LEADING CAUSES OF DEATH

DEATH CERTIFICATES

leading causes of death

mortality data

$$\frac{\text{DEATHS}}{\text{POPULATION}} \times 100{,}000$$

TEEN PREGNANCY

pregnancy rate

birth rate

module 3

SMOKING AND HEALTH

population-based surveys

prevalence rate

deaths due to smoking

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INTRODUCTION

What is covered in Module 3?

So far in this course, you have focused on data representing events at opposite ends of the life cycle: *births and deaths*. You have learned about the sources of these data, and have practiced using the data to make comparisons and draw conclusions. This module takes you even further into the world of data by introducing you to a rich data source on personal health behaviors. You will explore how these data are collected and analyzed, and how they can be used to estimate health risk behaviors and chronic disease outcomes.

What will you learn?

At the end of Module 3, learners should be able to:

- Describe the Behavioral Risk Factor Surveillance System (BRFSS), including its purpose and potential u methodology, and its strengths and limitations.
- Explain prevalence rates and how they differ from incidence rates.
- Compare aggregate smoking prevalence data across years in a region (multi-county) with the state as a w
- Define the concepts of relative and attributable risk.
- Estimate the number of deaths attributable to smoking in a state and region.

Before you read any further,
view Act 1 of the videotape.

Section I. Health Behavior Surveys

Why be concerned about health behaviors?

Each year, over half of all premature deaths in the United States are caused by poor health behavior choices. The health behaviors known to cause the most deaths - and thus to be the most risky - are:

- alcohol and other drug use
- lack of preventive services, such as screening and immunization
- physical inactivity
- poor diet
- risky sexual behaviors
- tobacco use
- violence.

The health problems related to these risky health behaviors include cancer, heart disease, diabetes, injuries, and AIDS.

Public health agencies at the community, state, and national levels are charged with improving the health of our citizens. Achieving this goal depends, in large part, on reducing the prevalence of these risky health behaviors. But how do we know how many Americans engage in these behaviors and which groups are most at risk?

How do we measure health behaviors?

In an ideal world, with unlimited resources and time, we would learn about health behaviors by interviewing **every individual** in the nation. The U.S. Census attempts to obtain a limited amount of information about every individual only every ten years.

For obvious reasons, such an extensive (and costly) endeavor is not feasible every time we need information about a population. Instead, we use **surveys** of a **sample** of the entire population. Through these surveys, we are attempting to measure the **prevalence** of a particular behavior, or set of behaviors, among a certain population.

What is prevalence?

Two common measures are used to describe the presence of particular behaviors - or disease - in a population:

- ***Incidence*** - or the number of *new* events (e.g., cases of a specified disease or persons exhibiting a specified behavior) during a given time interval
- ***Prevalence*** - or the number of *new and pre-existing* events (e.g., the *total* number of cases of a specified disease or persons exhibiting a specified behavior) during a given time interval

Incidence and prevalence can be calculated using a variation of the rate formula introduced in Module 1.

$$\textbf{Incidence} = \frac{\text{Number of new events during a given time period}}{\text{Population at risk during the same time period}} \times 100$$

$$\textbf{Prevalence} = \frac{\text{Number of new and pre-existing events during a given time period}}{\text{Population at risk during the same time period}} \times 100$$

Example: Incidence

Let's suppose that a survey of 5,254 persons aged 35 and older has been conducted. Respondents to this survey were asked: "Have you been diagnosed with lung cancer **in the past 12 months**?" We want to estimate the incidence of lung cancer, **in the past 12 months**, among persons 35 and older. Of the 5,254 respondents, 7 indicated that they had been diagnosed in this time interval (the past 12 months). So, the incidence of lung cancer in the past 12 months among this adult sample would be:

$(7 \div 5{,}254) \times 100 = 0.13\%$ or about 130 per 100,000

Example: Prevalence

Let's continue with this example to examine the prevalence of lung cancer. Now suppose that the 5,254 persons aged 35 and older were also asked: "Have you **ever** been diagnosed as having lung cancer?" Of the 5,254 persons in the sample, 15 responded with yes. This would include new and pre-existing cases. So, the prevalence of lung cancer in this adult sample would be:

$(15 \div 5{,}254) \times 100 = 0.28\%$ or about 280 per 100,000

What health surveys are currently conducted?

There are presently several ongoing health surveys conducted in the United States. Some examples include the National Health Interview Survey (NHIS), the Youth Risk Behavior Survey (YRBS), and the Behavioral Risk Factor Surveillance System (BRFSS).

