Population	E-cigarette Ever Use	E-cigarette past 30-day use
	%	%
Minnesota adults		
Overall	20.7 ± 1.4	6.0 ± 0.9
Age		
18 to 24	44.4 ± 5.5	21.8 ± 4.6
25 to 44	28.7 ± 2.8	6.8 ± 1.6
45 to 64	14.1 ± 2.1	2.9 ± 1.1
65 or older	3.8 ± 1.1	0.5 ± 0.4
Gender		
Female	17.7 ± 1.9	4.1 ± 1.1
Male	23.8 ± 2.1	7.9 ± 1.4
Current smokers		
Overall	61.9 ± 4.8	16.1 ± 3.8
Age		
18 to 24	94.2 ± 8.5	45.4 ± 19.9
25 to 44	72.5 ± 7.0	19.8 ± 6.3
45 to 64	47.0 ± 7.3	8.5 ± 4.0
65 or older	47.9 ± 12.4	6.9 ± 6.3
Gender		
Female	62.2 ± 7.0	14.1 ± 5.5
Male	61.7 ± 6.6	17.8 ± 5.2
Former smokers		
Overall	21.3 ± 2.7	4.4 ± 1.4
Age		
18 to 24	88.1 ± 11.1	37.9 ± 20.8
25 to 44	43.1 ± 6.3	8.7 ± 3.8
45 to 64	17.5 ± 4.6	2.8 ± 2.1
65 or older	2.6 ± 1.5	0.1 ± 0.2
Gender		
Female	19.0 ± 3.9	2.4 ± 1.3
Male	23.1 ± 3.7	6.1 ± 2.3
Never smokers		
Overall	11.1 ± 1.5	4.4 ± 1.0
Age		
18 to 24	36.5 ± 5.8	18.5 ± 4.8
25 to 44	10.9 ± 2.4	2.2 ± 1.2
45 to 64	3.2 ± 1.5	1.3 ± 1.1
65 or older	0.6 ± 0.7	0.3 ± 0.5
Gender		
Female	8.6 ± 1.8	2.8 ± 1.2
Male	14.0 ± 2.3	6.2 ± 1.7

Source: Minnesota Adult Tobacco Survey, 2018

Ever use of e-cigarettes is more common among current cigarette smokers than the general population, former smokers, and never smokers, at 61.9±4.8 percent vs. 20.7±1.4 percent of all adults, 21.3±2.7 percent of former smokers, and 11.1±1.5 percent of never smokers. The differences between ever use of e-cigarettes among current smokers and ever use of e-cigarettes among all adults, former smokers, and never smokers are statistically significant. Ever use of e-cigarettes among current, former, and never cigarette smokers declines as age group increases, most differences being statistically significant. Additionally, a significantly greater percentage of males are ever e-cigarette users and never cigarette smokers (14.0±2.3 percent) than females (8.6±1.8 percent).

Similar patterns exist for past 30-day e-cigarette use among current, former, and never smokers as for ever e-cigarette use. Past 30-day e-cigarette use declines with age for all three groups, and 18-24 years olds are the group most likely to be past-30 day e-cigarette users within these three groups. A significantly greater percentage of men are either past 30-day e-cigarette users and former smokers or past 30-day e-cigarette users and never smokers compared to women. In addition, daily use of e-cigarettes is reported by 32.7±7.5 percent of all past 30-day users and by 32.2±12.8 percent of the past 30-day users who are also current cigarette smokers (not shown in table).

Among current cigarette smokers, 16.1±3.8 percent are also past 30-day e-cigarette users. Less than 5 percent of former cigarette smokers (4.4±1.4 percent) and never cigarette smokers (4.4±1.0 percent) are past 30-day e-cigarette users.

Overall, among past 30-day e-cigarette users, 37.0±7.5 percent are current cigarette smokers, 19.1±5.8 percent are former cigarette smokers and 44.0±7.9 percent are never cigarette smokers (Table 3-5). Among past 30-day e-cigarette users, the majority who are also either current or former cigarette smokers are between the ages of 25-44 (55.0±12.3 percent and 53.8±15.7 percent, respectively). These percentages are statistically significantly higher than those of any other age group. Among past 30-day e-cigarette users, a significantly greater percentage of men are either former cigarette smokers or never cigarette smokers compared to women.

Table 3-5. Selected demographic characteristics by cigarette smoking status among past 30-day e-cigarette users

Characteristics	Current cigarette smoker	Former cigarette smoker	Never cigarette smoker
	%		%
Overall	37.0 ± 7.5	19.1 ± 5.8	44.0 ± 7.9
Age			
18 to 24	20.2 ± 10.7	22.8 ± 12.7	71.3 ± 10.9
25 to 44	55.0 ± 12.3	53.8 ± 15.7	17.8 ± 8.9
45 to 64	22.0 ± 9.2	22.6 ± 12.7	9.8 ± 6.5
65 or older	2.8 ± 2.6	0.9 ± 1.1	1.2 ± 2.0
Total	100.0	100.0	100.0
Gender			
Female	40.9 ± 13.1	24.5 ± 13.4	34.6 ± 12.0
Male	59.1 ± 13.1	75.5 ± 13.4	65.4 ± 12.0
Total	100.0	100.0	100.0
Education			
Less than high school	19.3 ± 12.8	20.0 ± 18.7	15.9 ± 11.4
High school graduate/GED	26.4 ± 10.1	22.8 ± 12.2	29.5 ± 10.2
Some college or technical school	44.1 ± 12.9	38.0 ± 15.9	44.2 ± 11.8
College graduate or beyond	10.3 ± 6.1	19.3 ± 11.1	10.4 ± 5.4
Total	100.0	100.0	100.0
Household income			
\$35,000 or less	46.5 ± 14.7	53.0 ± 17.7	39.0 ± 15.8
\$35,001 to \$50,000	12.0 ± 11.7	25.3 ± 16.3	28.1 ± 13.9
\$50,001 to \$75,000	20.6 ± 11.9	10.5 ± 11.9	23.3 ± 14.3
\$75,001 or more	21.0 ± 12.3	11.2 ± 10.3	9.7 ± 9.2
Total	100.0	100.0	100.0

Source: Minnesota Adult Tobacco Survey, 2018

Among all e-cigarette users, curiosity is the most common reason given (70.4±3.6 percent) for using e-cigarettes, and this is true across all age groups (Table 3-6). Adult Minnesotans who have ever used e-cigarettes also use them because of the perception of less harm associated with e-cigarettes compared to other tobacco products (47.7±4.0 percent), to cut down on other tobacco products (44.9±4.0 percent), to quit other tobacco products (42.3±3.9 percent), for enjoyment (41.8±3.9 percent), because they come in various flavors other than menthol (36.9±3.9 percent), because they can be used in places where other tobacco products are prohibited (28.4±3.7 percent), because they are affordable (22.8±3.4 percent), for some other reason (17.7±3.0 percent) and because they come in menthol flavor (8.4±2.3 percent). Notably, a majority of 18-24 year old young adults (55.7±7.8 percent) use e-cigarettes because they come in flavors other than menthol.

Table 3-6. Reasons to use e-cigarettes, by all ever e-cigarette users and specific age groups

Reason	All e-cigarette users	18-24 year old e-cigarette users	25-44 year old e-cigarette users	45-64 year old e-cigarette users	65 year old and older e-cigarette users	25 year old and older e-cigarette users
	%	%	%	%	%	%
Curiosity	70.4 ± 3.6	71.9 ± 7.1	74.6 ± 5.2	61.4 ± 7.8	64.8 ± 14.8	69.9 ± 4.2
Because they might be less harmful than other tobacco products	47.7 ± 4.0	47.8 ± 8.1	45.2 ± 5.9	52.1 ± 8.0	51.6 ± 14.5	47.7 ± 4.6
To cut down on other tobacco products	44.9 ± 4.0	27.6 ± 7.4	46.2 ± 5.9	59.8 ± 7.8	55.0 ± 15.6	50.9 ± 4.5
To quit other tobacco products	42.3 ± 3.9	24.9 ± 7.2	44.5 ± 5.9	55.6 ± 8.1	50.0 ± 15.3	48.3 ± 4.5
Enjoyment	41.8 ± 3.9	65.6 ± 7.4	39.7 ± 5.7	22.5 ± 7.0	28.4 ± 13.9	33.7 ± 4.4
Because they come in flavors other than menthol	36.9 ± 3.9	55.7 ± 7.8	35.1 ± 5.6	23.6 ± 7.3	15.8 ± 10.9	30.5 ± 4.3
Because they can be used in places other tobacco products are not allowed	28.4 ± 3.7	27.6 ± 7.1	29.0 ± 5.5	28.3 ± 7.3	27.6 ± 13.6	28.7 ± 4.2
Because they are affordable	22.8 ± 3.4	28.0 ± 7.3	22.2 ± 5.1	17.4 ± 5.6	28.4 ± 14.9	20.9 ± 3.7
Some other reason	17.7 ± 3.0	29.4 ± 7.4	15.2 ± 4.0	11.2 ± 5.1	11.9 ± 9.4	13.8 ± 3.1
Because they come in menthol flavor	8.4 ± 2.3	10.0 ± 5.1	9.2 ± 3.7	4.9 ± 3.0	9.6 ± 8.9	7.9 ± 2.6

Source: Minnesota Adult Tobacco Survey, 2018

Among every day, some day or past 30-day e-cigarette users who use every day or some days, 77.6±6.4 percent report that their e-cigarette, vaping device or e-juice used most often contains nicotine (Table 3-7). This is consistent with studies that show majority of e-cigarette, e-juice contain nicotine.² There are no statistically significant differences by age, gender, education or income.

Table 3-7. E-cigarette, vaping device or e-juice contains nicotine, by selected demographic characteristics, among every day, some day or past 30-day e-cigarette users

Characteristics	E-cigarette contains nicotine
	%
Overall	77.6 ± 6.4
Age	
18 to 24	78.6 ± 9.2
25 to 44	87.0 ± 8.1
45 to 64	57.6 ± 20.2
65 or older	34.7 ± 35.0
Gender	
Female	78.1 ± 10.3
Male	77.4 ± 8.3
Education	
Less than high school	74.2 ± 24.9
High school graduate/GED	80.5 ± 10.5
Some college or technical school	77.4 ± 9.7
College graduate or beyond	73.9 ± 14.0
Household income	
\$35,000 or less	75.4 ± 12.3
\$35,001 to \$50,000	71.4 ± 20.1
\$50,001 to \$75,000	79.4 ± 12.4
\$75,001 or more	80.1 ± 10.9

Source: Minnesota Adult Tobacco Survey, 2018

² Marynak, Kristy L., et al. "Sales of nicotine-containing electronic cigarette products: United States, 2015." *American Journal of Public Health* 107.5 (2017): 702-705.

Among every day, some day or past 30-day cigarette smokers, the most commonly reported reason for not trying e-cigarettes is: “just not interested” (80.7±5.9 percent; Table 3-8). This is followed by “health concerns about using them” (23.6±6.7 percent), they are too much trouble to use (16.5±6.2 percent), they might leak, catch fire, or explode (16.4±5.9 percent), they are too expensive (14.8±5.3 percent), any other reason (12.5±4.7 percent), or family or friends would not approve (5.1±3.6 percent).

Table 3-8. Reasons for not trying e-cigarettes, among every day, some day or past 30-day cigarette smokers

Reasons for not trying e-cigarettes	Current every day or some day cigarette smokers
	%
Just not interested	80.7 ± 5.9
Health concerns about using them	23.6 ± 6.7
Too much trouble to use	16.5 ± 6.2
Might leak, catch fire, or explode	16.4 ± 5.9
Too expensive	14.8 ± 5.3
Any other reason	12.5 ± 4.7
Family or friends would not approve	5.1 ± 3.6

Source: Minnesota Adult Tobacco Survey, 2018

Preferring cigarettes is the most common reason for not continuing to use e-cigarettes among every day, some day or past 30-day cigarette smokers, with 64.3±6.8 percent reporting this reason (Table 3-9). The second most commonly given reason for not continuing to use e-cigarettes is that they weren’t as satisfying as smoking cigarettes (48.3±7.0 percent). This is followed by “didn’t help quitting smoking cigarettes” (33.4±6.6 percent), smokers had health concerns about using them (28.9±6.2 percent), they are too much trouble to use (24.6±5.9 percent), smokers didn’t like the taste (24.4±5.9 percent), they’re too harsh (22.4±5.8 percent), they might leak, catch fire, or explode (21.7±5.7 percent), they’re too expensive (19.5±5.8 percent), any other reason (13.3±4.8 percent), smokers didn’t like the way they made them feel (12.1±4.8 percent), or family or friends would not approve (6.9±3.5 percent).

Table 3-9. Reasons for not continuing to use e-cigarettes, among every day, some day or past 30-day cigarette smokers

Reasons for not continuing to use e-cigarettes	Current every day or some day cigarette smokers
	%
Prefer cigarettes	64.3 ± 6.8
Weren't as satisfying as smoking cigarettes	48.3 ± 7.0
Didn't help quitting smoking cigarettes	33.4 ± 6.6
Health concerns about using them	28.9 ± 6.2
Too much trouble to use	24.6 ± 5.9
Didn't like the taste	24.4 ± 5.9
Too harsh	22.4 ± 5.8
Might leak, catch fire, or explode	21.7 ± 5.7
Too expensive	19.5 ± 5.8
Any other reason	13.3 ± 4.8
Didn't like the way they made you feel	12.1 ± 4.8
Family or friends would not approve	6.9 ± 3.5

Source: Minnesota Adult Tobacco Survey, 2018

3.3.1 Use of Flavors in E-Cigarettes and Cigars

MATS 2018 examined the use of flavors in e-cigarettes and cigars.

Use of flavored e-cigarettes: E-cigarettes are sold in a variety of flavors. MATS 2018 included two measures of flavor use, one regarding regular use of flavored e-cigarettes, one regarding regular use of menthol e-cigarettes.

Survey Questions

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

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

Use of flavored cigars: Two survey questions were added in 2018 examining flavored cigar use, one regarding regular use of flavored cigars, and one regarding regular use of menthol cigars.

Survey Questions

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?

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

Among current e-cigarette users, 80.2±5.7 percent report that their usual e-cigarette is flavored (menthol or other flavors), and among current cigar users, 36.3±10.8 percent report that their usual cigar is flavored (Table 3-10). Among current e-cigarette users, the majority of 18 to 44 year olds use flavored e-cigarettes, with nearly all 18-24 year olds reporting flavor use (96.7±3.3 percent of 18-24 year olds and 84.2±9.0 percent of 25-44 year olds). These percentages are statistically significantly higher than those for 45-64 year olds (37.3±17.9 percent) and adults 65 or older (22.1±28.3 percent). Similarly, among current cigar smokers, more adults age 18-44 use flavored cigars compared to adults 45 or older, but the differences are not statistically significant. There is no significant difference in the use of flavored e-cigarettes by gender, but nearly 80 percent of female cigar smokers report use of flavored cigars (79.1±21.5 percent) versus almost 30 percent (28.2±11.3 percent) of males, a statistically significant difference.

Among current e-cigarette users whose usual e-cigarette is flavored, 20.9±6.8 percent report that their usual e-cigarette is menthol or mint flavored. A similar percentage of current cigar users whose usual cigar is flavored report that their usual cigar is menthol or mint flavored (21.1±6.6 percent). No significant differences exist for age or gender among either of the products.

Table 3-10. Use of flavors among current e-cigarette and cigar users, by age and gender

Characteristics	Usual e-cigarette is flavored	Usual e-cigarette is menthol/mint flavored ^a	Usual cigar is flavored	Usual cigar is menthol/mint flavored ^b
	%	%	%	%
Overall	80.2 ± 5.7	20.9 ± 6.8	36.3 ± 10.8	21.1 ± 6.6
Age				
18 to 24	96.7 ± 3.3	23.0 ± 9.3	40.5 ± 23.7	16.1 ± 18.2
25 to 44	84.2 ± 9.0	12.9 ± 9.0	41.2 ± 15.0	12.4 ± 7.6
45 to 64	37.3 ± 17.9	47.2 ± 31.9	24.0 ± 17.8	34.0 ± 13.8
65 or older	22.1 ± 28.3	S	11.1 ± 17.4	22.9 ± 12.9
Gender				
Female	87.3 ± 8.2	20.0 ± 10.2	79.1 ± 21.5	23.6 ± 14.7
Male	76.4 ± 7.3	21.5 ± 7.8	28.2 ± 11.3	20.3 ± 7.4

^a Among current e-cigarette users whose usual e-cigarette is flavored

^b Among current cigar users whose usual cigar is flavored

Note: "S" in the table indicates data suppression because of small sample size.

Source: Minnesota Adult Tobacco Survey, 2018

3.4 Minnesota Adults' Use of Tobacco with Marijuana

In MATS 2018, new items were added to gain an understanding about how tobacco is used with marijuana.

A **current user** of marijuana has used it at least one day in the past 30 days.

- During the past 30 days, have you used marijuana?

In 2018, MATS added questions that examine marijuana with tobacco use.

Survey Questions

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

- Smoke it? [IF NEEDED: in a joint, blunt, or waterpipe]
- Vape it? [IF NEEDED: in an e-cigarette or vaping device]
- Eat it? [IF NEEDED: in food, such as in a cookie, candy, mint or cracker]
- Use it in some other way?

For those who currently vape marijuana, one question examines whether marijuana was mixed with e-juice containing nicotine in the past 30 days, and one examines the frequency in which marijuana and nicotine were mixed.

During the past 30 days, when you vaped marijuana, did you mix the marijuana with an e-juice containing nicotine? (Yes/No)

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

- Every time
- Most of the time
- Sometimes
- Rarely

A similar set of questions is asked of those who currently smoke marijuana.

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?

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

- Every time
- Most of the time
- Sometimes
- Rarely

Overall, 7.6 ± 0.9 percent of Minnesota adults are current users of marijuana (Table 3-11). In comparison, 21.3 ± 1.5 percent of Minnesota adults are current users of any tobacco product including e-cigarettes who may or may not be current marijuana users. Using the broadest definition of tobacco use, which is the same as previously defined except also includes current use of blunts, the estimate increases slightly to 21.9 ± 1.5 percent.

Current use of marijuana declines as age increases, ranging from 16.7 ± 4.0 percent among young adults ages 18-24, to 1.3 ± 0.5 percent among adults ages 65 or older. All of the differences between age groups are statistically significant. Males currently use marijuana at a statistically significantly higher rate than females (9.6 ± 1.5 percent versus 5.8 ± 1.2 percent). Among the education subgroups, those with less than a high school degree currently use marijuana at a statistically higher rate than any other group, at 18.9 ± 7.0 percent, and college graduates use marijuana at a significantly lower rate than any other group, at 4.5 ± 1.0 percent. Current use of marijuana declines as income increases, though the only statistically significant difference is between those who have incomes of \$35,000 or less, at 11.2 ± 2.6 percent, and those with incomes of \$75,001 or more, at 5.5 ± 1.1 percent. Similar patterns exist among current users of any tobacco including e-cigarettes and blunts.