The **NHIS** is a household-based survey that has been used to collect health data from the U.S. adult population since 1957. It is designed primarily to produce national estimates on self-reported illnesses, chronic conditions, injuries, impairments, the use of health services, and other related topics for the civilian, non-institutionalized population.

The **YRBS** is a school-based survey of youths in grades 9-12. It measures six categories of priority health risk behaviors, including tobacco use, among adolescents.

The **BRFSS** is a state-level telephone survey that provides estimates of risk behaviors and preventive health measures for the adult population.

What is the BRFSS?

In the early 1980s, the Centers for Disease Control and Prevention (CDC) collaborated with several states to design and test a unique system for collecting data on health behaviors among adults. This system, called the Behavioral Risk Factor Surveillance System (BRFSS), has evolved over the past decade into our nation's primary source of state-based information on risk behaviors among adult populations.

The BRFSS uses a monthly telephone survey to gather information from adults, 18 years of age and older, on their knowledge, attitudes, and practices related to such issues as:

- health status and access to care
- tobacco and alcohol use
- dietary patterns, such as consumption of fruits and vegetables
- leisure-time physical activities
- injury control, including use of household smoke detectors
- HIV and AIDS
- use of preventive services, including immunizations and screening for colorectal cancer
- women's health issues, such as screening for breast and cervical cancer

As of 1994, all 50 states and the District of Columbia (known as "participants") were involved in the BRFSS. The BRFSS survey questionnaire consists of three components:

- **Core Questionnaire** - a set of questions asked by all participants. These questions, which have remained fairly constant or **comparable** since the BRFSS began, deal primarily with recent or current behaviors that are risk factors for disease (listed earlier in this section). Certain risk factor and demographic information (e.g., age, gender, race, ethnicity, education, etc.) are obtained every year in what is known as the "fixed core." Data on selected risk factors are obtained every other year as part of the "rotating core." Finally, up to five additional questions on new topics are asked for a one-year period only in the "emerging core."

- **Optional Standard Modules** - sets of questions on specific topics developed by CDC and made available to states. Each year, states decide which, if any, of the modules they will include. The question topics could be an extension of a core questionnaire risk factor or a completely unrelated risk factor.

- **State Added Questions** - questions developed by individual state participants on topics of special interest. The BRFSS is flexible and can be used to address emerging health issues of unique interest to a state.

The BRFSS has several important characteristics of a valid survey. It is:

- *representative*, which means that the characteristics of the sample, or people interviewed, are similar to the characteristics of the general population and the results can be generalized to that larger population of interest.
- *comparable,* so that the results from one year can be compared to results from other years of the same survey - both within a state and between states.
- *timely*, since it is usually repeated annually and thus updated frequently.
- *weighted* to represent the population of interest (and thus be representative).
- conducted by *trained interviewers* who follow standard protocols and interviewing methods.

The survey is not without its limitations, however. Because it is a telephone survey, the BRFSS by design excludes individuals who do not have a telephone in their homes. It is also based on self-reported data and may have only a small number of respondents in certain categories.

What data come from the BRFSS?

Each year, CDC compiles and analyzes the data from each of the BRFSS participants and produces a standard report. Called the BRFSS Summary Prevalence Report, it includes tables and reports for selected risk factors and preventive health measures in the BRFSS core questionnaire and standard modules. The BRFSS maintains a website that contains this report, state prevalence data, announcements, publications using BRFSS data, BRFSS questionnaires, State BRFSS Coordinators, etc. The site is: http://www.cdc.gov/nccdphp/brfss/.

Figure 1 is a sample of the data included in the 1997 BRFSS Summary Prevalence Report. It shows the estimated prevalence and relevant statistics for all states for the core question: "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?" For some summary reports, responses to more than one question are included in the analysis.

The columns in Figure 1 include the following information:

Participant — Refers to each of the 50 states plus the District of Columbia.

Sample size — The number of individuals in the sample who were eligible and responded to the questions(s). These are unweighted numbers. While some questions are asked of some individuals in the sample (such as mammogram use among women), the health insurance question was asked of all individuals in the sample.

Percent — An estimate of the prevalence or the percent of the population that answers "yes" to the question, or respondents having the behavioral risk factor of interest. These percentages are based on weighted data. They are therefore the best estimate of the prevalence in the participants' population.