Table 3-11. Current use of marijuana and tobacco: patterns of use, by selected demographic characteristics

Characteristics	Current use of marijuana ^a	Current use of any tobacco product including e-cigarettes ^b	Current use of any tobacco including e-cigarettes and blunts ^c
	%	%	%
Overall	7.6 ± 0.9	21.3 ± 1.5	21.9 ± 1.5
Age			
18 to 24	16.7 ± 4.0	31.1 ± 5.1	33.0 ± 5.2
25 to 44	9.9 ± 1.9	27.2 ± 2.8	28.0 ± 2.8
45 to 64	5.9 ± 1.4	20.3 ± 2.4	20.7 ± 2.4
65 or older	1.3 ± 0.5	6.4 ± 1.4	6.4 ± 1.4
Gender			
Female	5.8 ± 1.2	15.8 ± 1.9	16.3 ± 1.9
Male	9.6 ± 1.5	27.0 ± 2.2	27.7 ± 2.2
Education			
Less than high school	18.9 ± 7.0	44.9 ± 8.4	47.2 ± 8.3
High school graduate/GED	7.5 ± 1.7	24.8 ± 2.9	25.2 ± 2.9
Some college or technical school	8.4 ± 1.6	24.6 ± 2.5	25.3 ± 2.6
College graduate or beyond	4.5 ± 1.0	9.5 ± 1.5	9.9 ± 1.5
Household income			
\$35,000 or less	11.2 ± 2.6	31.5 ± 3.7	32.7 ± 3.7
\$35,001 to \$50,000	9.7 ± 3.2	27.0 ± 4.8	27.5 ± 4.8
\$50,001 to \$75,000	7.2 ± 2.2	18.8 ± 3.5	19.3 ± 3.5
\$75,001 or more	5.5 ± 1.1	16.3 ± 2.0	16.5 ± 2.0

Source: Minnesota Adult Tobacco Survey, 2018

^a Any current use of marijuana (may or may not be tobacco users)

^b Current use of any tobacco including cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, smokeless tobacco or e-cigarettes (may or may not be marijuana users)

^c Current use of any tobacco including cigarettes, pipes, cigars/cigarillos/little filtered cigars, hookah, smokeless tobacco, e-cigarettes; reflects blunt users who did not otherwise identify themselves as tobacco users.

Among current marijuana users, the most common mode of marijuana use is smoking, with nearly 90 percent of users (Table 3-12). This is followed by eating (22.3±5.5 percent), vaping (22.1±5.5 percent), or some other way (8.0±3.6 percent).

Table 3-12. Modes of marijuana use, among current marijuana users

Modes of marijuana use	Current marijuana users
	%
Smoke	89.7 ± 3.5
Eat	22.3 ± 5.5
Vape	22.1 ± 5.5
Some other way	8.0 ± 3.6

Source: Minnesota Adult Tobacco Survey, 2018

Among current marijuana users, 30.4±6.5 percent smoke marijuana in a blunt (cigar filled with marijuana), combining tobacco with their use of marijuana (Table 3-13). In comparison, only 3.0±0.6 percent of Minnesota adults are current cigar smokers. Over half of young adults ages 18-24 who are current marijuana users are current blunt users (52.1±13.0 percent). This is a statistically significantly greater percentage than that of adults ages 45-64 (9.3±7.5 percent) and adults 65 or older (8.6±9.7 percent). Among the education groups, over half of Minnesota adults with less than a high school education who are current marijuana users are current blunt users (53.5±19.0 percent). This is statistically significantly greater percentage than that of high school graduates (19.2±9.5 percent) and college graduates (12.9±8.1 percent). Current blunt use decreases as income increases: significantly more adults with incomes of \$35,000 or less are current blunt users (40.2±12.1 percent) than those with incomes of \$50,001-75,000 (15.3±11.0 percent) or \$75,001 or more (16.7±9.0 percent). No significant differences exist by gender.

Table 3-13. Current cigar use, current marijuana use, and current use of marijuana with tobacco in a blunt, by selected demographic characteristics

Characteristics	Current cigar use	Current use of marijuana ^a	Current blunt use, among current marijuana users ^b
	%	%	%
Overall	3.0 ± 0.6	7.6 ± 0.9	30.4 ± 6.5
Age			
18 to 24	5.7 ± 2.5	16.7 ± 4.0	52.1 ± 13.0
25 to 44	4.6 ± 1.4	9.9 ± 1.9	31.1 ± 10.5
45 to 64	1.7 ± 0.7	5.9 ± 1.4	9.3 ± 7.5
65 or older	0.7 ± 0.4	1.3 ± 0.5	8.6 ± 9.7
Gender			
Female	1.0 ± 0.5	5.8 ± 1.2	38.5 ± 11.3
Male	5.1 ± 1.1	9.6 ± 1.5	25.5 ± 7.3
Education			
Less than high school	10.1 ± 5.4	18.9 ± 7.0	53.5 ± 19.0
High school graduate/GED	2.5 ± 1.0	7.5 ± 1.7	19.2 ± 9.5
Some college or technical school	3.1 ± 1.0	8.4 ± 1.6	34.3 ± 10.1
College graduate or beyond	1.6 ± 0.6	4.5 ± 1.0	12.9 ± 8.1
Household income			
\$35,000 or less	3.6 ± 1.6	11.2 ± 2.6	40.2 ± 12.1
\$35,001 to \$50,000	1.9 ± 1.6	9.7 ± 3.2	36.8 ± 20.4
\$50,001 to \$75,000	2.6 ± 1.4	7.2 ± 2.2	15.3 ± 11.0
\$75,001 or more	3.1 ± 1.0	5.5 ± 1.1	16.7 ± 9.0

^a Any current use of marijuana (may or may not be tobacco users)

^b Current use of marijuana as a blunt, among current marijuana users

Source: Minnesota Adult Tobacco Survey, 2018

3.5 Perceptions of Harm

3.5.1 Perceptions of Harm

Harm of Occasional Cigarette Use

Survey Question

- Do you believe there is any harm in having an occasional cigarette?

Over 80 percent of all Minnesotans (81.0±1.4 percent) agree that smoking an occasional cigarette is harmful (Table 3-14). The perceived harmfulness of occasional smoking is higher among never smokers (84.8±1.6 percent) than among former smokers (78.0±2.7 percent), and higher among former smokers than among current smokers (69.9±4.6 percent). All of these differences are statistically significant.

Perceptions of the harm in occasional smoking differ by gender, education and income in statistically significant ways. Women (84.3±1.8 percent) are significantly more likely than men (77.6±2.1 percent) to think occasional smoking is harmful. Those with higher levels of education (82.7±2.2 percent of those with some college and 85.4±1.8 percent of those with a college degree) are more likely than those with lower levels of education (69.6±8.2 percent of those without a high school diploma and 76.2±3.0 percent of those with a high school diploma) to think that occasional smoking is harmful. Those in the lowest income category (76.9±3.5 percent) are less likely than those in the highest income category (84.0±1.9 percent) to think that occasional smoking is harmful.

Table 3-14. Perceived harmfulness of smoking an occasional cigarette, by selected demographic characteristics and smoking status

Characteristics	Perceived harmful
	%
Overall	81.0 ± 1.4
Age	
18 to 24	83.0 ± 4.1
25 to 44	80.5 ± 2.5
45 to 64	81.4 ± 2.3
65 or older	80.1 ± 2.5
Gender	
Female	84.3 ± 1.8
Male	77.6 ± 2.1
Education	
Less than high school	69.6 ± 8.2
High school graduate/GED	76.2 ± 3.0
Some college or technical school	82.7 ± 2.2
College graduate or beyond	85.4 ± 1.8
Household income	
\$35,000 or less	76.9 ± 3.5
\$35,001 to \$50,000	78.5 ± 4.4
\$50,001 to \$75,000	81.6 ± 3.3
\$75,001 or more	84.0 ± 1.9
Smoking status	
Never smokers	84.8 ± 1.6
Current smokers	69.9 ± 4.6
Former smokers	78.0 ± 2.7

Source: Minnesota Adult Tobacco Survey, 2018

Perceptions of Harm from Menthol Cigarettes

Perceptions of harm from menthol cigarettes

Survey Question

- Do you agree or disagree with the following statements about menthol cigarettes?
Menthols are less harmful [to smokers] than non-menthols.

In MATS 2018, a survey item was added to assess Minnesota adults' perceptions of menthol cigarettes. As shown in Table 3-15, 4.1±0.8 percent of adults agree that menthol cigarettes are less harmful than non-menthols. Those without a high school degree (11.8±6.2 percent) are significantly more likely to agree that menthols are less harmful than those with some college (3.2±1.1 percent) or college graduates (2.3±0.9 percent). Similarly, those at income levels of \$35,000 or below are significantly more likely to agree that menthols are less harmful compared to any other income group. There are no statistically significant differences by age, gender, or smoking status.

Table 3-15. Perceptions of menthol cigarettes as less harmful compared to non-menthol cigarettes, by selected demographic characteristics and smoking status

Characteristics	Perceptions of menthol cigarettes as less harmful
	%
Overall	4.1 ± 0.8
Age	
18 to 24	8.5 ± 3.7
25 to 44	3.4 ± 1.4
45 to 64	3.4 ± 1.2
65 or older	4.3 ± 1.5
Gender	
Female	3.7 ± 1.0
Male	4.5 ± 1.2
Education	
Less than high school	11.8 ± 6.2
High school graduate/GED	5.7 ± 1.8
Some college or technical school	3.2 ± 1.1
College graduate or beyond	2.3 ± 0.9
Household income	
\$35,000 or less	9.2 ± 2.7
\$35,001 to \$50,000	2.3 ± 1.7
\$50,001 to \$75,000	3.6 ± 1.9
\$75,001 or more	1.9 ± 0.8
Cigarette smoking status	
Never smokers	4.5 ± 1.1
Current smokers	5.0 ± 2.7
Former smokers	2.9 ± 1.1

Source: Minnesota Adult Tobacco Survey, 2018

3.6 Tobacco Use, 2014 to 2018

Between 2014 and 2018, there was a slight decrease in the percentage of Minnesota adults who were current users of some form of tobacco, including cigarettes, pipes, cigars, hookah, and smokeless tobacco, though this decrease was not statistically significant. In 2014, 19.2±1.1 percent of Minnesota adults were current tobacco users, while in 2018 this figure dropped to 18.5±1.4 percent (Table 3-16). The percentage of adult Minnesotans who were current users of any tobacco products or e-cigarettes increased slightly from 20.7±1.1 percent in 2014 to 21.3±1.5 percent in 2018. This increase, however, was not statistically significant.

3.7 Use of Non-Cigarette Tobacco Products, 2014 to 2018

This section describes trends in the use of non-cigarette tobacco products. Trend results for cigarettes can be found in Chapter 2.

Use of Non-Cigarette Tobacco Products among all Minnesota Adults. Between 2014 and 2018, among adult Minnesotans there was a slight decrease in the current use of non-cigarette tobacco products, including pipes, cigars, hookah and smokeless tobacco, but this decrease was not statistically significant (Table 3-16). Among the individual non-cigarette tobacco products, there were marginal changes from 2014 to 2018, none of them statistically significant.

Table 3-16. Tobacco use among Minnesota adults and current smokers from 1999 to 2018, by tobacco product

Current tobacco use	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Minnesota adults							
Any tobacco product not including e-cigarettes ^a	27.0 ± 1.9	22.9 ± 1.6	21.1 ± 1.5	21.0 ± 1.3	19.2 ± 1.1	18.5 ± 1.4	-0.7
Any tobacco product including e-cigarettes ^a	NA	NA	NA	21.1 ± 1.3	20.7 ± 1.1	21.3 ± 1.5	0.6
Any non-cigarette tobacco product not including e-cigarettes ^a	7.9 ± 1.2	5.9 ± 0.9	6.1 ± 0.8	7.5 ± 0.8	7.6 ± 0.7	6.8 ± 0.9	-0.7
Pipe ^a	0.9 ± 0.4	0.5 ± 0.2	0.5 ± 0.3	0.6 ± 0.3	0.7 ± 0.2	0.8 ± 0.3	0.1
Cigar ^a	4.5 ± 1.0	2.5 ± 0.6	2.8 ± 0.6	3.2 ± 0.6	2.9 ± 0.5	3.0 ± 0.6	0.0
E-cigarettes ^b	NA	NA	NA	0.7 ± 0.3	5.9 ± 0.7	6.0 ± 0.9	0.1
Hookah ^a	NA	NA	0.4 ± 0.2	0.7 ± 0.3	1.4 ± 0.4	1.1 ± 0.4	-0.3
Smokeless tobacco ^d	3.4 ± 0.7	3.2 ± 0.7	3.1 ± 0.6	4.3 ± 0.7	3.6 ± 0.5	3.2 ± 0.6	-0.4
Current smokers							
Any non-cigarette tobacco product not including e-cigarettes ^a	14.9 ± 3.2	10.7 ± 2.8	11.9 ± 2.8	17.6 ± 3.2	19.9 ± 3.2	16.3 ± 3.7	-3.7
Pipe ^a	2.0 ± 1.2	1.1 ± 0.7	0.9 ± 0.6	1.8 ± 1.2	2.6 ± 1.2	3.8 ± 2.2	1.2
Cigar ^a	10.9 ± 3.0	5.4 ± 2.2	7.5 ± 2.4	9.4 ± 2.5	9.5 ± 2.3	8.4 ± 2.9	-1.1
E-cigarettes ^b	NA	NA	NA	3.6 ± 1.8	27.3 ± 3.5	16.1 ± 3.8	-11.2
Hookah ^a	NA	NA	1.5 ± 1.2	2.2 ± 1.2	4.6 ± 1.9	2.4 ± 1.5	-2.2 *
Smokeless tobacco ^b	5.2 ± 2.0	5.0 ± 2.0	4.4 ± 1.6	9.6 ± 2.7	7.4 ± 2.0	6.6 ± 2.2	-0.9

^a These items are hypothesized to decline from 2014 to 2018

^b These items are hypothesized to increase from 2014 to 2018

* Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Use of Non-Cigarette Tobacco Products among Current Cigarette Smokers. Among current smokers, there was a decrease of 3.7 percentage points in the use of non-cigarette tobacco products not including e-cigarettes, but the decrease was not statistically significant. Among the individual non-cigarette tobacco products, there were decreases across all products except pipe, which increased by 1.2 percentage points, but the change was not statistically significant. There was a statistically significant decrease in the use of hookah among current smokers of 2.2 percentage points from 2014 to 2018. There was also a large decrease in the use of e-cigarettes among current smokers from 27.3 percent in 2014 to 16.1 percent in 2018, which is described below.

Use of E-Cigarettes from 2014 to 2018

There was a statistically significant increase in ever use of e-cigarettes among Minnesota adults (Table 3-17), from 17.7±1.1 percent in 2014 to 20.7±1.4 percent in 2018. There was a statistically significant decrease in ever use of e-cigarettes among current cigarette smokers when a two-tailed test is applied. In 2014, 70.0±3.3 percent of adults were

current smokers and ever e-cigarette users, while in 2018 61.8±4.8 percent were current smokers and ever e-cigarette users. Current use of e-cigarettes among all Minnesota adults remained stable at 6 percent from 2014 to 2018, but there was a marked decrease of over 11 percentage points in the percentage of current smokers who were current e-cigarette users that is statistically significant when a two-tailed test is applied.

Table 3-17. Ever and current use of e-cigarettes among Minnesota adults and current smokers, from 2010 to 2018

Population	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%
Minnesota adults				
Ever use of e-cigarettes ^a	2.1 ± 0.5	17.7 ± 1.1	20.7 ± 1.4	3.0 *
Current use of e-cigarettes ^b	0.7 ± 0.3	5.9 ± 0.7	6.0 ± 0.9	0.1
Current smokers				
Ever use of e-cigarettes ^a	9.1 ± 2.6	70.0 ± 3.3	61.9 ± 4.8	-8.1
Current use of e-cigarettes ^b	3.6 ± 1.8	27.3 ± 3.5	16.1 ± 3.8	-11.2

^a Ever use is hypothesized to increase from 2014 to 2018

^b Current use is hypothesized to increase from 2014 to 2018

* Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2010, 2014 and 2018

Table 3-18 presents current e-cigarette use characteristics of various demographic and smoking status groups from 2010 to 2018. There was a large, statistically significant increase in current e-cigarette use among young adults ages 18-24, from 12.8±3.0 percent in 2014 to 21.9±4.6 percent in 2018. The older age groups each had small reductions in current e-cigarette use of less than 2 percentage points. The only other statistically significant increase in current e-cigarette use was among never smokers, 4.4±1.0 percent of whom were current e-cigarette users in 2018, up from 1.2±0.4 percent in 2014. There was an increase of 4.5 percentage points in the percent of adults without a high school education who are current e-cigarette users, but it was not statistically significant.

Table 3-18. Current e-cigarette use among all Minnesota adults, by selected demographic characteristics and smoking status, from 2010 to 2018

Characteristics	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%
Overall	0.7 ± 0.3	5.9 ± 0.7	6.0 ± 0.9	0.1
Age				
18 to 24	1.6 ± 1.1	12.8 ± 3.0	21.9 ± 4.6	9.1 *
25 to 44	0.9 ± 0.7	7.8 ± 1.4	6.8 ± 1.6	-1.0
45 to 64	0.5 ± 0.5	4.3 ± 0.9	2.9 ± 1.1	-1.5
65 or older	0.1 ± 0.1	0.8 ± 0.4	0.5 ± 0.4	-0.3
Gender				
Female	0.7 ± 0.5	4.9 ± 0.9	4.1 ± 1.1	-0.8
Male	0.7 ± 0.4	7.0 ± 1.1	8.0 ± 1.4	0.9
Education				
Less than high school	1.7 ± 1.9	9.6 ± 3.9	14.1 ± 6.4	4.5
High school graduate/GED	1.2 ± 0.8	7.1 ± 1.4	6.5 ± 1.6	-0.6
Some college or technical school	0.5 ± 0.4	7.3 ± 1.3	7.3 ± 1.6	-0.1
College graduate or beyond	0.2 ± 0.2	2.5 ± 0.7	2.2 ± 0.7	-0.3
Smoking status				
Never smokers	0.2 ± 0.2	1.2 ± 0.4	4.4 ± 1.0	3.2 *
Current smokers	3.6 ± 1.8	27.3 ± 3.5	16.1 ± 3.8	-11.2
Former smokers	0.1 ± 0.2	4.8 ± 1.2	4.4 ± 1.4	-0.4

Hypothesis: Current use of e-cigarettes will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2010, 2014 and 2018

As seen in Table 3-19, there were large, statistically significant decreases in the percentage of past 30-day e-cigarette users who are current smokers between 2014 and 2018, at the overall level, and by all age groups. Overall, the percentage of past 30-day e-cigarette users who are current smokers decreased from 65.8±5.7 percent in 2014 to 37.0±7.5 percent in 2018. The largest declines among the age groups were among 18-24 year olds, at 32 percent, and among 45-64 year olds, at 27.7 percent. Among past 30-day e-cigarette users, there was also a decline in the percent who are former smokers, from 22.5±5.1 percent in 2014 to 19.1±5.8 percent in 2018. Among the age groups, there were declines from 2014 to 2018 of 10.2 percent for past 30-day e-cigarette users who are 18-24 years old, and 20.6 percent for past 30-day e-cigarette users who are 65 or older. There were small increases in the percent of past 30-day e-cigarette users who are 25-44 years old and 45-64 years old and former smokers, but the increases are not statistically

significant. In contrast to the trends for current smokers, there were large, statistically significant increases in the rate of never smoking from 2014 to 2018, both overall and by all age groups. Overall, the percentage of past 30-day e-cigarette users who are never smokers increased from 11.7±3.5 percent in 2014 to 44.0±7.9 percent in 2018.

Encouragingly, the change in the percent of past 30-day e-cigarette users who are 18-24 years old and never smokers is the largest increase among the age groups, at 42.2 percent.

Table 3-19. Smoking status by age among past 30 day e-cigarette users, from 2014 to 2018

Current	2014	2018	Change from 2014 to 2018
	%	%	%
Overall	65.8 ± 5.7	37.0 ± 7.5	-28.9 *
Age			
18 to 24	49.3 ± 12.7	17.3 ± 9.4	-32.0 *
25 to 44	69.2 ± 8.1	52.9 ± 12.4	-16.2 *
45 to 64	76.3 ± 10.2	48.6 ± 20.4	-27.7 *
65 or older	67.7 ± 21.0	60.2 ± 15.0	-7.4 *
Former	2014	2018	Change from 2014 to 2018
	%	%	%
Overall	22.5 ± 5.1	19.1 ± 5.8	-3.4
Age			
18 to 24	20.3 ± 10.4	10.1 ± 6.0	-10.2
25 to 44	24.2 ± 7.6	26.7 ± 10.9	2.6
45 to 64	21.1 ± 10.1	25.8 ± 15.8	4.7
65 or older	30.1 ± 20.0	9.5 ± 12.3	-20.6
Never	2014	2018	Change from 2014 to 2018
	%	%	%
Overall	11.7 ± 3.5	44.0 ± 7.9	32.3 *
Age			
18 to 24	30.4 ± 9.8	72.6 ± 10.3	42.2 *
25 to 44	6.7 ± 4.1	20.3 ± 10.2	13.7 *
45 to 64	2.6 ± 3.2	25.7 ± 18.6	23.0 *
65 or older	2.2 ± 4.5	30.3 ± 13.8	28.1 *

Hypotheses: Current use of cigarettes among past 30-day e-cigarette users will decrease from 2014 to 2018; former use of cigarettes among past 30-day e-cigarette users will increase from 2014 to 2018; never use of cigarettes among past 30-day e-cigarette users will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2014 and 2018

3.8 Individual-level Influences on Smoking Behavior, 2014 to 2018

This section examines Minnesota smokers in terms of changes over time in selected smoking-related behaviors and attitudes.

Harm of Occasional Cigarette Use

As discussed in Section 3.4.1, perception of harm is an important indicator of potential experimentation with tobacco, motivation to quit and support for tobacco control policies. This section examines the trend in the perceived harmfulness of smoking an occasional cigarette. Between 2014 and 2018, there was a statistically significant increase of 6.2 percentage points in the percentage of Minnesota adults who believe smoking an occasional cigarette is harmful (Table 3-20). Furthermore, there were increases among all of the demographic and smoking status subgroups, most of them being statistically significant. The largest increase was among young adults ages 18-24; the percentage perceiving an occasional cigarette as harmful increased by 8.4 percentage points from 2014 to 2018. Both males and females experienced statistically significant increases from 2014 to 2018. The educational group with the largest increase was adults with some college; this group experienced an increase of 8.7 percentage points. There is the large and statistically significant increase in the percent of smokers who perceive the occasional cigarette as harmful; this percentage increased from 54.2±3.8 percent in 2014 to 69.9±4.6 percent in 2018.

Table 3-20. Perceived harmfulness of smoking an occasional cigarette, by selected demographic characteristics and smoking status, among smokers from 1999 to 2018

Smoking characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	%
Overall	NA	72.5 ± 4.4	78.3 ± 1.5	75.1 ± 1.4	74.8 ± 1.2	81.0 ± 1.4	6.2 *
Age							
18 to 24	NA	70.4 ± 4.3	71.8 ± 4.8	67.9 ± 4.7	74.6 ± 3.9	83.0 ± 4.1	8.4 *
25 to 44	NA	S	79.9 ± 2.9	74.3 ± 2.5	72.9 ± 2.3	80.5 ± 2.5	7.6 *
45 to 64	NA	NA	78.8 ± 2.0	78.1 ± 2.0	75.4 ± 2.0	81.4 ± 2.3	6.0 *
65 or older	NA	NA	78.2 ± 2.1	76.4 ± 2.4	77.8 ± 2.3	80.1 ± 2.5	2.3
Gender							
Female	NA	73.5 ± 5.7	81.1 ± 1.9	79.3 ± 1.8	78.7 ± 1.6	84.3 ± 1.8	5.6 *
Male	NA	71.5 ± 6.8	75.4 ± 2.2	70.9 ± 2.1	70.9 ± 1.9	77.6 ± 2.1	6.8 *
Education							
Less than high school	NA	59.2 ± 12.9	68.9 ± 6.7	65.1 ± 6.4	64.1 ± 6.3	69.6 ± 8.2	5.5
High school graduate/GED	NA	70.0 ± 6.6	74.7 ± 3.0	72.0 ± 3.0	71.8 ± 2.6	76.2 ± 3.0	4.4 *
Some college or technical school	NA	77.5 ± 6.5	78.8 ± 2.5	74.7 ± 2.3	74.1 ± 2.1	82.7 ± 2.2	8.7 *
College graduate or beyond	NA	79.9 ± 10.6	84.3 ± 1.9	81.0 ± 1.8	80.7 ± 1.7	85.4 ± 1.8	4.7 *
Smoking status							
Never smokers	NA	79.3 ± 5.4	84.0 ± 1.8	81.0 ± 1.7	80.7 ± 1.5	84.8 ± 1.6	4.1 *
Current smokers	NA	60.3 ± 8.3	61.1 ± 4.5	55.2 ± 4.1	54.2 ± 3.8	69.9 ± 4.6	15.7 *
Former smokers	NA	64.6 ± 13.8	77.0 ± 2.5	75.0 ± 2.4	73.3 ± 2.3	78.0 ± 2.7	4.7 *

Hypothesis: Perceived harmfulness of smoking an occasional cigarette will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Note: "S" in the table indicates data suppression because of small sample size. In 2003, perceived harmfulness was only measured among young adults.

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

3.9 Key Findings

Some of the most important findings from this chapter are summarized below. All differences presented in this summary are statistically significant at the 0.05 confidence level unless otherwise noted.

Key Tobacco Prevalence Findings for 2018

- Overall, 18.5±1.4 percent of Minnesota adults currently use some form of tobacco, including cigarettes, pipes, cigars, hookah, and any form of smokeless tobacco, and 21.3±1.5 percent currently use some form of tobacco including e-cigarettes.
- Current use of any tobacco including e-cigarettes declines significantly with age from 31.1±5.1 percent of the 18-24 year olds to 6.4±1.4 percent of those 65 or older. Men are significantly more likely to use any tobacco product including e-cigarettes compared to women (27.0±2.2 percent for men versus 15.8±1.9 percent for women).

- Compared to women, men are more likely to use any tobacco product including e-cigarettes (23.5±2.1 percent for men versus 13.7±1.7 percent for women).
- Current use of smokeless tobacco among Minnesota adults is lower than current e-cigarette use (3.2±0.6 percent compared to 6.0±0.9 percent). Smokeless tobacco is almost exclusively used by men (6.4±1.2 percent compared to 0.1±0.1 among women).
- In 2018, 11.3±1.2 percent of Minnesota adults were current users of one or more non-cigarette tobacco products including e-cigarettes. Further, 6.8±0.9 percent of Minnesota adults were current users of one or more non-cigarette tobacco products not including e-cigarettes.
- Use of non-cigarette tobacco both including and not including e-cigarettes declines steadily across the age groups. Men are significantly more likely to use non-cigarette tobacco than women.
- Overall, 28.6±4.5 percent of cigarette smokers also use some other form of tobacco including e-cigarettes. In comparison, 16.3±3.7 percent of cigarette smokers also use some other form of tobacco not including e-cigarettes.
- Ever use of e-cigarettes is more common among current cigarette smokers than the general population, 61.9±4.8 percent vs. 20.7±1.4 percent, a statistically significant difference. Young adults 18-24 years old (44.4±5.5 percent) and males (23.8±2.1 percent) have ever used e-cigarettes at higher rates than older or female adults.
- Current use of e-cigarettes is reported by 6.0 percent of Minnesota adults, and 16.1 percent of current smokers, a statistically significant difference.
- Young adults 18-24 years old (21.8±4.6 percent) currently use e-cigarettes at higher rates than those 25 or older, a statistically significant difference.
- Daily use of e-cigarettes is reported by 32.7±7.5 percent of past 30-day users and by 32.2±12.8 percent of the past 30-day users who are also current cigarette smokers.
- Overall, among past 30-day e-cigarette users, 37.0±7.5 percent are current cigarette smokers, 19.1±5.8 percent are former cigarette smokers and 44.0±7.9 percent are never cigarette smokers.

- Among current e-cigarette users, curiosity is the most common reason given for using e-cigarettes (70.4±3.6 percent), and this is true across all age groups.
- Over 75 percent of current every day e-cigarette users (77.6±6.4 percent) report that their e-cigarette contains nicotine.
- Among every day, some day or past 30-day cigarette smokers, the most commonly given reason for not trying e-cigarettes is that they are just not interested (80.7±5.9 percent).
- The most commonly given reason for not continuing to use e-cigarettes among every day, some day or past 30-day cigarette smokers is that they prefer cigarettes (64.3±6.8 percent).
- About 80 percent of current e-cigarette users (80.2±5.7 percent) report that their usual e-cigarette is flavored. Nearly all young adults ages 18-24 report that their usual e-cigarette is flavored (96.7±3.3 percent).
- Over one-third of current cigar users report that their usual cigar is flavored (36.3±10.8 percent). A significantly higher percentage of female cigar users report that their usual cigar is flavored compared to male cigar users (79.1±21.5 percent versus 28.2±11.3 percent).
- Among current e-cigarette users whose usual e-cigarette is flavored, 20.9±6.8 percent report that their usual e-cigarette is menthol or mint flavored. A similar percentage of current cigar users whose usual cigar is flavored report that their usual cigar is menthol or mint flavored (21.1±6.6 percent).
- Overall, 7.6±0.9 percent of Minnesota adults are current users of marijuana.
- Over 20 percent (21.9±1.5 percent) of Minnesota adults are current users of any tobacco product including e-cigarettes and blunts.
- Among current marijuana users, the most common mode of marijuana use is smoking it, at around 90 percent.
- Among current marijuana users, 30.4±6.5 percent use marijuana with tobacco as a blunt. Over half of young adults ages 18-24 who are current marijuana users are also current blunt users (52.1±13.0 percent).

- Over 80 percent (81.0±1.4 percent) of Minnesotans think that smoking an occasional cigarette is harmful. This perception declines significantly from never smokers to former smokers to current smokers, with current smokers considerably less likely to think so, at 69.9±4.6 percent.
- Only 4 percent of adults perceive menthol cigarettes as less harmful compared to non-menthol cigarettes. Those with incomes of \$35,000 or less are significantly more likely to think that menthol cigarettes are less harmful than any other income group (9.2±2.7 percent).

Key Tobacco Prevalence Findings for 2014 to 2018

- In 2014, 19.2±1.1 percent of Minnesota adults were current tobacco users, while in 2018 this figure dropped to 18.5±1.4 percent. This change was not statistically significant.
- There was a significant decrease in current hookah use among current smokers, from 4.6±1.9 percent in 2014 to 2.4±1.5 percent in 2018, a statistically significant change.
- There was a sharp decrease of over 11 percentage points in current use of e-cigarettes among current smokers, from 27.3±3.5 percent in 2014 to 16.1±3.8 percent in 2018. This decrease is statistically significant when a two-tailed test is applied.
- There was a statistically significant increase in ever use of e-cigarettes among Minnesota adults, from 17.7±1.1 percent in 2014 to 20.7±1.4 percent in 2018. However, among cigarette smokers, there was a sharp decrease in ever use of e-cigarettes, from 70.0±3.3 percent in 2014 to 61.9±4.8 percent in 2018, that is statistically significant when a two-tailed test is applied.
- There was a large, statistically significant increase in current e-cigarette use among young adults ages 18-24, from 12.8±3.0 percent in 2014 to 21.9±4.6 percent in 2018.
- Among never smokers, 4.4±1.0 percent were current e-cigarette users in 2018, up from 1.2±0.4 percent in 2014, a statistically significant increase.

- There were large, statistically significant decreases in the percent of past 30-day e-cigarette users who were current smokers from 2014 to 2018, both overall and by all age groups. Overall, there was a 28.9 percent decrease.
- Conversely, there were large, statistically significant increases in the percent of past 30-day e-cigarette users who were never smokers from 2014 to 2018, both overall and by all age groups. Overall, there was a 32.3 percent increase. Encouragingly, the change in the percent of past 30-day e-cigarette users who are 18-24 years old and never smokers is the largest increase among the age groups, at 42.2 percent.
- The percent of smokers who perceive smoking an occasional cigarette as harmful increased from 74.8±1.2 percent in 2014 to 81.0±1.4 percent in 2018, a statistically significant increase. There were increases across all of the demographic and smoking status subgroups, most of them statistically significant. The largest change was among current smokers, which experienced an increase of nearly 16 percentage points.

4. Quitting Behaviors Among Minnesota Smokers

4.1 Introduction

This chapter describes quitting behaviors among Minnesota’s adult smokers. The results presented here examine quit attempts, successful quitting, the use of quitting programs and medications, assistance for quitting from health care providers, and the impact of smoke-free rules on quitting.

4.2 Quitting Smoking and Use of Assistance to Quit

This section examines the prevalence of quitting attempts and successful quitting, and the use of quitting programs and medications in quit attempts.

4.2.1 Past-year Smoking and Successful Quitting

Past-year Smoking and Successful Quitting

Past-year smokers include individuals who have smoked at any time during the past year, that is, all current smokers as of the date of interview, and former smokers *if* they last smoked regularly any time in the 12 months immediately preceding the interview. To examine the prevalence of past-year quitting, MATS considers quit attempts and quits among this denominator population of past-year smokers.

Past-year successful quitters include all those past-year smokers who are former smokers at the time of their interview, that is, those who were smoking at some point in the past 12 months but are no longer smoking.

Survey Questions

- During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?
- How many times in the past 12 months did you try to quit smoking?
- About how long has it been since you last smoked cigarettes regularly?

Note: Given the focus on the past 12 months in this analysis, caution must be used in interpreting the prevalence of past-year successful quitters. Some current smokers may have been quit for many of the past 12 months and recently relapsed but are not considered a past-year successful quitter in this section on quitting. To be considered successful quitters, respondents could not be smoking at the time of their interview. Conversely, some former smokers discussed in this section on quitting may have been smoking for much of the past 12 months and only recently quit. Therefore, this chapter does not describe sustained abstinence.

Quitting Among Past-year Smokers

Past-year Smokers. In the 12 months preceding MATS 2018, 16.0±1.3 percent of Minnesota adults (650,000 adults) smoked cigarettes (Table 4-1); these past-year smokers combine current smokers and former smokers who last smoked regularly less than a year ago. Past-year smokers are more likely to have lower education and income levels; there is a significant difference between the percent of past-year smokers with less than a high school degree and each of the other three education categories. Encouragingly, young adults ages 18-24 have one of the lowest past-year smoking rates among the age groups, at 11.8±3.5 percent. This is statistically significantly lower than the rates for all of the other age categories except 65 or older, at 6.0±1.3 percent.

Successful Quitters. Among all past-year smokers, 11.6±2.7 percent (76,000 adults) quit in the past year (Table 4-1). Among successful quitters, young adults ages 18-24 quit at a significantly higher rate (27.4±13.4 percent) than 45 to 64 year olds (6.9±3.4 percent). Quit rates were statistically higher among those with some college or technical school (17.0±4.9 percent) than those with less than a high school education (17.0±4.9 percent) and those with a high school degree or GED (8.1±3.8 percent).

Table 4-1. Past-year smoking and quitting, by selected demographic characteristics

Characteristics	Past year smokers (among all Minnesotans)	Successful past-year quitters (among past-year smokers)
	%	%
Overall	16.0 ± 1.3	11.6 ± 2.7
Age		
18 to 24	11.8 ± 3.5	27.4 ± 13.4
25 to 44	21.0 ± 2.6	11.7 ± 4.0
45 to 64	18.1 ± 2.3	6.9 ± 3.4
65 or older	6.0 ± 1.3	17.8 ± 8.8
25 or older	16.6 ± 1.4	10.1 ± 2.6
Gender		
Female	14.2 ± 1.8	9.9 ± 3.5
Male	17.9 ± 2.0	13.1 ± 3.9
Education		
Less than high school	35.5 ± 8.2	3.3 ± 4.4
High school graduate/GED	19.9 ± 2.7	8.1 ± 3.8
Some college or technical school	19.0 ± 2.3	17.0 ± 4.9
College graduate or beyond	5.3 ± 1.1	11.0 ± 6.1
Household income		
\$35,000 or less	27.4 ± 3.6	8.6 ± 4.0
\$35,001 to \$50,000	19.8 ± 4.3	13.9 ± 8.5
\$50,001 to \$75,000	15.0 ± 3.2	11.0 ± 6.4
\$75,001 or more	10.0 ± 1.6	14.1 ± 5.7

Source: Minnesota Adult Tobacco Survey, 2018

Tobacco control programs in Minnesota are trying to help former smokers maintain longer periods without smoking, so MATS monitors the length of time since former smokers smoked regularly. Among all former smokers, 16.4±2.6 percent last smoked regularly between one and five years ago, 17.0±2.6 percent last smoked regularly between five and ten years ago, and 58.3±3.2 percent last smoked regularly more than ten years ago. Thus, a high percentage of former smokers have been able to sustain their quit beyond the one-year mark.

Quitting Among Current Smokers

In the past year, 45.7±4.9 percent of adult current smokers in Minnesota attempted to quit (defined as not smoking for one day or longer in the 12 months before the survey because they were trying to quit smoking) (Table 4-2). This equates to approximately 260,000 current smokers who tried to quit in the past 12 months but are still smoking. There are no statistically significant differences by age, gender, education or income.

Table 4-2. Current smokers with a quit attempt in the past 12 months, by selected demographic characteristics

Characteristics	Made a quit attempt
	%
Overall	45.7 ± 4.9
Age	
18 to 24	54.3 ± 19.2
25 to 44	49.7 ± 7.7
45 to 64	40.5 ± 7.3
65 or older	42.2 ± 12.1
25 or older	45.0 ± 5.0
Gender	
Female	46.5 ± 7.1
Male	45.1 ± 6.7
Education	
Less than high school	34.7 ± 15.5
High school graduate/GED	46.5 ± 7.7
Some college or technical school	51.0 ± 7.3
College graduate or beyond	40.9 ± 11.1
Household income	
\$35,000 or less	45.8 ± 8.4
\$35,001 to \$50,000	48.7 ± 13.1
\$50,001 to \$75,000	42.0 ± 12.6
\$75,001 or more	46.9 ± 9.4

Source: Minnesota Adult Tobacco Survey, 2018

Among current smokers with a quit attempt in the past 12 months, over 70 percent made more than one attempt: 25.5±6.4 percent made two attempts, 18.9±5.8 percent made three attempts, and 26.8±6.5 percent made four or more attempts (Table 4-3).

Table 4-3. Number of quit attempts in the past 12 months among current smokers with at least one quit attempt, by selected demographic characteristics

Characteristics	1 attempt	2 attempts	3 attempts	4 or more attempts	Row total
	%	%	%	%	%
Overall	28.8 ± 6.7	25.5 ± 6.4	18.9 ± 5.8	26.8 ± 6.5	100
Age					
18 to 24	22.8 ± 27.5	20.6 ± 18.9	33.1 ± 24.1	23.6 ± 18.9	100
25 to 44	24.3 ± 9.3	27.2 ± 10.5	19.3 ± 8.4	29.2 ± 10.1	100
45 to 64	37.8 ± 11.5	22.1 ± 8.3	16.0 ± 7.4	24.2 ± 10.8	100
65 or older	18.6 ± 15.1	40.3 ± 18.8	14.3 ± 12.1	26.9 ± 16.8	100
Gender					
Female	28.1 ± 9.6	27.4 ± 10.3	18.4 ± 8.6	26.1 ± 10.1	100
Male	29.5 ± 9.6	23.7 ± 7.4	19.4 ± 8.0	27.4 ± 8.5	100
Education					
Less than high school	32.5 ± 29.5	22.8 ± 24.0	9.0 ± 17.6	35.7 ± 29.9	100
High school graduate/GED	29.0 ± 10.7	21.4 ± 9.0	25.3 ± 9.2	24.4 ± 8.9	100
Some college or technical school	29.4 ± 9.6	27.4 ± 9.7	18.0 ± 8.6	25.2 ± 9.6	100
College graduate or beyond	22.0 ± 15.4	36.0 ± 15.7	11.9 ± 10.4	30.2 ± 15.8	100
Household income					
\$35,000 or less	24.1 ± 11.3	26.2 ± 10.7	20.6 ± 9.4	29.2 ± 11.8	100
\$35,001 to \$50,000	28.7 ± 18.9	28.4 ± 15.2	23.6 ± 16.3	19.3 ± 10.5	100
\$50,001 to \$75,000	28.5 ± 17.9	20.1 ± 12.4	16.4 ± 12.5	35.1 ± 16.0	100
\$75,001 or more	39.3 ± 14.5	27.7 ± 12.9	11.2 ± 8.5	21.8 ± 10.6	100

Source: Minnesota Adult Tobacco Survey, 2018

4.2.2 Use of Quitting Programs and Medications

Use of Quitting Assistance

Types of Quitting Assistance

In the MATS, smokers could indicate the use of many types of quitting assistance, including the two major types, stop-smoking medications and behavioral counseling.