Standard error — A measure of the variability in the percent or prevalence estimate. The last exercise in Module 2 focused on variability in numbers of births and in birth rates. Numbers, rates, and percentages are more variable in smaller populations. A survey is usually conducted on a relatively small sample drawn from a much larger population. In Module 2 you learned how the number of births might vary among 100 similar counties. In the case of a sample survey like the BRFSS, imagine taking 100 different samples from the population of a state. The number of individuals with some characteristic would vary from one sample to the next. The percent of individuals with some characteristic, or the prevalence estimate, based on the survey would also vary from one sample to the next. The **standard error** provides a way of estimating the sampling error — the variability in an estimate based on a sample survey. The standard error also allows us to calculate the confidence interval or confidence limits for these prevalence estimates. Without getting into the arithmetic, the standard error provides a measure of the variability that occurs in percentage estimates or prevalence estimates because they are based on a sample.

95% confidence interval — A range that with 95% certainty includes the true population prevalence. If you were to conduct a survey for each of 100 different samples drawn from the same population, the confidence interval would be the range of values for the prevalence estimate that you could expect in 95 out of 100 similar samples. The confidence interval is another way of referring to the confidence limits discussed in Module 2.

Summary statistics are also provided at the bottom of the table. They include:

Number of participants — Total number of state respondents who answered the question(s) regarding the respective "risk factor."

Median — The middle value of all state prevalence estimates. The median is provided, rather than the average, because the BRFSS consists of random samples from each of the 50 states, the District of Columbia, and Puerto Rico.

Range — The lowest prevalence and the highest prevalence among all participants.

Example: Interpreting BRFSS Prevalence Reports

Let's suppose we want to know the prevalence of having no health insurance in Georgia. In Figure 1, find Georgia in the first column. Reading across the columns, we discover that:

The sample in Georgia included 2,303 adults. The estimated prevalence of having no health insurance is 12.0%. The standard error of the estimate is 0.9%.

We can be 95% confident that, based on this sample, the true prevalence of having no health insurance among adults in Georgia is between 10.3% and 13.7%.

Figure 1: Summary Prevalence Report for No Health Insurance

1997 BEHAVIORAL RISK FACTOR SURVEILLANCE DATA
ESTIMATED PREVALENCE AND RELEVANT STATISTICS FOR NO HEALTH INSURANCE*
DENOMINATOR IS PERSONS AGE 18 AND OVER
DENOMINATOR EXCLUDES MISSING, DON'T KNOW, AND REFUSED

PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
ALABAMA	2171	14.4	0.9	(12.7, 16.1)
ALASKA	1536	21.3	1.6	(18.2, 24.4)
ARIZONA	1902	14.7	1.2	(12.4, 16.9)
ARKANSAS	1792	17.3	1.2	(15.0, 19.6)
CALIFORNIA	4058	19.3	0.8	(17.8, 20.8)
COLORADO	1824	11.9	0.9	(10.0, 13.7)
CONNECTICUT	2246	9.4	0.9	(7.8, 11.1)
DELAWARE	2554	10.8	0.8	(9.2, 12.3)
DISTRICT OF COLUMBIA	1504	11.6	1.0	(9.6, 13.6)
FLORIDA	3487	17.6	0.8	(16.1, 19.1)
GEORGIA	2303	12.0	0.9	(10.3, 13.7)
HAWAII	2166	6.4	0.7	(5.1, 7.7)
IDAHO	4911	16.6	0.8	(15.1, 18.1)
ILLINOIS	2883	11.3	0.7	(10.0, 12.7)
INDIANA	2365	12.4	0.8	(10.8, 14.0)
IOWA	3596	9.6	0.6	(8.4, 10.7)
KANSAS	2000	9.5	0.8	(8.0, 10.9)
KENTUCKY	3607	13.8	0.7	(12.4, 15.2)
LOUISIANA	1652	20.4	1.2	(18.0, 22.8)
MAINE	1699	12.0	0.9	(10.3, 13.8)
MARYLAND	4566	10.2	0.6	(9.0, 11.4)
MASSACHUSETTS	1765	9.3	0.8	(7.6, 10.9)
MICHIGAN	2561	9.9	0.7	(8.6, 11.3)
MINNESOTA	4808	8.4	0.5	(7.5, 9.3)
MISSISSIPPI	1595	15.2	1.1	(13.0, 17.4)
MISSOURI	1848	12.2	1.0	(10.3, 14.1)
MONTANA	1800	14.6	0.9	(12.8, 16.4)
NEBRASKA	2692	7.6	0.6	(6.4, 8.8)
NEVADA	2496	14.1	1.4	(11.3, 16.8)
NEW HAMPSHIRE	1511	10.3	1.0	(8.4, 12.2)
NEW JERSEY	2658	11.7	0.8	(10.1, 13.2)
NEW MEXICO	1807	22.2	1.2	(19.9, 24.5)
NEW YORK	3397	14.0	0.7	(12.6, 15.4)
NORTH CAROLINA	3624	14.7	0.7	(13.3, 16.1)
NORTH DAKOTA	1799	11.7	0.9	(9.9, 13.5)
OHIO	3164	10.5	0.7	(9.0, 11.9)
OKLAHOMA	1880	17.0	1.1	(14.9, 19.2)
OREGON	3313	12.5	0.7	(11.1, 14.0)
PENNSYLVANIA	3595	9.4	0.6	(8.3, 10.6)
RHODE ISLAND	1836	10.7	0.9	(8.9, 12.5)
SOUTH CAROLINA	2150	15.0	1.0	(13.1, 17.0)
SOUTH DAKOTA	2196	13.2	0.9	(11.5, 14.9)
TENNESSEE	2973	11.7	0.7	(10.3, 13.2)
TEXAS	2486	24.2	1.0	(22.3, 26.2)
UTAH	2861	11.2	0.8	(9.6, 12.7)
VERMONT	3177	14.4	0.8	(12.9, 15.9)
VIRGINIA	3512	11.3	0.7	(9.9, 12.6)
WASHINGTON	3598	10.9	0.6	(9.7, 12.2)
WEST VIRGINIA	2429	18.1	0.9	(16.3, 19.9)
WISCONSIN	2243	9.3	0.9	(7.6, 11.0)
WYOMING	2406	19.0	1.2	(16.6, 21.3)
PUERTO RICO	2260	10.3	0.8	(8.8, 11.7)