- **Use of any assistance:** use of any medications, nicotine replacement therapy, prescription medications, or behavioral counseling. Does not include use of e-cigarettes as it is not a proven method of quitting assistance
- **Use of any medications:** use of at least one of the nicotine replacement therapy (NRT) medications (nicotine gum, patch, nasal spray, inhaler, or lozenge) or the non-NRT prescription medications (Zyban®/bupropion or Chantix®/varenicline)
- **Use of any nicotine replacement therapy**
- **Use of any prescription medications**

- **Use of any behavioral counseling:** use of a stop-smoking clinic or class, a telephone quitline, clinician counseling, or a web-based counseling service
- **Use of e-cigarettes:** While not a method of quitting approved by the Food and Drug Administration, many smokers perceive e-cigarettes as a possible tool for cessation

Survey Questions

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?

The last time you tried to quit smoking, did you use a prescription medication like Zyban, Wellbutrin, or Chantix to help 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?

The last time you tried to quit smoking, did you use e-cigarettes to help you quit?

All of the estimates appearing in the following discussion about the use of quitting assistance are based on current smokers' last quit attempt in the past 12 months.

Any Assistance. Of current smokers with a quit attempt in the past 12 months, 48.0±7.2 percent used some form of quitting assistance (Table 4-4). The remaining 52.0±7.2 percent did not use assistance as defined by MATS. Fewer 18-24 year olds used some form of quitting assistance compared to older adults, at around 20 percent (19.3±19.8) versus over 50 percent (56.0±11.5) for 45-64 year olds; this difference is statistically significant. No statistically significant differences exist in the use of assistance by gender, education or income.

Stop-smoking Medications. Of current smokers with a quit attempt in the past 12 months, 45.5±7.1 percent used some kind of stop-smoking medication in their last quit attempt. Similar to the findings for use of any assistance, fewer 18-24 year olds used medication compared to older adults, at nearly 20 percent (19.3±19.8) versus over 50 percent (52.5±11.5) for 45-64 year olds; the difference is statistically significant. There were no significant differences among gender, education or income groups.

Behavioral Counseling. Of current smokers with a quit attempt in the past 12 months, 15.4±5.5 percent used behavioral counseling. No young adults ages 18-24 used behavioral counseling; this number is statistically significantly different from those of that of 25 to 44 year olds (17.1±9.0 percent) and 45 to 64 year olds (17.4±8.6 percent). There are no statistically significant differences by gender, education, or income.

Table 4-4. Use of any assistance, stop-smoking medication, or behavioral counseling among current smokers who tried to quit in the past 12 months, by selected demographic characteristics

Characteristics	Use of any assistance	Use of medication	Use of behavioral counseling
	%	%	%
Overall	48.0 ± 7.2	45.5 ± 7.1	15.4 ± 5.5
Age			
18 to 24	19.3 ± 19.8	19.3 ± 19.8	0.0 ± 0.0
25 to 44	47.2 ± 11.1	45.2 ± 10.7	17.1 ± 9.0
45 to 64	56.0 ± 11.4	52.5 ± 11.5	17.4 ± 8.6
65 or older	48.3 ± 16.0	43.8 ± 16.5	11.6 ± 11.8
Gender			
Female	55.3 ± 11.0	50.3 ± 10.4	20.8 ± 9.6
Male	41.6 ± 9.2	41.2 ± 9.2	10.5 ± 5.8
Education			
Less than high school	48.1 ± 29.2	48.1 ± 29.2	21.3 ± 24.2
High school graduate/GED	43.1 ± 10.9	42.2 ± 10.8	8.9 ± 5.9
Some college or technical school	51.6 ± 10.5	47.6 ± 9.8	20.5 ± 9.1
College graduate or beyond	51.2 ± 17.2	45.8 ± 17.5	6.2 ± 6.4
Household income			
\$35,000 or less	48.2 ± 12.3	47.2 ± 12.2	14.2 ± 8.9
\$35,001 to \$50,000	49.3 ± 18.7	38.6 ± 18.5	18.1 ± 10.4
\$50,001 to \$75,000	57.1 ± 17.1	57.1 ± 17.1	25.6 ± 17.8
\$75,001 or more	45.7 ± 14.2	44.2 ± 14.9	11.9 ± 10.6

Source: Minnesota Adult Tobacco Survey, 2018

Some form of nicotine replacement therapy was used by 33.2±6.8 percent of current smokers with a quit attempt in the past 12 months (Table 4-5). E-cigarettes were used to assist a quit attempt by 37.9±8.6 percent of current smokers, a percentage that is nearly double that of prescription medications (19.7±5.8 percent).

Table 4-5. Use of any assistance, nicotine replacement therapy, and prescription medications, e-cigarettes, or behavioral counseling among current smokers who have tried to quit in the past 12 months

Type of assistance	%
Use of any assistance*	48.0 ± 7.2
Use of any nicotine replacement therapy	33.2 ± 6.8
Use of prescription medications	19.7 ± 5.8
Use of behavioral counseling	15.4 ± 5.5
Use of e-cigarettes	37.9 ± 8.6

*Individual percentages sum to more than overall percentage, because respondents could have used more than one type of assistance.

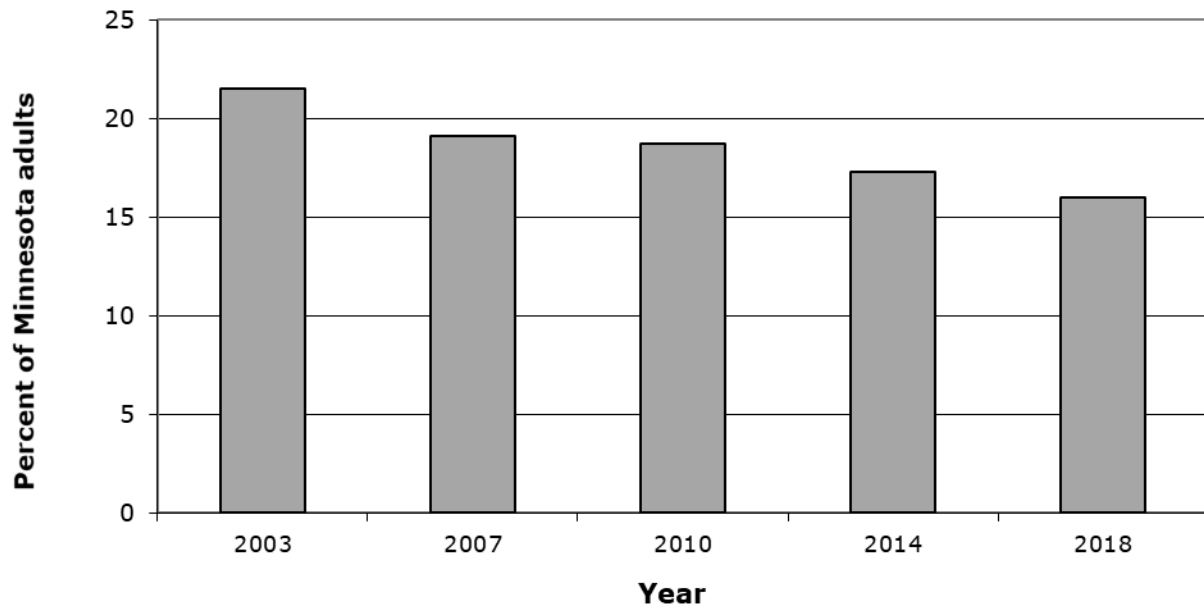
Source: Minnesota Adult Tobacco Survey, 2018

4.2.3 Past-year Smoking, Quit Attempts and Successful Quitting, 1999 to 2018

This section discusses the changes in quit attempts, successful quitting and perceptions and use of quitting assistance among Minnesota adults over time.

Past-year Smokers. In the 12 months before MATS 2018, 16.0±1.3 percent of Minnesota adults smoked cigarettes (Figure 4-1); these past-year smokers include both current smokers and former smokers who quit in the past year. This is not a statistically significant change from 2014 (17.3±1.1 percent).

Figure 4-1. Past year smokers, from 2003 to 2018



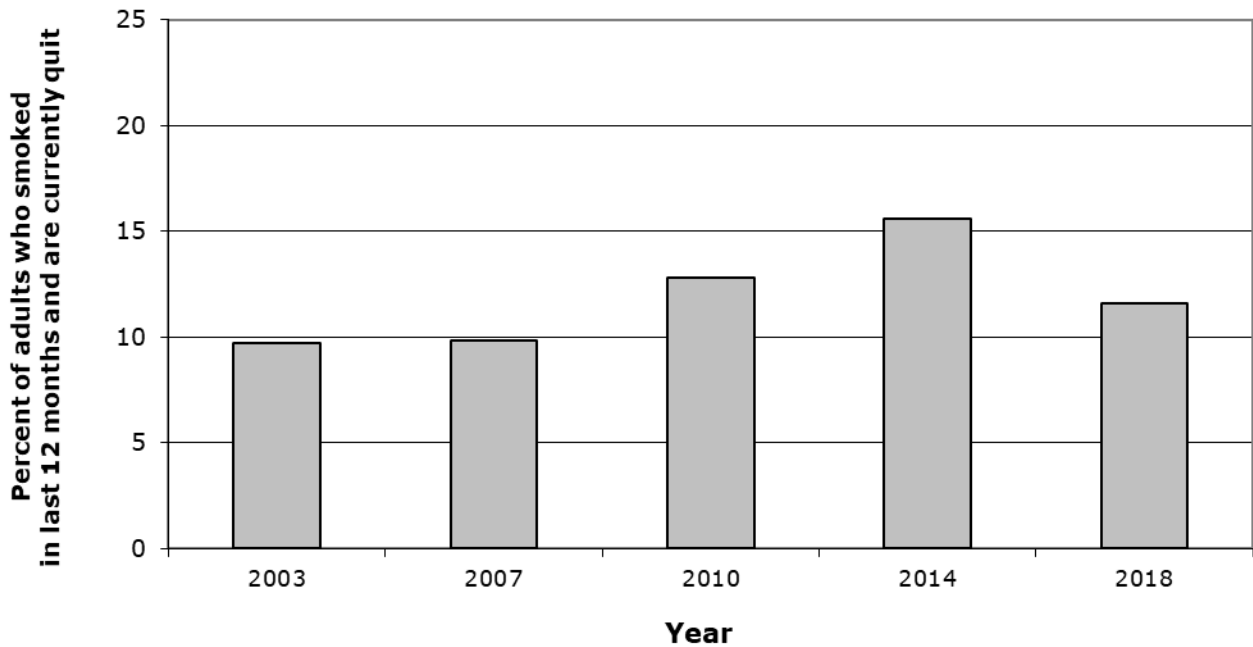
	2003	2007	2010	2014	2018	Change from 2014 to 2018
	Percent of Minnesota adults	21.5 ± 1.6	19.1 ± 1.4	18.7 ± 1.3	17.3 ± 1.1	16.0 ± 1.3

Hypothesis: The percentage who are past year smokers will decline from 2014 to 2018.

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

Past-year Successful Quitters. Contrary to expectations, between 2014 and 2018, the percentage of past-year smokers who successfully quit decreased from 15.6±2.4 percent to 11.6±2.7 percent (Figure 4-2). This is a statistically significant decrease when applying a two-tailed test.

Figure 4-2. Past year successful quitters, from 2003 to 2018



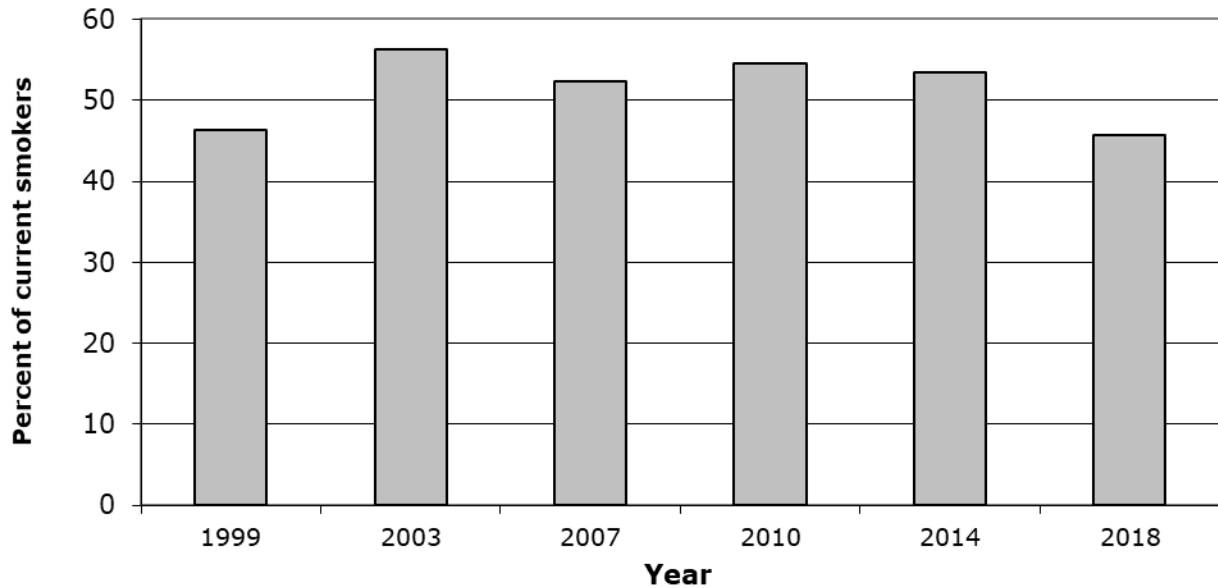
	2003	2007	2010	2014	2018	Change from 2014 to 2018
	Percent of adults who smoked in last 12 months and are currently quit	9.7 ± 1.8	9.8 ± 2.1	12.8 ± 2.5	15.6 ± 2.4	

Hypothesis: The percentage who are past year successful quitters will increase from 2014 to 2018.

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

Current Smokers with Quit Attempts. Contrary to expectations, between 2014 and 2018, the percentage of adult current smokers in Minnesota who attempted to quit for one day or longer in the 12 months before the survey because they were trying to quit decreased from 53.4±3.8 to 45.7±4.9 (Figure 4-3). This is a statistically significant decrease from 2014 when applying a two-tailed test.

Figure 4-3. Current smokers who tried to quit in the past 12 months, from 1999 to 2018



							Change from 2014 to 2018
	1999	2003	2007	2010	2014	2018	
Percent of current smokers	46.3 ± 4.4	56.3 ± 4.5	52.4 ± 4.6	54.6 ± 4.1	53.4 ± 3.8	45.7 ± 4.9	-7.7

Hypothesis: The percentage who have tried to quit in past 12 months will increase from 2014 to 2018.

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

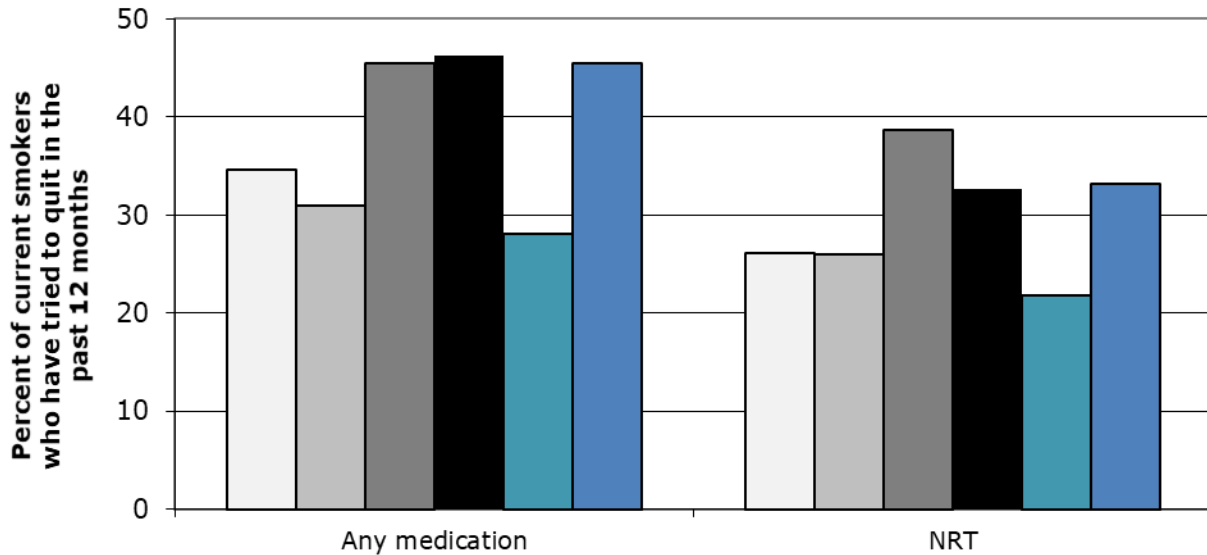
Use of Any Stop-Smoking Medications and Counseling

Among current smokers with a quit attempt in the previous 12 months, there is a statistically significant increase in the use of any stop-smoking assistance since 2014. In 2018, 48.0±7.2 percent used some form of assistance, compared to 30.0±4.6 percent in 2014.

Stop-smoking Medications and Nicotine Replacement Therapy. In 2018, 45.5±7.1 percent of current smokers with a quit attempt in the previous 12 months used some kind of stop-smoking medication (including nicotine replacement therapy) in their most recent quit attempt, compared to 28.1±4.5 percent in 2014. (Figure 4-4). This is a statistically significant increase. The percentage who used nicotine replacement therapy

alone in their most recent quit attempt also increased significantly to 33.2±6.8 percent in 2018, from 21.8±4.1 percent in 2014.

Figure 4-4. Use of any stop-smoking medication and of NRT among current smokers who have tried to quit in the past 12 months, from 1999 to 2018



Type of stop-smoking medication used

Year	Any medication	NRT
□ 1999	34.6 ± 6.7	26.2 ± 6.0
▒ 2003	30.9 ± 4.8	26.0 ± 4.4
■ 2007	45.5 ± 6.1	38.7 ± 5.8
■ 2010	46.3 ± 5.6	32.6 ± 5.4
■ 2014	28.1 ± 4.5	21.8 ± 4.1
■ 2018	45.5 ± 7.1	33.2 ± 6.8
Change from 2014 to 2018	17.4*	11.5*

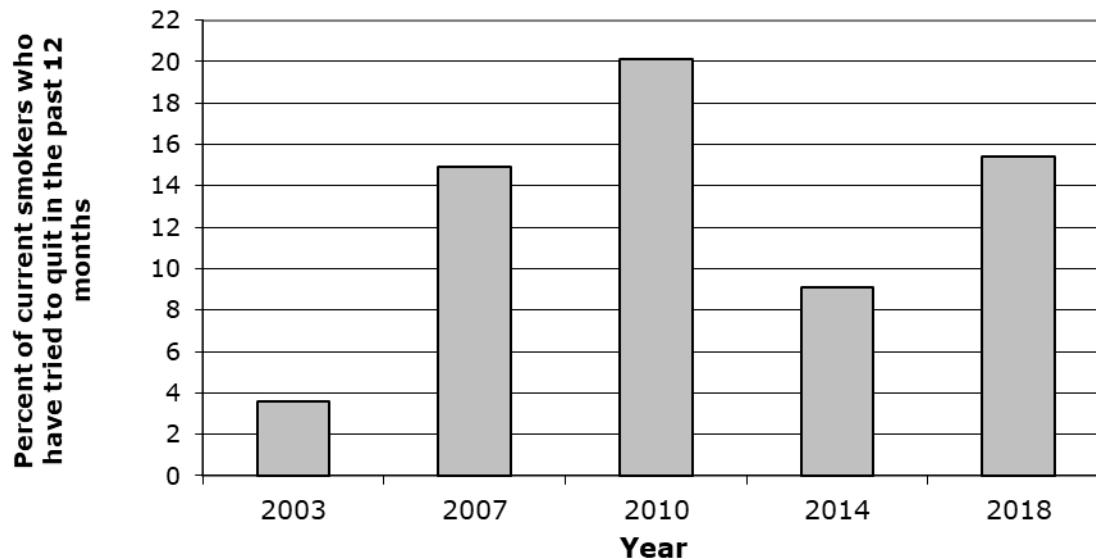
Hypothesis: The percentages who used any medication or used NRT will increase between 2014 and 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 1999, 2003, 2007, 2010, 2014 and 2018

Behavioral Therapy. In 2018, 15.4±5.5 percent of current smokers with a quit attempt used behavioral therapy (Figure 4-5), a statistically significant increase from 2014 (9.1±3.0 percent).

Figure 4-5. Use of behavioral therapy by current smokers who have tried to quit in the past 12 months, from 2003 to 2018



						Change from 2014 to 2018
	2003	2007	2010	2014	2018	
Percent of current smokers who have tried to quit in the past 12 months	3.6 ± 1.8	14.9 ± 4.0	20.1 ± 4.6	9.1 ± 3.0	15.4 ± 5.5	6.3*

Hypothesis: The percentage who used behavioral therapy will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

E-cigarettes. In 2018, 37.9±8.6 percent of current smokers with a quit attempt used e-cigarettes to assist in quitting smoking, which is a decrease from 2014 (45.1±6.2). This change is not statistically significant.

4.3 Assistance from Health Care Providers

This section examines the smoker's path to quitting through treatment received from a health care provider, specifically whether patients recall being asked if they smoke, advised to quit, or referred to an appropriate cessation counseling program.

Section 4.3.1 examines the adult Minnesota smokers who have seen health care providers and their demographic characteristics. Section 4.3.2 describes how well adult Minnesota smokers are being identified and encouraged to quit by their providers. Section 4.3.3 describes whether smokers are being connected by their providers to effective treatments available in Minnesota.

4.3.1 Visits to Providers

Visits to Any Health Care Providers

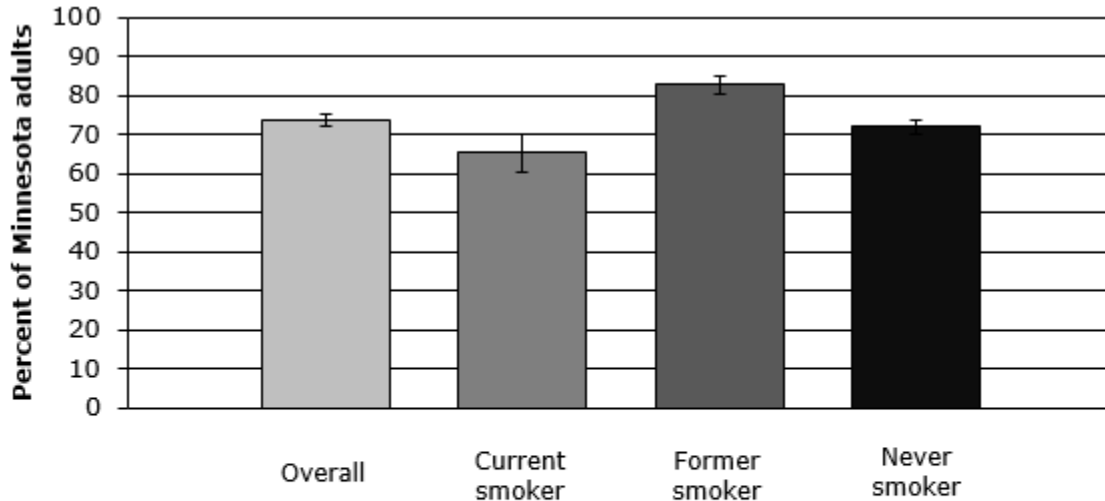
Survey Question

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

Visits to Any Provider by All Minnesota Adults

Visit to Any Provider. Over 70 percent (73.7 ± 1.5) of all adult Minnesotans visited a health care provider in the last 12 months, while 65.2 ± 4.8 percent of smokers saw a provider (Figure 4-6). In comparison, 71.8 ± 3.6 percent of never smokers and 82.6 ± 2.5 percent of former smokers saw a provider in the last 12 months. The differences between the percentage of former smokers who saw a provider and the percentages of current and never smokers who saw a provider are statistically significant.

Figure 4-6. Minnesota adults who visited a health care provider in the last 12 months, by smoking status



Smoking status	Visited one or more providers
Overall	73.7 ± 1.5
Current smokers	65.2 ± 4.8
Former smokers	82.6 ± 2.5
Never smokers	71.8 ± 2.0

Source: Minnesota Adult Tobacco Survey, 2018

Visits to Providers by Smokers

The statistics about Minnesota adults seeing health care providers are most useful as points of comparison with smokers' use of health care providers. The rest of this section focuses on smokers' visits with health care providers.

As previously noted, 65.2±4.8 percent of current smokers—about 372,000 smokers—saw a provider in the last 12 months. Since this section focuses on the supportive effect of health care providers on quitting, it is worthwhile to examine the smokers who saw a provider by age, gender, education and income.

Table 4-6 presents the percentage of each demographic group of smokers who saw a provider in the last 12 months. The likelihood that a smoker visited any health care provider in the past year increases with the age of the smoker. Smokers 65 or older are at least 15 percentage points more likely to visit any health care provider (83.5±7.9 percent) than smokers in any of the three younger age groups. The differences between the oldest age group and both the 18-24 year old age group and the 25-44 year old age group are statistically significant.

Female smokers saw a healthcare provider at a considerably higher rate than male smokers, 75.4±6.5 percent as compared to 56.4±6.8 percent, a statistically significant difference. Smokers with college education or beyond are more likely to have seen a healthcare provider than those with less than high school diploma (78.9 percent compared to 51.1 percent). The percentages for the some college and college graduate groups are significantly different from that of the less than high school group. There were no statistically significant differences by household income.

Table 4-6. Health care provider visits in the last 12 months among current smokers, by selected demographic characteristics

Characteristics	Any provider
	%
Overall	65.2 ± 4.8
Age	
18 to 24	52.1 ± 18.9
25 to 44	61.6 ± 7.7
45 to 64	68.4 ± 7.4
65 or older	83.5 ± 7.9
Gender	
Female	75.4 ± 6.5
Male	56.4 ± 6.8
Education	
Less than high school	51.1 ± 16.2
High school graduate/GED	59.9 ± 7.7
Some college or technical school	72.1 ± 6.7
College graduate or beyond	78.9 ± 9.9
Household income	
\$35,000 or less	65.7 ± 8.4
\$35,001 to \$50,000	64.4 ± 12.6
\$50,001 to \$75,000	53.8 ± 13.4
\$75,001 or more	68.7 ± 8.8

Source: Minnesota Adult Tobacco Survey, 2018

4.3.2 Interventions with Smokers: The Ask, Advise and Refer Model

The 2008 U.S. Public Health Service (PHS) Guideline strongly recommends that physicians and other providers implement five evidence-based strategies to help smokers quit, sometimes referred to as the 5As.³ The MATS 2018 questions capture the outcomes of the more streamlined three-step health care provider tobacco treatment model (Ask, Advise and Refer). The rest of this section examines implementation of this model.

The Ask, Advise and Refer Model in MATS

MATS assesses the three-step Ask, Advise and Refer model. This streamlined model encourages providers to ask their patients if they smoke and then to advise them to stop smoking if they do. “Refer” describes how providers should encourage patients to use behavioral counseling and stop-smoking medications. MATS measured the Ask, Advise and Refer model using the following questions.

Survey Questions

Ask

- During the past 12 months, did a doctor or any other health care provider ask if you smoke?

Advise

- During the past 12 months, did a doctor or any other health care provider advise you to quit smoking?

Refer

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

³ Fiore MC, et al. *Treating Tobacco Use and Dependence: 2008 Update*. Clinical Practice Guideline. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service. May 2008.

Implementation of Ask, Advise and Refer Model in Minnesota

The next sections look at the extent to which Minnesota adult smokers experienced each of the steps in the Ask, Advise and Refer model.

Ideally, all patients would report that their health care providers implement the clinical practice guideline. The analysis of smokers' experience with the Ask, Advise and Refer model is limited to those smokers who saw a health care provider in the 12 months before the survey. The results appear in Table 4-7. The percentages are smokers who received the service (indicated in each table column) from at least one provider, as a percentage of those *smokers who saw any provider*.

Table 4-7. Ask, Advise and Refer model services received from health care providers among smokers who visited any provider in the last 12 months, by selected demographic characteristics

Characteristics	Asked	Advised	Referred
	%	%	%
Overall	95.4 ± 2.4	76.4 ± 5.2	55.2 ± 6.0
Age			
18 to 24	100.0 ± 0.0	58.3 ± 22.9	42.6 ± 27.9
25 to 44	97.2 ± 3.9	72.8 ± 8.8	52.0 ± 9.9
45 to 64	94.8 ± 3.8	82.6 ± 6.5	61.2 ± 8.4
65 or older	86.2 ± 9.0	74.9 ± 11.0	48.1 ± 12.8
Gender			
Female	97.5 ± 1.7	72.5 ± 7.6	54.9 ± 8.4
Male	92.9 ± 4.8	80.9 ± 6.7	55.6 ± 8.6
Education			
Less than high school	90.4 ± 13.0	68.2 ± 20.4	58.8 ± 22.3
High school graduate/GED	94.1 ± 3.9	78.1 ± 8.2	52.1 ± 10.0
Some college or technical school	97.1 ± 2.7	80.5 ± 7.2	57.6 ± 9.0
College graduate or beyond	97.7 ± 3.0	68.0 ± 13.2	50.7 ± 13.1
Household income			
\$35,000 or less	93.3 ± 5.5	73.0 ± 9.2	50.4 ± 10.1
\$35,001 to \$50,000	95.8 ± 4.9	86.2 ± 9.6	68.0 ± 14.8
\$50,001 to \$75,000	99.2 ± 1.5	74.6 ± 14.2	50.8 ± 16.1
\$75,001 or more	96.6 ± 4.4	76.2 ± 9.9	54.6 ± 11.1

Source: Minnesota Adult Tobacco Survey, 2018

Getting the Ask, Advise and Refer Model from Any Provider. Among smokers who saw any provider in the last 12 months, 95.4±2.4 percent of them were asked if they smoke and 76.4±5.2 percent were advised not to smoke. More than half (55.2±6.0 percent) of current smokers received a referral for assistance to quit smoking.

In 2018, nearly all smokers were asked by a provider if they smoke. The percentage of patients whose providers advise could still be improved. The lower rate for referral suggests that more providers need to implement this portion of the guideline consistently.

In terms of being asked by providers if they smoke, being advised not to smoke, and receiving referrals for assistance, there are no apparent demographic trends that are significantly different.

4.3.3 Referral Received by Smokers from Providers

As noted, MATS identified three ways that providers could refer their patients who smoke to assist with quitting: providing any referral, recommending stop-smoking medications, and recommending behavioral counseling.

Table 4-8 presents the percentage of smokers who received any form of referral from a health care provider. The first row, *Any Referral*, is identical to the *Referred* column in Table 4-7 and is included here for convenient reference. A provider may furnish more than one form of referral.

Table 4-8. Stop-smoking referrals received by smokers who visited a provider in last 12 months, among all smokers who visited a provider

Form of referral	Visited any provider
	%
Any referral	55.2 ± 6.0
Recommended medication	45.6 ± 5.8
Recommended behavioral counseling	35.1 ± 5.9

Source: Minnesota Adult Tobacco Survey, 2018

Overall, 45.6±5.8 percent of smokers who saw a provider received a recommendation for stop-smoking medication from a provider in the last 12 months and over one-third (35.1±5.9 percent) received a recommendation for behavioral counseling.

4.4 Smoke-Free Rules and Quitting

This section examines associations of smoke-free rules at home and in vehicles with quitting attempts.

4.4.1 Home Smoke-Free Rules and Quitting

Home Smoke-Free Rules

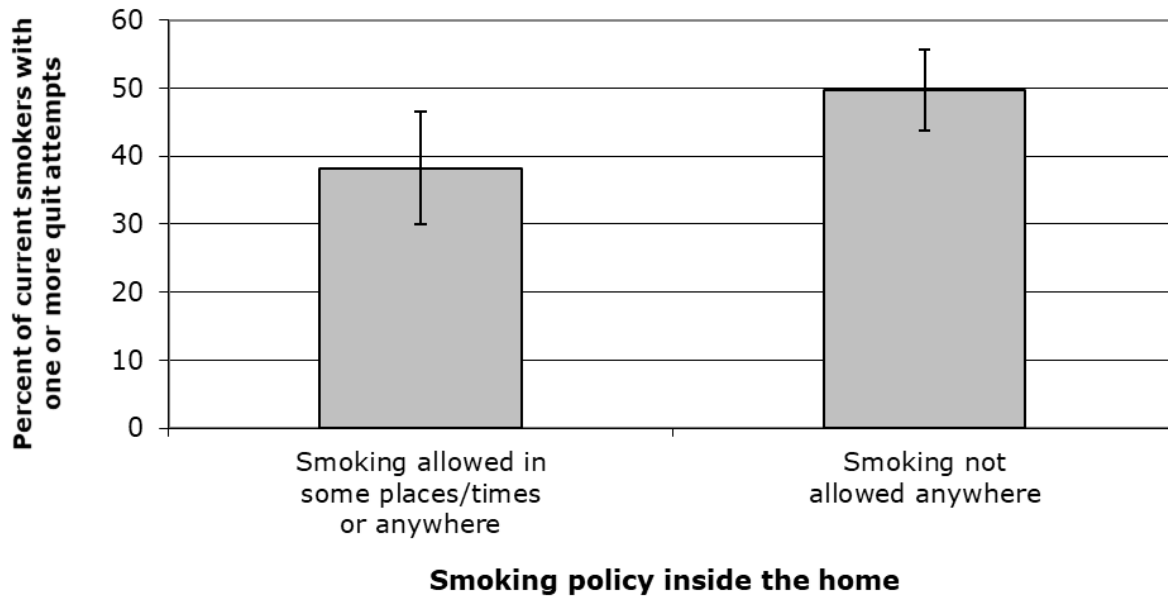
Survey Question

- 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, smoking is allowed in some places or at some times, or smoking is allowed anywhere inside the home?

Over 90 percent (91.5±1.0 percent) of Minnesota adults live in homes where smoking is not allowed anywhere. Not unexpectedly, never smokers (96.2±0.8 percent) are the most likely to live in homes with smoke-free rules, followed by former smokers (94.1±1.6 percent) and current smokers (66.3±4.7 percent). These differences between the current smokers and both the former and never smokers are statistically significant. Notably, a majority of all smokers live in homes where smoking is not allowed. Smoke-free rules at home are discussed in more detail in Chapter 5.

Nearly 50 percent (49.7±6.0 percent) of smokers with smoke-free rules in their home tried to quit smoking in the past year, compared with 38.2±8.3 percent of those who do not have smoke-free rules at home (Figure 4-7). This difference is not statistically significant.

Figure 4-7. Current smokers with one or more quit attempts in the past 12 months, by smoking rule inside the home



	Smoking allowed in some places/times or anywhere	Smoking not allowed anywhere
Percent of current smokers with one or more quit attempts	38.2 ± 8.3	49.7 ± 6.0

Source: Minnesota Adult Tobacco Survey, 2018

4.4.2 Vehicle Smoke-Free Rules and Quitting

Vehicle Smoke-Free Rules

Survey Question

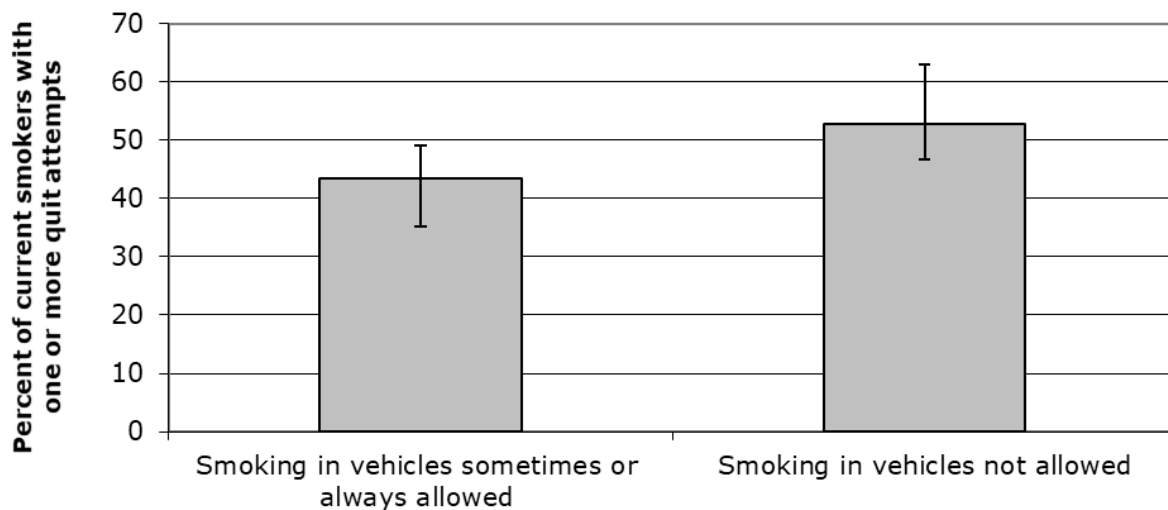
- Not counting motorcycles, in the vehicles that you or family members who live with you own or lease, is smoking... Always allowed in vehicles, Sometimes allowed in at least one vehicle, Never allowed in any vehicle, or No one in family owns a vehicle.

About 80 percent (80.2±1.4 percent) of Minnesota adults who have a vehicle or whose household members have a vehicle do not allow smoking in the vehicles owned or leased by themselves or by family members with whom they live. Similar to smoke-free home rules, never smokers (90.6±1.3 percent) are the most likely to own or use vehicles with smoke-free rules, followed by former smokers (86.7±2.3 percent) and current

smokers (21.5±3.9 percent). These differences among smoking status groups are statistically significant. Smoke-free rules in vehicles are discussed in more detail in Chapter 5.

More than 50 percent (52.7±10.2 percent) of smokers who own or use vehicles with smoke-free rules tried to quit smoking in the past year, compared with 43.4±5.6 percent of those who do not own or use vehicles with smoke-free rules (Figure 4-8). This difference is not statistically significant.

Figure 4-8. Current smokers with one or more quit attempts in the past 12 months, by smoking rule in vehicles



Smoking policy in vehicles

	Smoking in vehicles sometimes or always allowed	Smoking in vehicles not allowed
Percent of current smokers with one or more quit attempts	43.4 ± 5.6	52.7 ± 10.2

Source: Minnesota Adult Tobacco Survey, 2018

4.5 Key Findings

Some of the most important findings from this chapter are summarized below. All differences presented in this summary are statistically significant at the 0.05 confidence level unless otherwise noted.

Key Quitting Behavior Findings for 2018

- In the 12 months preceding MATS 2018, 16.0±1.3 percent of Minnesota adults smoked cigarettes. Referred to as past-year smokers, this group represents current smokers and former smokers who last smoked regularly less than a year ago and total about 650,000 adults.
- 45.7±4.9 percent of current smokers attempted to quit smoking in the past 12 months. Among all past year smokers, 11.6±52.7% quit in the past year.
- Among current smokers with a quit attempt, over two-thirds (71.2 percent) made more than one attempt: 25.5±6.4 percent made two attempts, 18.9±5.8 percent made three attempts, and 26.8±6.5 percent made four or more attempts.
- Nearly 50 percent (48.0±7.2 percent) of current smokers with a quit attempt in the past 12 months used some form of quitting assistance.
- About 45 percent (45.5±7.1 percent) of current smokers with a quit attempt in the past 12 months used some kind of stop-smoking medication in their last quit attempt.
- Some form of nicotine replacement therapy was used by 33.2±6.8 percent of current smokers with a quit attempt in the past 12 months.
- Around 20 percent (19.7±5.8 percent) of current smokers with a quit attempt in the past 12 months used prescription medications in the quit attempt.
- E-cigarettes were used as part of a quit attempt by nearly 40 percent (37.9±8.6 percent) of current smokers with a quit attempt in the past 12 months.
- Behavioral counseling was used by around 15 percent (15.4±5.5) of current smokers with a quit attempt in the past 12 months.