SUMMARY STATISTICS: NO. OF PARTICIPANTS = 52 MEDIAN = 12.0 RANGE = 6.4-24.2

* HAVING NO HEALTH CARE PLAN

Exercise 1: Interpreting Prevalence Estimates

Instructions: You have been given a copy of the same BRFSS Summary Prevalence Report that Adam gave to Zack and Vanessa. Table 1, below, and Table 2 on the following page present data on the prevalence of smoking from the BRFSS. These prevalence estimates are based on responses to two questions: "Have you smoked at least 100 cigarettes in your entire life?" and "Do you now smoke cigarettes everyday, some days, or not at all?" Examine these tables carefully, then answer the questions that follow to begin to discover how Adam's state (State C) compares with others in its patterns of cigarette smoking behavior.

1. What is the sample size for State C? How does this sample size compare with the sample sizes for other states?

2. What is the 95% confidence interval for State C's estimate? What does this mean?

Table 1
1996 Behavioral Risk Factor Surveillance Data
Estimated Prevalence and Relevant Statistics for Current Smokers*

PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
A	3995	18.60	0.70	(17.23, 19.97)
B	3571	21.81	0.78	(20.28, 23.34)
C	3598	23.59	0.80	(22.02, 25.16)
D	3611	31.66	0.93	(29.84, 33.48)
E	4471	20.90	0.79	(19.35, 22.45)
F	4400	20.58	0.68	(19.25, 21.91)
G	3131	22.72	0.92	(20.92, 24.52)
H	4303	23.25	0.73	(21.82, 24.68)
I	3581	24.54	0.82	(22.93, 26.15)
J	3575	23.44	0.81	(21.85, 25.03)

SUMMARY STATISTICS: NO. OF PARTICIPANTS = 10 MEDIAN = 22.99 RANGE = 18.60-31.66
YEAR 2000 OBJECTIVE 3.4: 15% FOR PEOPLE AGED 20 AND OLDER

* CURRENT SMOKERS INCLUDE BOTH INDIVIDUALS WHO EVER SMOKED 100 CIGARETTES AND CURRENT SMOKERS (EVERY & SOME DAYS). DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

Table 2
1996 Behavioral Risk Factor Surveillance Data
Estimated Prevalence and Relevant Statistics for Current Smokers, By Sex*