- Approximately two-thirds (65.2±4.8 percent) of current smokers visited a health care provider in the past 12 months.
- Among smokers who saw any provider in the past 12 months, 95.4±2.4 percent were asked if they smoke and 76.4±5.2 percent were advised not to smoke. More than half (55.2±6.0 percent) of current smokers received a referral for assistance to quit smoking.
- Overall, 45.6±5.8 percent of smokers who saw a provider in the past 12 months received a recommendation for stop-smoking medication and over one-third (35.1±5.9 percent) received a recommendation for a quit-smoking program.
- Over 90 percent (91.5±1.0 percent) of Minnesota adults live in homes where smoking is not allowed anywhere. Never smokers (96.2±0.8 percent) are the most likely to live in homes with smoke-free rules, followed by former smokers (94.1±1.6 percent) and current smokers (66.3±4.7 percent).
- Nearly 50 percent (49.7±6.0 percent) of smokers with smoke-free rules in their home tried to quit smoking in the past year, compared with 38.2±8.3 percent of those who do not have smoke-free rules at home. This difference is not statistically significant.
- About 80 percent (80.2±19.8 percent) of Minnesota adults who or whose household members have a vehicle do not allow smoking in the vehicles. Similar to smoke-free home rules, never smokers (90.6±1.3 percent) most commonly own or use vehicles with smoke-free rules, followed by former smokers (86.7±2.3 percent) and current smokers (21.5±3.9 percent). These differences among smoking status groups are statistically significant.
- More than 50 percent (52.7±10.2 percent) of smokers with smoke-free rules in their vehicles tried to quit smoking in the past year, compared with 43.4±5.6 percent of those who do not have smoke-free rules in vehicles.

Key Quitting Behavior Findings for 2014 to 2018

- The percentage of past-year smokers decreased slightly, from 17.3±1.1 percent in 2014 to 16.0±1.3 percent in 2018, but the change was not statistically significant.
- Between 2014 and 2018, the percentage of past-year smokers who successfully quit decreased from 15.6±2.4 percent to 11.6±2.7 percent. This is a statistically significant decrease when applying a two-tailed test.
- The percentage of current smokers who tried to quit in the past 12 months also decreased, from 53.4±3.8 in 2014 to 45.7±4.9 in 2018; the change is statistically significant when a two-tailed test is applied.
- The percentage of smokers with a quit attempt in the past 12 months who used some form of assistance increased from 30.0±4.6 percent in 2014 to 48.0±7.2 percent in 2018.
- Between 2014 and 2018, the percentage of smokers with a quit attempt in the past 12 months who used some kind of stop-smoking medication increased from 28.1±4.5 percent to 33.2±6.8 percent.
- The percentage of smokers with a quit attempt in the past 12 months who used nicotine replacement therapy increased from 21.8±4.1 percent in 2014 to 33.2±6.8 percent in 2018.
- In 2018, 15.4±5.5 percent of current smokers with a quit attempt in the previous 12 months used behavioral therapy, an increase from 2014 (9.1±3.0 percent). This is not a statistically significant increase.

5. Secondhand Smoke Exposure and Smoke-Free Rules Among Minnesota Adults

5.1 Introduction

This chapter examines exposure to secondhand smoke as well as Minnesotans' perceptions and social norms regarding secondhand smoke exposure. The MATS 2018 results presented here examine the prevalence of exposure to secondhand smoke among nonsmoking Minnesota adults in the community, in the home and in vehicles. This chapter also presents the percentage of Minnesota adults protected by smoke-free rules in homes and vehicles.

5.2 Secondhand Smoke Exposure Among Nonsmoking Adults

This section focuses on secondhand smoke exposure in any setting among nonsmoking adults, and examines exposure in the community, in a car and at home. Nonsmoking Minnesota adults include those who are not current smokers of cigarettes, pipes or cigars, as defined in Chapters 2 and 3.

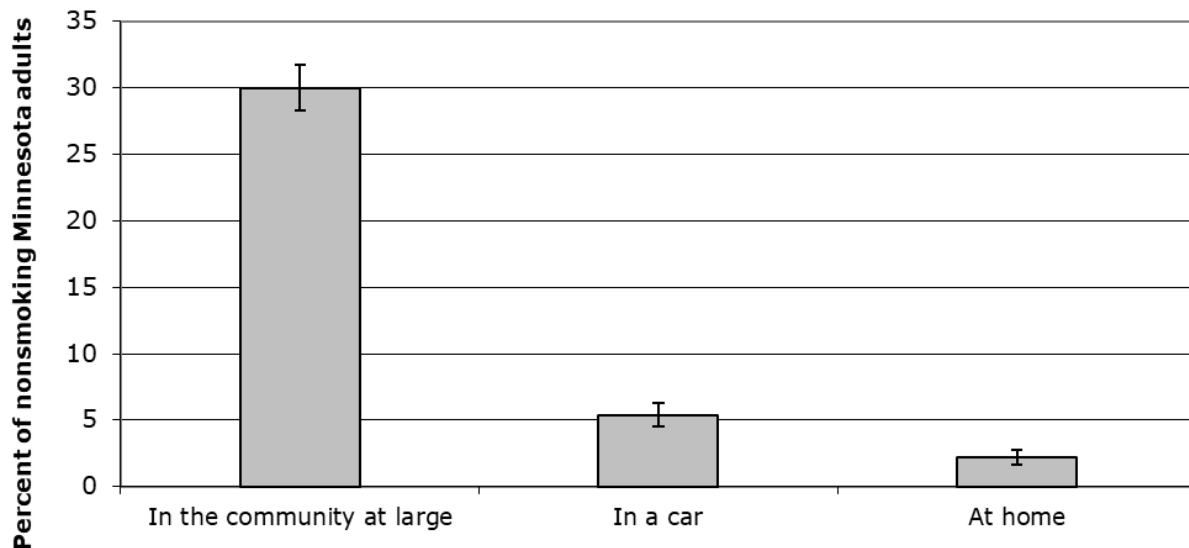
5.2.1 Any Exposure to Secondhand Smoke

Exposure to Secondhand Smoke in Any Setting

Exposure to secondhand smoke in any setting is exposure in any one or more of the following settings: in the community at large, in a car or at home. Questions and definitions for each individual exposure setting (community, car and home) can be found in the sections below.

Exposure to secondhand smoke varies by setting. Nonsmoking Minnesota adults are more likely to be exposed to secondhand smoke in the community at large (30.0±1.7 percent) than in a car (5.4±0.9 percent), and least likely to be exposed at home (2.2±0.6 percent) than in either of the two locations (Figure 5-1). These differences are statistically significant.

Figure 5-1. Exposure of nonsmoking Minnesota adults to secondhand smoke in the past 7 days, in selected settings



Setting of exposure to secondhand smoke

	In the community at large	In a car	At home
Percent of nonsmoking Minnesota adults	30.0 ± 1.7	5.4 ± 0.9	2.2 ± 0.6

Source: Minnesota Adult Tobacco Survey, 2018

There are statistically significant differences in the exposure of nonsmoking Minnesota adults to secondhand smoke by age, gender, education and income level (Table 5-1). Exposure in the community, at home and in a car are described in Sections 5.2.2, 5.2.3 and 5.2.4.

Table 5-1. Exposure of Non-smoking Minnesotans to secondhand smoke in the past seven days in various settings, by selected demographic characteristics

Characteristics	In the community at large	At home	In a car
	%	%	%
	Overall	30.0 ± 1.7	2.2 ± 0.6
Age			
18 to 24	44.6 ± 6.2	2.9 ± 1.9	12.4 ± 4.3
25 to 44	36.1 ± 3.2	2.0 ± 1.0	6.9 ± 1.7
45 to 64	26.4 ± 2.7	2.7 ± 1.2	3.9 ± 1.4
65 or older	19.0 ± 2.4	1.6 ± 0.9	1.8 ± 0.8
Gender			
Female	26.7 ± 2.2	2.4 ± 0.9	4.4 ± 1.2
Male	33.7 ± 2.5	2.0 ± 0.8	6.5 ± 1.4
Education			
Less than high school	18.8 ± 8.6	1.2 ± 2.0	14.9 ± 7.9
High school graduate/GED	30.2 ± 3.6	3.6 ± 1.6	8.0 ± 2.1
Some college or technical school	34.5 ± 3.0	3.0 ± 1.2	5.3 ± 1.5
College graduate or beyond	27.5 ± 2.3	0.8 ± 0.5	2.3 ± 0.9
Household income			
\$35,000 or less	30.9 ± 4.0	3.7 ± 1.8	9.8 ± 2.8
\$35,001 to \$50,000	30.0 ± 5.3	2.7 ± 1.7	7.6 ± 3.6
\$50,001 to \$75,000	28.6 ± 4.1	3.8 ± 2.0	4.8 ± 2.1
\$75,001 or more	32.4 ± 2.5	1.2 ± 0.7	3.4 ± 1.1

Source: Minnesota Adult Tobacco Survey, 2018

5.2.2 Secondhand Smoke Exposure in the Community

Exposure to Secondhand Smoke in the Community

Exposure in the community at large includes exposure in any setting other than car or home.

Survey Questions

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

If Yes:

The last time this happened, in Minnesota, where were you? Were you at... a restaurant or bar outdoor patio, a building entrance, an outdoor shopping mall or strip mall, a community sports event, a gambling venue, a park, a bus stop, a parking lot, another person's home, another person's car, somewhere else outdoors, or some other place?

- How much total time in the past seven days were you exposed to other people's tobacco smoke in...(fill with location from item above)

Table 5-2 presents statistics for duration of exposure to secondhand smoke in selected community locations among nonsmoking adult Minnesotans. Overall, the median duration of exposure to secondhand smoke in the past 7 days is 7.1±1.6 minutes. Young adults ages 18-24 years old are exposed to secondhand smoke for more time than 25-44 year olds, a statistically significant difference. Both nonsmoking men and women are exposed to secondhand smoke for 7.2±1.9 minutes. Nonsmoking Minnesota adults with a college degree are exposed to secondhand smoke for the shortest duration (4.5±1.2 minutes) compared to those with some college (7.6±1.9 minutes) or those with a high school degree (10.4±4.0 minutes), the differences being statistically significant. Nonsmokers with incomes of \$35,000 or less are exposed to secondhand smoke for a longer duration (9.5±2.4 minutes) than those with incomes of \$35,001 to 50,000 (4.9±1.6 minutes) and those with incomes of \$75,001 or more (4.9±1.2 minutes); these differences are statistically significant.

Table 5-2. Secondhand smoke exposure in the past week among non-smoking Minnesota adults (in minutes), by selected demographic characteristics

Characteristics	Minutes of exposure (median)
	%
Overall	7.1 ± 1.6
Age	
18 to 24	9.0 ± 2.6
25 to 44	4.9 ± 1.2
45 to 64	7.1 ± 2.0
65 or older	8.5 ± 3.5
Gender	
Female	7.2 ± 1.9
Male	7.2 ± 1.9
Education	
Less than high school	12.1 ± 16.8
High school graduate/GED	10.4 ± 4.0
Some college or technical school	7.6 ± 1.9
College graduate or beyond	4.5 ± 1.2
Household income	
\$35,000 or less	9.5 ± 2.4
\$35,001 to \$50,000	4.9 ± 1.6
\$50,001 to \$75,000	7.7 ± 2.2
\$75,001 or more	4.9 ± 1.2

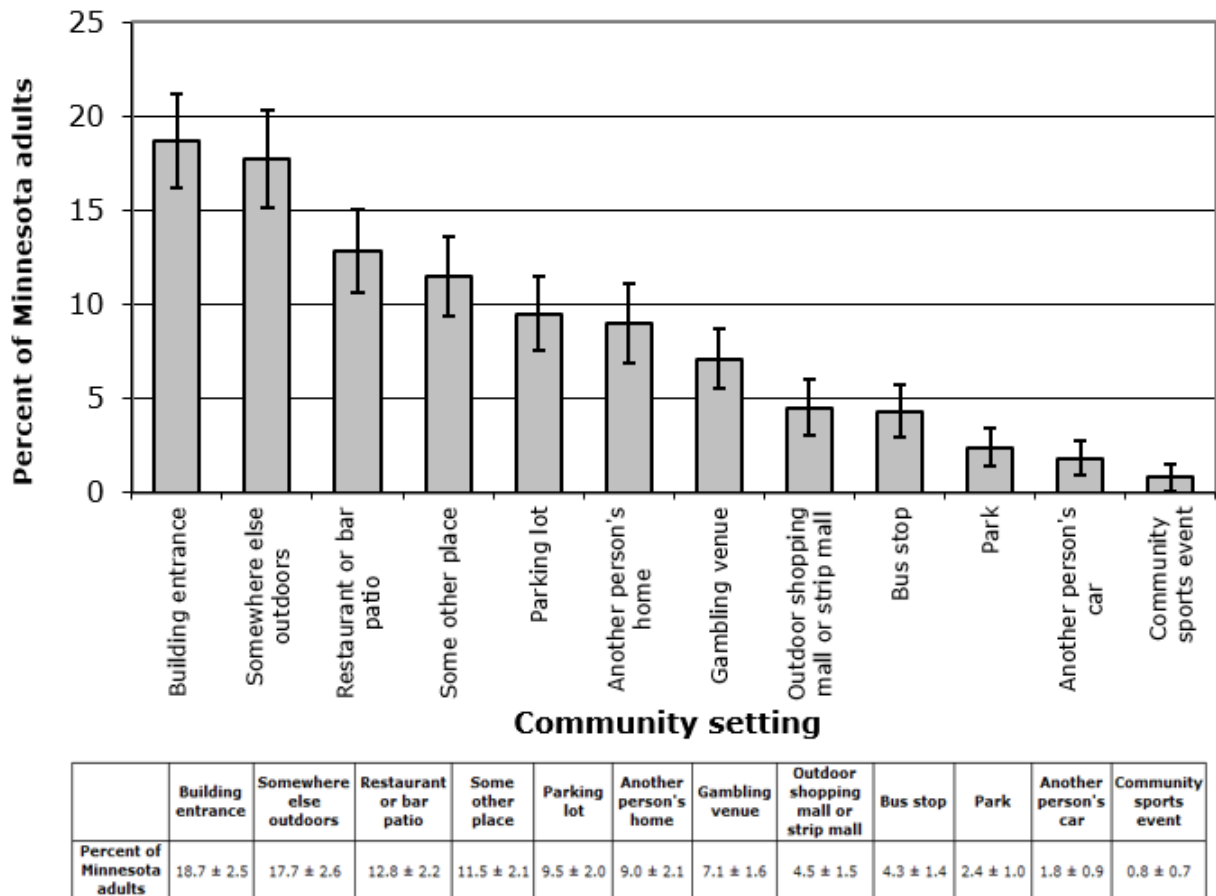
Source: Minnesota Adult Tobacco Survey, 2018

Almost one-third (30.0±1.7 percent) of nonsmoking adult Minnesotans have been exposed to secondhand smoke in their community in the past seven days (Table 5-1). Nonsmoking adults ages 65 or older (19.0±2.4 percent) are less likely to be exposed to secondhand smoke in the community than any other age group. Nonsmoking men (33.7±2.5 percent) are more likely to be exposed to secondhand smoke in the community than women (26.7±2.2 percent). These differences are statistically significant.

The most common location for recent community exposure to secondhand smoke among nonsmokers who were exposed to secondhand smoke in their community in the past 7 days is a building entrance (18.7±2.5 percent), followed by somewhere outdoors

(17.7±2.6 percent) and the outdoor patio of a restaurant or a bar (12.8±2.2 percent) (Figure 5-2).

Figure 5-2. Most recent exposure of nonsmoking Minnesota adults to secondhand smoke in community settings, by type of setting



Source: Minnesota Adult Tobacco Survey, 2018

5.2.3 Secondhand Smoke Exposure at Home

Overall, 2.2±0.6 percent of nonsmoking Minnesota adults were exposed to secondhand smoke inside their home in the past seven days (Table 5-1). Among the educational groups, nonsmokers with a college degree are less likely than those with some college or high school graduates to be exposed to secondhand smoke inside their home in the past 7 days, with only 0.8±0.5 percent exposed. This is compared to 3.0±1.2 percent of nonsmokers with some college, and 3.6±1.6 percent of nonsmoking high school

graduates, a statistically significant difference. There are no statistically significant differences in smoking in the home by age, gender, or income.

Presence of Children under 18 in the Home and Exposure to Secondhand Smoke

Survey Questions

- Are there any children under age 18 living in this household?
- During the past seven days, how many days did anyone smoke cigarettes, cigars, or pipes anywhere inside your home?
- Do you live in an apartment building, condo, townhome, or other building with shared walls?
- During the past 7 days, have you smelled smoke from cigarettes, cigars or pipes anywhere inside the building, including your own apartment?

A large number of Minnesota’s children live in homes where secondhand smoke is sometimes present. Among nonsmoking adults with children living in their households, 4.4±1.3 percent had someone smoking in their home in the past seven days (not shown in table). This means that, in a given week, someone smoked in the homes of around 66,000 nonsmoking adults who have one or more children in the home.

Among all nonsmokers who live in multi-unit housing, 14.6±2.7 percent have smelled smoke from cigarettes, cigars or pipes inside their home in the past seven days (Table 5-3). Among nonsmoking adults ages 65 or older, only 8.4±3.1 percent have smelled smoke in the past seven days inside their home. This percentage is statistically significantly lower compared to that of nonsmoking adults ages 45-64 (19.2±6.7 percent). Among the income categories, nonsmokers with incomes of \$35,000 or less smelled smoke inside their home at a statistically significantly higher rate (21.5±5.7 percent) compared to nonsmokers with incomes of \$75,001 or more (9.0±4.9 percent). There are no statistically significant differences in smelling smoke inside the home among nonsmoking Minnesota adults by gender or education.

Table 5-3. Smelling cigarette, cigar or pipe smoke inside the home, among non-smoking Minnesotans who live in multi-unit housing, by selected demographic characteristics

Characteristics	Smelled cigarette, cigar or pipe smoke inside the home
	%
Overall	14.6 ± 2.7
Age	
18 to 24	16.5 ± 6.4
25 to 44	14.7 ± 4.4
45 to 64	19.2 ± 6.7
65 or older	8.4 ± 3.1
Gender	
Female	16.6 ± 3.9
Male	12.4 ± 3.7
Education	
Less than high school	16.2 ± 15.2
High school graduate/GED	16.7 ± 5.5
Some college or technical school	17.1 ± 4.8
College graduate or beyond	10.4 ± 3.8
Household income	
\$35,000 or less	21.5 ± 5.7
\$35,001 to \$50,000	15.0 ± 7.9
\$50,001 to \$75,000	13.1 ± 5.4
\$75,001 or more	9.0 ± 4.9

Source: Minnesota Adult Tobacco Survey, 2018

5.2.4 Secondhand Smoke Exposure in a Car

Exposure to Secondhand Smoke in a Car

Survey Question

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

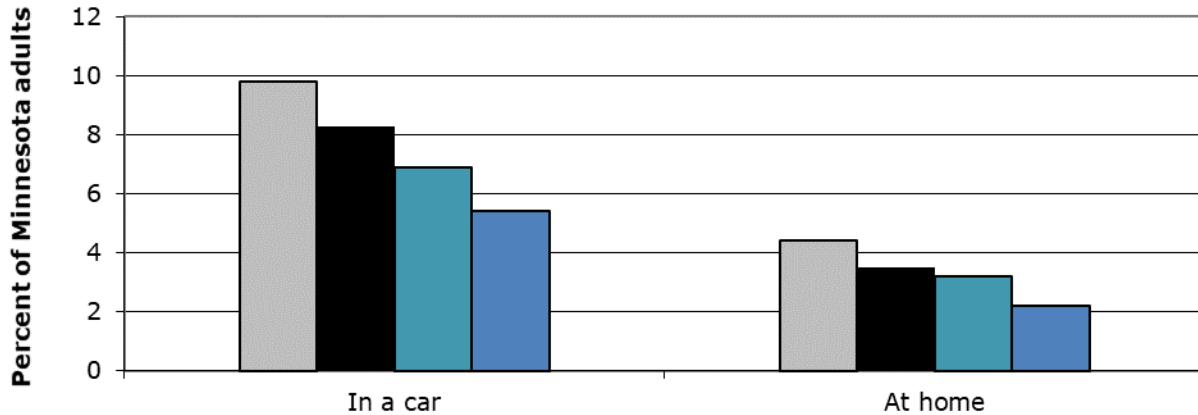
Overall, 5.4±0.9 percent of nonsmoking Minnesota adults were exposed to secondhand smoke in a car in the past seven days (Table 5-1). There are significant differences in exposure to secondhand smoke in a car by age, education and income. Exposure among nonsmoking adults generally decreases as age, education and income increase, though the differences are not always statistically significant. Nonsmoking young adults 18-24

years old (12.4 ± 4.3 percent) are about three times as likely to be exposed to secondhand smoke in a car as adults who are 45-64 years old (3.9 ± 1.4 percent), and about six times more likely than nonsmokers ages 65 years or older (1.8 ± 0.8 percent). Among nonsmoking adults who do not have a college degree, between 8 and 12 percent were exposed to secondhand smoke in a car, while among nonsmokers who have a college degree, only 2.3 ± 0.9 percent were exposed. Nonsmokers at the lowest income level are more likely to be exposed to secondhand smoke in a car (9.8 ± 2.8 percent) than nonsmokers at the highest income level (3.4 ± 1.1 percent).

5.2.5 Secondhand Smoke Exposure, 2007 to 2018

This section describes changes in exposure to secondhand smoke in a car and at home between 2007 and 2018 as well as secondhand smoke exposure in the community at large from 2014 to 2018. Overall, there was a statistically significant decline in past seven-day exposure to secondhand smoke in vehicles among nonsmoking Minnesota adults, from 6.9 ± 0.8 percent in 2014 to 5.4 ± 0.9 percent in 2018 (Figure 5-3). There was also a statistically significant decrease in past seven-day exposure to secondhand smoke at home among nonsmoking adult Minnesotans, from 3.2 ± 0.6 percent in 2014 to 2.2 ± 0.6 percent in 2018. Similarly, there was a decline in secondhand smoke exposure in the community at large among nonsmoking adult Minnesotans, from 31.7 ± 1.4 percent in 2014 to 30.0 ± 1.7 percent in 2018 (not shown in figure). However, this decline was not statistically significant.

Figure 5-3. Exposure of nonsmoking Minnesota adults to secondhand smoke in the past 7 days in selected settings, from 2007 to 2018



Setting of exposure to secondhand smoke		
Year	In a car	At home
2007	9.8 ± 1.1	4.4 ± 0.7
2010	8.3 ± 1.0	3.5 ± 0.7
2014	6.9 ± 0.8	3.2 ± 0.6
2018	5.4 ± 0.9	2.2 ± 0.6
Change from 2014 to 2018	-1.6*	-1.0*

Hypothesis: The percentage of nonsmoking adults exposed to secondhand smoke in the past 7 days both in a car and at home will decrease from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Survey, 2018

The decline in the percentage of nonsmoking Minnesota adults exposed to secondhand smoke at home is consistent across most age, gender and education groups (Table 5-4). There was a statistically significant decline of 4.0 percentage points among the 18-24 year old age group from 2014 to 2018. The percentage of nonsmoking males exposed to secondhand smoke at home also decreased significantly by 1.3 percentage points. Among the education subgroups, there was a statistically significant decrease of 5.3 percentage points for nonsmokers with less than a high school degree.

Table 5-4. Exposure of non-smoking Minnesota adults to secondhand smoke in the past seven days at home, by selected demographic characteristics, from 2007 to 2018

Characteristics	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%
Overall	4.4 ± 0.7	3.5 ± 0.7	3.2 ± 0.6	2.2 ± 0.6	-1.0 *
Age					
18 to 24	6.8 ± 2.7	9.5 ± 3.7	6.9 ± 2.7	2.9 ± 1.9	-4.0 *
25 to 44	3.2 ± 1.2	2.3 ± 1.0	1.6 ± 0.7	2.0 ± 1.0	0.4
45 to 64	4.7 ± 1.3	3.2 ± 0.9	3.8 ± 1.0	2.7 ± 1.2	-1.1
65 or older	5.0 ± 1.3	2.8 ± 1.1	2.7 ± 1.1	1.6 ± 0.9	-1.2
Gender					
Female	3.8 ± 0.8	3.6 ± 0.9	3.1 ± 0.7	2.4 ± 0.9	-0.6
Male	5.1 ± 1.3	3.5 ± 1.0	3.3 ± 0.9	2.0 ± 0.8	-1.3 *
Education					
Less than high school	9.5 ± 4.5	7.7 ± 4.1	6.5 ± 3.8	1.2 ± 2.0	-5.3 *
High school graduate/GED	6.7 ± 1.8	4.5 ± 1.5	5.1 ± 1.4	3.6 ± 1.6	-1.5
Some college or technical school	3.8 ± 1.1	4.3 ± 1.3	3.1 ± 0.9	3.0 ± 1.2	-0.1
College graduate or beyond	2.0 ± 0.7	1.1 ± 0.5	1.3 ± 0.5	0.8 ± 0.5	-0.5
Cigarette smoking status (BRFSS)					
Never smokers	4.0 ± 0.9	3.2 ± 0.8	2.6 ± 0.6	2.0 ± 0.7	-0.6
Current smokers	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0
Former smokers	5.4 ± 1.4	4.1 ± 1.2	4.6 ± 1.2	2.7 ± 1.2	-1.8 *

Hypothesis: The percentage of Minnesota adults exposed to second hand smoke will decline from 2014 to 2018.

* Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2007, 2010, 2014 and 2018

In 2014, 6.9±0.8 percent of nonsmoking adult Minnesotans were exposed to secondhand smoke in a car in the past seven days (Table 5-5). There were significant declines of around 2 percentage points for the 45-64 year old age group, the 65 or older age group, and for females. Among the education subgroups, there was a statistically significant decline of 3.2 percentage points for nonsmoking adults with some college education.

Table 5-5. Exposure of non-smoking Minnesota adults to secondhand smoke in the past seven days in a car, by selected demographic characteristics, from 2007 to 2018

Characteristics	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%
Overall	9.8 ± 1.1	8.3 ± 1.0	6.9 ± 0.8	5.4 ± 0.9	-1.6 *
Age					
18 to 24	22.5 ± 4.7	24.2 ± 5.2	14.4 ± 3.6	12.4 ± 4.3	-2.0
25 to 44	9.5 ± 2.0	7.6 ± 1.7	6.9 ± 1.4	6.9 ± 1.7	0.0
45 to 64	8.7 ± 1.5	6.2 ± 1.3	6.3 ± 1.2	3.9 ± 1.4	-2.4 *
65 or older	5.1 ± 1.1	3.5 ± 1.0	3.9 ± 1.3	1.8 ± 0.8	-2.1 *
Gender					
Female	8.7 ± 1.3	7.2 ± 1.3	6.4 ± 1.1	4.4 ± 1.2	-2.1 *
Male	11.0 ± 1.8	9.4 ± 1.6	7.5 ± 1.2	6.5 ± 1.4	-1.0
Education					
Less than high school	12.4 ± 4.8	12.6 ± 5.1	10.8 ± 4.6	14.9 ± 7.9	4.1
High school graduate/GED	12.7 ± 2.3	10.3 ± 2.2	10.2 ± 1.9	8.0 ± 2.1	-2.2
Some college or technical school	10.6 ± 2.0	10.7 ± 2.0	8.5 ± 1.6	5.3 ± 1.5	-3.2 *
College graduate or beyond	6.0 ± 1.4	3.2 ± 0.9	2.4 ± 0.7	2.3 ± 0.9	0.0
Cigarette smoking status (BRFSS)					
Never smokers	9.0 ± 1.3	7.6 ± 1.2	5.8 ± 0.9	4.8 ± 1.0	-0.9
Current smokers	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	0.0
Former smokers	11.6 ± 2.1	9.7 ± 1.8	9.6 ± 1.6	6.7 ± 1.8	-2.9 *

Hypothesis: The percentage of Minnesota adults exposed to second hand smoke will decline from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2007, 2010, 2014 and 2018

5.3 Minnesota Adults Covered by Smoke-Free and E-cigarette-Free Rules at Home and in the Car

5.3.1 Smoke-Free and E-cigarette-Free Rules at Home

Secondhand smoke rules at home differ from secondhand smoke rules in the community because homes are private. Home rules are adopted voluntarily by individuals, and rules preventing secondhand smoke exposure in the home appear to be widespread. In MATS 2018, a new item was added to understand Minnesota adults' rules about use of e-cigarettes or vaping devices in the home.

Smoke-Free and E-cigarette-Free Rules at Home

Survey Questions

- 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, smoking is allowed in some places or at some times, or smoking is allowed anywhere inside the home?
- Which statement best describes the rules about using e-cigarettes or vaping devices inside your home? Do not include decks, garages, or porches. Using these products is not allowed anywhere inside your home, using these products is allowed in some places or at some times, or using these products is allowed anywhere inside the home?

As shown in Table 5-6, 91.5±1.0 percent of Minnesota adults live in homes where smoking is not allowed anywhere. There are statistically significant differences in not allowing smoking at home by education, income, smoking status, combusted tobacco use status, and e-cigarette use. Those with higher levels of education are more likely to live in homes where smoking is not allowed. Whereas 96.9±0.8 percent of Minnesota adults with a college degree have smoke-free rules in their homes, 82.3±6.9 percent of those with less than a high school degree live in homes where smoking is not allowed. Those with higher incomes are more likely to have smoke-free rules in their homes than those with lower incomes: 95.6±1.2 percent of those with incomes over \$75,000 per year live in a home with such a rule, while 84.0±2.9 percent of those with incomes of \$35,000 per year or less live in a home with such a rule. As expected, both never and current smokers are far more likely to have smoke-free rules in their homes than current smokers; about 95 percent of both former and never smokers have smoke-free rules versus about 66 percent of current smokers. Similar differences exist between current combustible tobacco smokers and non-smokers: 69.6±4.1 percent of combustible smokers have smoke-free rules in their homes versus 96.2±0.7 percent of non-smokers. A greater percentage of non-current e-cigarette users have a smoke-free rule in their homes than current e-cigarette users: 92.2±1.0 percent versus 80.7±6.0 percent. This difference is statistically significant.

Fewer Minnesota adults have e-cigarette-free rules in their homes (83.9±1.3 percent) than they do smoke-free rules (95.1±1.0 percent; Table 5-6). Statistically significant differences in not allowing e-cigarette use in the home exist across all of the demographic and smoking status subgroups. As age increases, the percentage who have e-cigarette-free rules in the home increases, ranging from 68.5 percent for 18-24 year olds, to 92.9 percent for adults age 65 or older. Significantly more females have e-cigarette-free rules compared to males: 86.2±1.8 percent versus 81.5±2.0 percent, respectively. Those with higher education levels and incomes are more likely to have e-cigarette-free rules in their homes than those with lower education levels and incomes. Only 54.0±5.0 percent of current cigarette smokers have e-cigarette-free rules, compared to 90.4±1.4 percent of never smokers and 85.4±2.4 percent of former smokers. Similar differences exist between current combustible tobacco smokers and non-smokers- more nonsmokers have e-cigarette free rules (90.1±1.2) compared to current smokers (55.7±4.5). A statistically significantly greater percentage of non-current e-cigarette users have an e-cigarette-free rule in their homes compared to current e-cigarette users: 87.3±1.2 percent of non-current e-cigarette users versus 32.3±7.5 percent of current e-cigarette users.

Table 5-6. Minnesota adults living in homes with smoke-free or e-cigarette-free rules, by selected demographic characteristics, smoking status, and e-cigarette use

Characteristics	Smoking not allowed anywhere inside home	E-cigarettes not allowed anywhere inside home
	%	%
Overall	91.5 ± 1.0	83.9 ± 1.3
Age		
18 to 24	91.3 ± 3.0	68.5 ± 5.1
25 to 44	93.4 ± 1.7	83.1 ± 2.4
45 to 64	89.7 ± 1.9	85.4 ± 2.2
65 or older	91.8 ± 1.6	92.9 ± 1.5
Gender		
Female	92.8 ± 1.3	86.2 ± 1.8
Male	90.2 ± 1.5	81.5 ± 2.0
Education		
Less than high school	82.3 ± 6.9	71.6 ± 8.3
High school graduate/GED	87.5 ± 2.2	82.7 ± 2.5
Some college or technical school	91.3 ± 1.6	80.6 ± 2.4
College graduate or beyond	96.9 ± 0.8	91.2 ± 1.4
Household income		
\$35,000 or less	84.0 ± 2.9	74.4 ± 3.6
\$35,001 to \$50,000	90.2 ± 2.8	83.0 ± 3.9
\$50,001 to \$75,000	91.8 ± 2.5	84.8 ± 3.3
\$75,001 or more	95.6 ± 1.2	88.1 ± 1.8
Cigarette smoking status (BRFSS)		
Never smokers	96.2 ± 0.8	90.4 ± 1.4
Current smokers	66.3 ± 4.7	54.0 ± 5.0
Former smokers	94.1 ± 1.6	85.4 ± 2.4
Combusted tobacco use status		
Current smokers	69.6 ± 4.1	55.7 ± 4.5
Non-smokers	96.2 ± 0.7	90.1 ± 1.2
Past 30-day e-cigarette use		
Yes	80.7 ± 6.0	32.3 ± 7.5
No	92.2 ± 1.0	87.3 ± 1.2

Source: Minnesota Adult Tobacco Survey, 2018

Among adults with children aged 17 or younger living in their households, 95.3±1.3 percent live in homes with rules against smoking in their homes and 87.6±2.1 percent have rules against using e-cigarettes in their homes (not shown in table). In contrast, among adults who do not have children living in their household, 89.4±1.4 percent have rules against smoking in their homes and 81.8±1.7 percent have rules against using e-

cigarettes in their homes (not shown in a table). The presence of children in the home is significantly associated with having rules against smoking in the home and rules against using e-cigarettes in the home ($p < 0.05$), though the majority of adult Minnesotans live in homes with rules against smoking or using e-cigarettes, regardless of whether there are children in the home.

5.3.2 Smoke-Free Rules in Family Vehicles

Smoke-Free Rules in Vehicles

Survey Question

- Not counting motorcycles, in the vehicles that you or family members who live with you own or lease, is smoking...
Always allowed in vehicles, Sometimes allowed in at least one vehicle, Never allowed in any vehicle, or No one in family owns a vehicle.

Overall, 79.5 ± 1.4 percent of Minnesota adults do not allow smoking in vehicles owned or leased by them or their household's family members (Table 5-7). There are statistically significant differences in not allowing smoking in vehicles by age, education and smoking status. Adults age 65 or older are the most likely (88.8 ± 1.9 percent) to own or use vehicles with smoke-free rules compared to other age groups. This percentage is significantly higher than for other age groups. Those with a college degree (91.0 ± 1.4 percent) are more likely to own or use vehicles with smoke-free rules compared to those in all other education groups. As expected, current cigarette smokers are less likely to not allow smoking in vehicles (20.8 ± 3.8 percent) compared to never (90.2 ± 1.4 percent) and former (86.2 ± 2.3 percent) smokers. The trend is similar among smokers of any combustible products; 30.6 percent have a smoke-free rule in the vehicle they own or use, compared to 89.9 percent of nonsmokers.

Table 5-7. Minnesota adults who do not allow smoking in vehicles owned or leased by themselves or family members, by selected demographic characteristics and smoking status

Characteristics+RC:R[24]C[2]	Own or use vehicle with smoke-free policy
	%
Overall	79.5 ± 1.4
Age	
18 to 24	72.6 ± 4.9
25 to 44	78.3 ± 2.6
45 to 64	78.1 ± 2.5
65 or older	88.8 ± 1.9
Gender	
Female	80.8 ± 2.0
Male	78.3 ± 2.1
Education	
Less than high school	54.4 ± 8.5
High school graduate/GED	75.1 ± 3.0
Some college or technical school	77.3 ± 2.5
College graduate or beyond	91.0 ± 1.4
Household income	
\$35,000 or less	68.3 ± 3.7
\$35,001 to \$50,000	75.3 ± 4.6
\$50,001 to \$75,000	80.4 ± 3.6
\$75,001 or more	85.4 ± 1.9
Cigarette smoking status (BRFSS)	
Never smokers	90.2 ± 1.4
Current smokers	20.8 ± 3.8
Former smokers	86.2 ± 2.3
Combusted tobacco use status	
Current smokers	30.6 ± 3.9
Non-smokers	89.9 ± 1.1

Source: Minnesota Adult Tobacco Survey, 2018

5.3.3 Minnesota Adults Covered by Smoke-Free Rules at Home and in Family Vehicles, 1999 to 2018

In general, the trend for living in homes with smoke-free rules shows a consistent increase from 1999 to 2018. In 2018, 91.5±1.0 percent of Minnesota adults lived in homes where smoking was not permitted. This is a statistically significant increase of 2.2 percentage points over the 2014 estimate (Table 5-8 and Figure 5-4). There are multiple significant increases by age, gender, education, and smoking status. Adults ages 45-64 and 65 or older both had statistically significant increases in the percent of adults living in homes with smoke-free rules from 2014 to 2018: the former group increased by 3.5 percentage points to 89.7±1.9 percent in 2018 and the latter by 2.6 percentage points to 91.8±1.6 percent in 2018. Both females and males had statistically significant increases as well. Females increased by 2.6 percentage points to 92.8±1.3 percent in 2018 and males increased by 1.9 percentage points to 90.2±1.5 percent in 2018. Among the educational groups, the percentage of high school graduates who live in homes with smoke-free rules increased by 2.7 percentage points to 87.5±2.2 percent in 2018. College graduates increased by 1.2 percentage points to 96.9±0.8 percent in 2018. Additionally, the percentage of former smokers living in homes with smoke-free rules increased from 90.8±1.5 percent in 2014 to 94.1±1.6 percent in 2018, a statistically significant increase.

Table 5-8. Minnesota adults living with homes with smoke-free rules, by selected demographic characteristics and smoking status, from 1999 to 2018

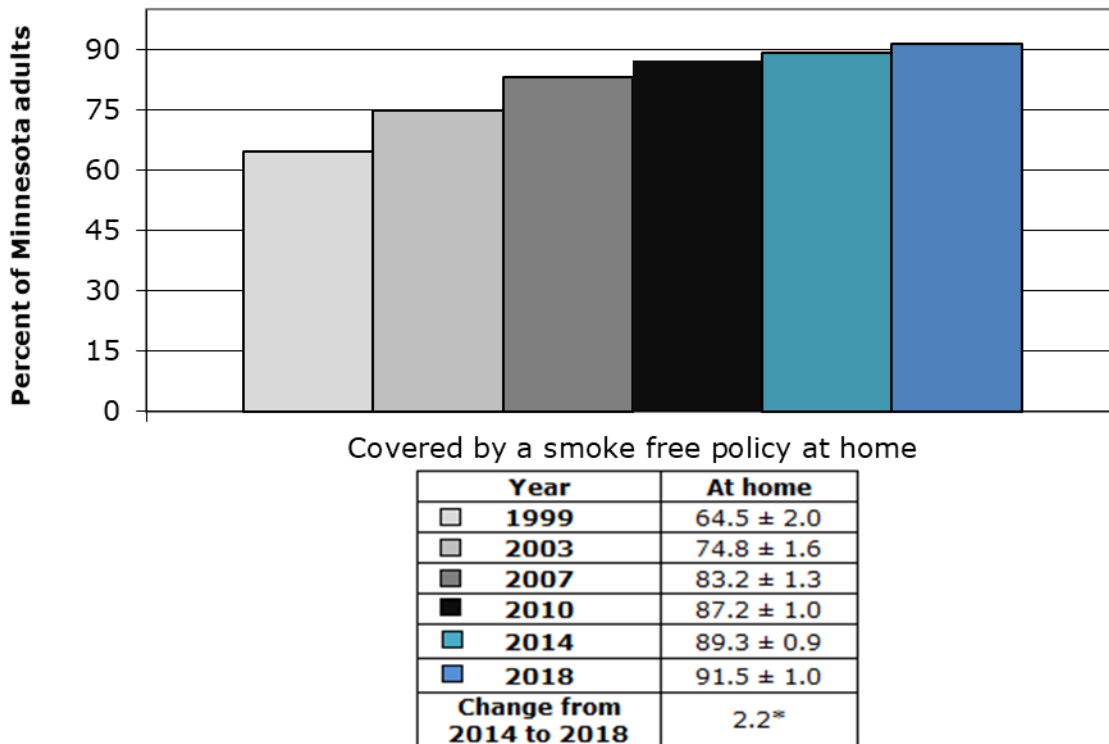
Characteristics	1999	2003	2007	2010	2014	2018	Change from 2014 to 2018
	%	%	%	%	%	%	
Overall	64.5 ± 2.0	74.8 ± 1.6	83.2 ± 1.3	87.2 ± 1.0	89.3 ± 0.9	91.5 ± 1.0	2.2 *
Age							
18 to 24	64.1 ± 6.5	72.2 ± 4.0	87.5 ± 3.1	83.5 ± 3.9	89.5 ± 2.8	91.3 ± 3.0	1.8
25 to 44	67.4 ± 2.9	78.3 ± 2.7	85.4 ± 2.5	90.2 ± 1.8	92.5 ± 1.3	93.4 ± 1.7	0.8
45 to 64	61.1 ± 3.6	72.6 ± 2.8	80.2 ± 2.0	86.1 ± 1.6	86.3 ± 1.6	89.7 ± 1.9	3.5 *
65 or older	63.6 ± 5.4	72.8 ± 3.2	80.6 ± 2.0	86.2 ± 1.9	89.2 ± 1.6	91.8 ± 1.6	2.6 *
Gender							
Female	65.3 ± 2.6	76.2 ± 2.2	83.8 ± 1.7	87.6 ± 1.4	90.2 ± 1.1	92.8 ± 1.3	2.6 *
Male	63.7 ± 3.1	73.5 ± 2.3	82.6 ± 1.9	86.9 ± 1.5	88.4 ± 1.3	90.2 ± 1.5	1.9 *
Education							
Less than high school	61.3 ± 6.1	67.4 ± 6.3	70.7 ± 6.8	72.5 ± 5.8	76.4 ± 5.2	82.3 ± 6.9	5.9
High school graduate/GED	56.7 ± 3.8	66.6 ± 3.2	76.1 ± 3.0	84.4 ± 2.2	84.8 ± 2.0	87.5 ± 2.2	2.7 *
Some college or technical school	61.9 ± 3.7	75.6 ± 2.8	84.2 ± 1.8	86.2 ± 1.8	89.7 ± 1.4	91.3 ± 1.6	1.6
College Graduate or beyond	78.8 ± 3.2	85.8 ± 2.2	93.0 ± 1.1	95.0 ± 0.9	95.7 ± 0.8	96.9 ± 0.8	1.2 *
Cigarette smoking status (BRFSS)							
Never smokers	77.9 ± 2.6	86.2 ± 1.7	92.1 ± 1.3	93.9 ± 1.1	95.5 ± 0.8	96.2 ± 0.8	0.6
Current smokers	31.4 ± 4.2	39.6 ± 4.4	49.6 ± 4.6	58.1 ± 4.0	61.4 ± 3.7	66.3 ± 4.7	4.9
Former smokers	65.9 ± 3.8	77.0 ± 2.4	85.6 ± 1.8	90.9 ± 1.5	90.8 ± 1.5	94.1 ± 1.6	3.4 *

Hypothesis: The percentage of Minnesotans living in homes with smoke-free rules will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Survey, 2018

Figure 5-4. Minnesota adults living in homes with smoke-free rules, from 1999 to 2018



Hypothesis: The percentage of adults covered by a smoke-free rule at home will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Surveys, 2003, 2007, 2010, 2014 and 2018

Beginning in 2014, MATS asked about smoke-free rules in family vehicles. In 2018, 80.2±1.4 percent of adult Minnesotans owned or leased vehicles with smoke-free rules (Table 5-9). This is a statistically significant increase from 2014, when 78.2±1.2 percent of adults owned or leased vehicles where smoking was not permitted. There are multiple significant increases by age, gender, education, and smoking status. Adults ages 18-24 and 65 or older both had statistically significant increases in the percent of adults owning or leasing vehicles with smoke-free rules from 2014 to 2018. Males had a statistically significant increase from 2014 (75.5±1.8) to 2018 (79.0±2.1). Among the educational groups, the percentage of high school graduates who own or lease vehicles with smoke-free rules increased by 4.3 percentage points from 71.7±2.5 in 2014 to 75.9±3.0 percent in 2018. Those with some college or technical school increased by

2.9 percentage points and college graduates increased by 1.6 percentage points in 2018. Additionally, the percentage of former smokers who own or lease vehicles with smoke-free rules increased from 82.0±1.3 percent in 2014 to 86.7±2.3 percent in 2018, a statistically significant increase.

Table 5-9. Minnesota adults who own or use vehicles with smoke-free rules, by selected demographic characteristics and smoking status, from 2014 to 2018

Characteristics	2014	2018	Change from 2014 to 2018
	%	%	%
Overall	78.2 ± 1.2	80.2 ± 1.4	2.0 *
Age			
18 to 24	67.1 ± 4.2	73.1 ± 4.9	6.0 *
25 to 44	76.7 ± 2.1	78.9 ± 2.6	2.1
45 to 64	78.9 ± 1.9	78.8 ± 2.5	-0.1
65 or older	87.7 ± 1.9	90.1 ± 1.9	2.4 *
Gender			
Female	80.8 ± 1.6	81.4 ± 2.0	0.6
Male	75.5 ± 1.8	79.0 ± 2.1	3.5 *
Education			
Less than high school	68.6 ± 5.8	56.7 ± 8.7	-12.0
High school graduate/GED	71.7 ± 2.5	75.9 ± 3.0	4.3 *
Some college or technical school	74.7 ± 2.1	77.6 ± 2.5	2.9 *
College graduate or beyond	89.9 ± 1.3	91.5 ± 1.4	1.6 *
Cigarette smoking status (BRFSS)			
Never smokers	89.2 ± 1.2	90.6 ± 1.3	1.4
Current smokers	25.5 ± 3.4	21.5 ± 3.9	-4.0
Former smokers	82.0 ± 2.0	86.7 ± 2.3	4.7 *

Hypothesis: The percentage of Minnesotans who own or use vehicles with smoke-free rules will increase from 2014 to 2018.

*Statistically significant at the 95% confidence level

Source: Minnesota Adult Tobacco Survey, 2018

5.4 Perceptions that Secondhand Smoke Is Harmful

MATS tracks Minnesota adults' changing awareness and understanding of the harmfulness of secondhand smoke. This section examines the perceived harmfulness of secondhand smoke among Minnesota adults.

Secondhand Smoke and Awareness of Its Effects

Secondhand smoke refers to the smoke generated from the burning end of a cigarette or other smoked tobacco product and from the exhaled smoke from the smoker.

Survey Question

- Do you think that breathing smoke from other people's cigarettes is... very harmful to one's health, somewhat harmful to one's health, not very harmful to one's health, or not at all harmful to one's health?

Nearly all Minnesota adults agree that secondhand smoke is harmful; 91.3±1.0 percent of adult Minnesotans say that secondhand smoke is very or somewhat harmful to health (Table 5-10).

Significantly more females than males believe that secondhand smoke is very or somewhat harmful: 95.8±0.9 percent versus 86.6±1.7 percent, respectively. A vast majority of current cigarette smokers (84.1±3.5 percent) agree that exposure to secondhand smoke is harmful, although former smokers (89.9±1.9 percent) and never smokers (93.7±1.1 percent) are more likely to hold this view. Similarly, 92.9±0.9 percent of Minnesota adults who do not smoke any combustible tobacco products are of the same belief that exposure to secondhand smoke is harmful, compared to 84.0±3.1 percent current smokers of combustible tobacco. While all of these differences are statistically significant, it is noteworthy that smokers are not that different from the rest of adult Minnesotans regarding the perceived harmfulness of secondhand smoke.

Table 5-10. Agreement that secondhand smoke is harmful, by selected demographic characteristics

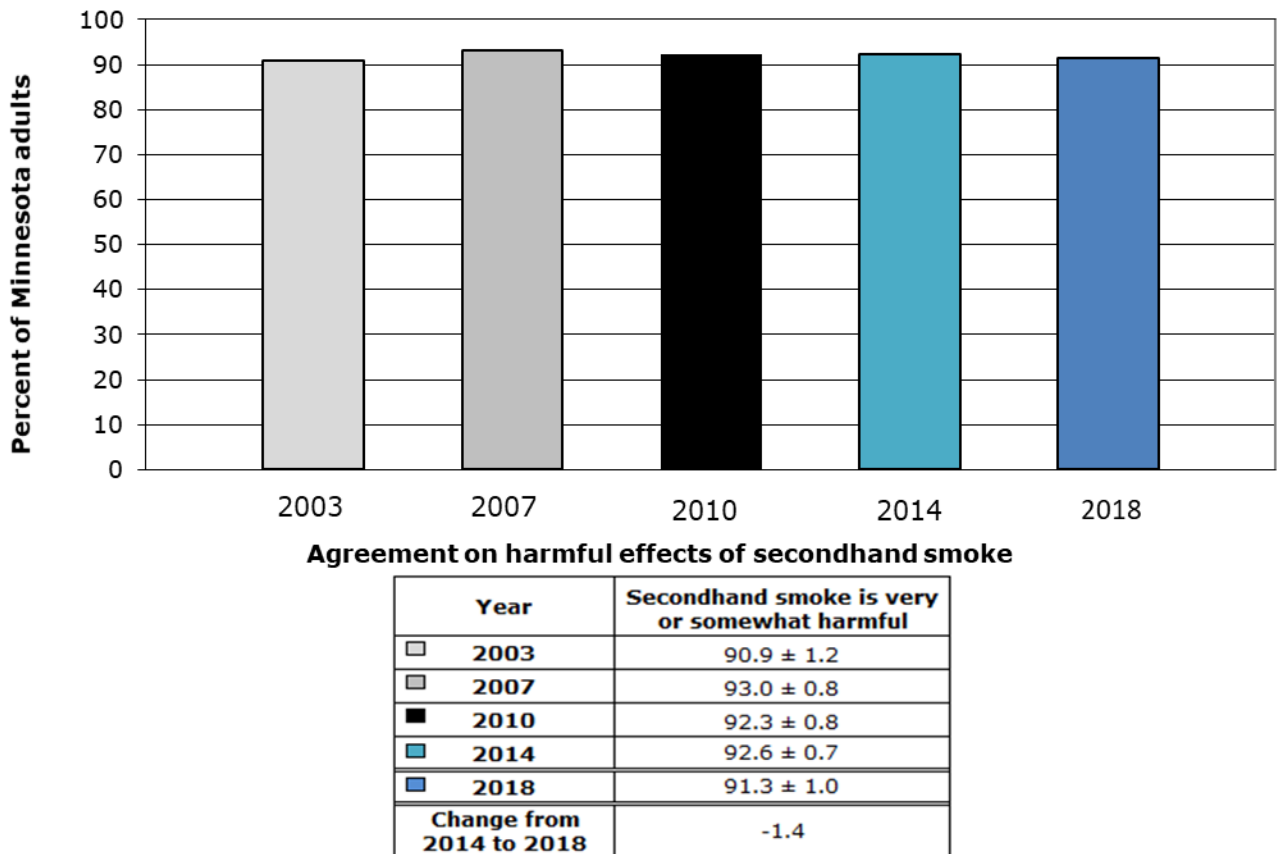
Characteristics	Secondhand smoke is very or somewhat harmful
	%
Overall	91.3 ± 1.0
Age	
18 to 24	93.6 ± 2.8
25 to 44	92.4 ± 1.6
45 to 64	90.8 ± 1.7
65 or older	88.8 ± 1.9
Gender	
Female	95.8 ± 0.9
Male	86.6 ± 1.7
Education	
Less than high school	82.3 ± 6.4
High school graduate/GED	87.6 ± 2.3
Some college or technical school	93.6 ± 1.3
College Graduate or beyond	94.1 ± 1.1
Household income	
\$35,000 or less	90.2 ± 2.4
\$35,001 to \$50,000	89.0 ± 3.2
\$50,001 to \$75,000	92.3 ± 2.1
\$75,001 or more	93.5 ± 1.2
Cigarette smoking status (BRFSS)	
Never smokers	93.7 ± 1.1
Current smokers	84.0 ± 3.5
Former smokers	89.9 ± 1.9
Combusted tobacco use status	
Current smokers	84.0 ± 3.1
Non-smokers	92.9 ± 0.9

Source: Minnesota Adult Tobacco Survey, 2018

5.4.1 Perceptions that Secondhand Smoke is Harmful, 2014 to 2018

Between 2014 and 2018, the percentage of Minnesota adults who believe that secondhand smoke is very or somewhat harmful decreased slightly from 92.6 ± 0.7 to 91.2 ± 1.0 (Figure 5-5). This is a statistically significant decrease when applying a two-tailed test. Although the percentage of adults who believe that secondhand smoke is harmful declined between 2014 and 2018, over 90 percent have perceived secondhand smoke as harmful since 2003, which is encouraging.

Figure 5-5. Agreement that secondhand smoke is harmful, from 2003 to 2018



Hypothesis: The percentage who agree that secondhand smoke is harmful will increase from 2014 to 2018.

Source: Minnesota Adult Tobacco Survey, 2003, 2007, 2010, 2014 and 2018

5.5 Key Findings

Some of the most important findings from this chapter are summarized below. All differences presented in this summary are statistically significant at the 0.05 confidence level unless otherwise noted.

Key Secondhand Smoke Findings for 2018

- Nonsmoking Minnesota adults are significantly more likely to be exposed to secondhand smoke in the community (30.0±1.7 percent) than in a car (5.7±0.9 percent) or at home (2.2±0.6 percent).
- Nonsmoking Minnesota adults who were exposed to secondhand smoke were exposed for a median of 7.1±1.6 minutes in the 7 days prior to being interviewed.
- The most common location for recent community exposure to secondhand smoke among nonsmokers is a building entrance (18.7±2.5 percent), followed by somewhere outdoors (17.7±2.6 percent) and the outdoor patio of a restaurant or a bar (12.8±2.2 percent).
- Nonsmoking men (33.7±2.5 percent) are more likely to be exposed to secondhand smoke in the community than women (26.7±2.2 percent).
- Nonsmokers with a college degree are less likely than those with some college or high school graduates to be exposed to secondhand smoke inside their home in the past 7 days, with only 0.8±0.5 percent exposed. This is compared to 3.0±1.2 percent of those with some college, and 3.6±1.6 percent of high school graduates, a statistically significant difference.
- Among nonsmoking adults with children living in their households, 4.4±1.3 percent had someone smoking in their home in the past seven days. This means that, in a given week, someone smoked in the homes of around 66,000 adults who have one or more children in the home.
- Among all nonsmokers who live in multi-unit housing, 14.6±2.7 have smelled smoke from cigarettes, cigars or pipes inside their home in the past seven days.

- Nonsmoking young adults 18-24 years old are about three times as likely to be exposed to secondhand smoke in a car (12.4 ± 4.3 percent) than adults who are 45-64 years old (3.9 ± 1.4 percent), and about six times more likely than those 65 years or older (1.8 ± 0.8 percent). Overall, 91.5 ± 1.0 percent of Minnesota adults live in homes where smoking is not allowed.
- Never cigarette smokers (96.2 ± 0.8 percent) and former smokers (94.1 ± 1.6 percent) are significantly more likely to live in homes with smoke-free rules than current smokers (66.3 ± 4.7 percent).
- Overall, 83.9 ± 1.3 percent of Minnesota adults live in homes where e-cigarettes are not allowed to be used.
- A statistically significantly greater percentage of non-current e-cigarette users have an e-cigarette-free rule in their homes compared to current e-cigarette users: 87.3 ± 1.2 percent versus 32.3 ± 7.5 percent, respectively.
- Young adults 18-24 years old are significantly less likely to live in homes with e-cigarette-free rules (68.5 ± 5.1 percent) than any other age group (ranging from 83-93 percent).
- Only 54.0 ± 5.0 percent of current cigarette smokers have e-cigarette-free rules in their homes, compared to 90.4 ± 1.4 percent of never smokers and 85.4 ± 2.4 percent of former smokers. Among adults with children living in their households, 95.3 ± 1.3 percent live in homes with a rule against smoking in their homes. This is compared to 89.4 ± 1.4 percent of adults who do not have children living in their home who have a rule against smoking in their homes.
- Among adults with children living in their households, 87.6 ± 2.1 percent live in homes with a rule against using e-cigarettes in their homes. This is compared to 81.8 ± 1.7 percent of adults who do not have children living in their home and have a rule against using e-cigarettes in their homes.
- Overall, 79.5 ± 1.4 percent of Minnesota adults do not allow smoking in vehicles owned or leased by them or the family members in their household. Current cigarette smokers are less likely to own or use vehicles where smoking is not permitted (20.8 ± 3.8 percent) compared to never (90.2 ± 1.4 percent) and former (86.2 ± 2.3 percent) smokers.

- Overall, 91.3±1.0 percent of Minnesota adults agree that secondhand smoke is very or somewhat harmful.
- Significantly more females than males believe secondhand smoke is very or somewhat harmful: 95.8±0.9 percent versus 86.6±1.7 percent, respectively.

Key Secondhand Smoke Findings for 2014 to 2018

- In 2014, 3.2±0.6 percent of nonsmoking adult Minnesota adults were exposed to secondhand smoke at home in the past seven days. This estimate declined by 1.0 percentage point to 2.2±0.6 percent in 2018, a statistically significant difference.
- There was a statistically significant decrease of 4.0 percentage points in the percent of nonsmoking Minnesota adults ages 18-24 exposed to secondhand smoke in the past 7 days at home, from 6.9±2.7 percent in 2014, to 2.9±1.9 percent in 2018.
- Overall, there was a statistically significant decline in past seven-day exposure to secondhand smoke in vehicles among nonsmokers, from 6.9±0.8 percent in 2014 to 5.4±0.9 percent in 2018.
- Significantly fewer nonsmoking Minnesota adults were exposed to secondhand smoke in the past 7 days at home in 2018 than in 2014: 1.2±2.0 percent versus 6.5±3.8 percent.
- In 2018, 91.5±1.0 percent of Minnesota adults lived in homes where smoking was not permitted. This is a statistically significant increase of 2.2 percentage points over 2014.
- In 2018, 80.2±1.4 percent of adult Minnesotans owned or used vehicles with smoke-free rules. This is a statistically significant increase from 2014, when 78.2±1.2 percent of adults owned or used vehicles where smoking was not permitted.
- Between 2014 and 2018, the percentage of Minnesota adults who believe that secondhand smoke is very or somewhat harmful decreased slightly from 92.6±0.7 to 91.2±1.0. This difference is statistically significant when a two-tailed test is applied. The overwhelming majority of Minnesota adults perceive secondhand smoke to be harmful.