	MALES				FEMALES			
PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
A	1725	21.41	1.13	(19.20, 23.62)	2270	15.85	0.83	(14.22, 17.48)
B	1440	23.33	1.20	(20.98, 25.68)	2131	20.43	0.97	(18.53, 22.33)
C	1478	26.27	1.28	(23.76, 28.78)	2120	21.15	0.98	(19.23, 23.07)
D	1319	33.96	1.46	(31.10, 36.82)	2292	29.57	1.08	(27.45, 31.69)
E	1836	22.55	1.26	(20.08, 25.02)	2635	19.38	0.97	(17.48, 21.28)
F	1961	21.72	1.03	(19.70, 23.74)	2439	19.52	0.88	(17.80, 21.24)
G	1328	24.88	1.51	(21.92, 27.84)	1803	20.76	1.10	(18.60, 22.92)
H	1744	23.26	1.14	(21.03, 25.49)	2559	23.23	0.93	(21.41, 25.05)
I	1521	23.83	1.24	(21.40, 26.26)	2060	25.16	1.07	(23.06, 27.26)
J	1515	24.57	1.22	(22.18, 26.96)	2060	22.36	1.08	(20.24, 24.48)

SUMMARY STATISTICS:	MALES		FEMALES	
	NUMBER OF PARTICIPANTS	= 10	NUMBER OF PARTICIPANTS	= 10
	MEDIAN	= 23.58	MEDIAN	= 20.96
	RANGE	= 21.41-33.96	RANGE	= 15.85-29.57

* CURRENT SMOKERS INCLUDE BOTH INDIVIDUALS WHO EVER SMOKED 100 CIGARETTES AND CURRENT SMOKERS (EVERY & SOME DAYS). DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

3. What is the current smoking prevalence (%) estimate in State C:
   a. For all adults?
   b. For males?
   c. For females?

4. How do State C's sex-specific current smoking prevalence estimates compare with those of other states?

5. The national smoking prevalence among people aged 18 and older is 24.7%. What is the percent difference between State C and the nation as a whole?

6. Decide whether each of the following is a measure of incidence or a measure of prevalence.

   a. In Alabama, 14.4% of persons 18 and over had no health insurance in 1997.

   b. Among persons 18 and over 15.5% reported that they had no health insurance at some time during 1997.

   c. In State C, 21.15 % of females 18 and older were current smokers.

   d. Among females 18 and older who were current smokers, 11.45% reported that they had attempted to quit smoking during the last 12 months.

   e. Among females 18 and older who were current smokers, 95% reported that they had attempted to quit smoking at some time in their life.

Now view Act 2 of the videotape.

Section II. Prevalence Estimates for Subgroups

Why analyze subgroups?

For surveys in general, it is quite common to want to examine your outcome of interest by population subgroups such as age, sex, race, region of the United States, state, or local areas. The reason for this type of analysis is that your outcome of interest might vary dramatically among these subgroups. As an example, the use of smokeless tobacco is much more prevalent for males than females or in the southeastern part of the United States compared with the northeastern part.

What should you consider when analyzing subgroups?

When you are considering analyzing a health behavior by a population subgroup, you need to take into account the sample size, or the number of individuals who participated in the survey, for each subgroup. For some population subgroups, the sample size may be quite small. In order to produce stable estimates for your outcome of interest, you need to have a sufficient sample size on which to base this estimate. A generally accepted rule is not presenting any estimate that is based on a sample size of less than 50 respondents. This should be considered a minimum standard, however. As the sample size increases, the standard error decreases, the confidence interval decreases, and you get a much more stable estimate. The standard error and confidence interval should therefore be used in interpreting estimates based on a survey.

How do you analyze subgroups with small sample sizes?

In the case of small sample sizes for subgroups, there is always the option of combining, data for several years to increase the sample size enough to produce a stable health behavior estimate. There are, however, a few issues that should be considered when planning to aggregate data.

Comparability

First, you should determine whether the health behavior was defined exactly the same way during the time period of interest. This makes the individual yearly estimates comparable. In most cases, the definition will be the same — but not always. If a question has been reworded or the response categories have changed, then the definition will change slightly.

Next, you should determine whether the health behavior changed dramatically during the time period of interest. If there are dramatic changes, you would have to wonder which year is more accurate. Did something happen during the time period to cause this change?

Sampling Weights

The BRFSS data are weighted to the state population for each calendar year. When several years of BRFSS data are combined, the sampling weights should be adjusted or recalculated. When you combine data across years, consult your state's BRFSS coordinator.

Sample Design

The calculation of sampling weights and variance estimates depends on the sampling design. If the sampling design has changed, it may be more difficult to combine data for several years. For example, the sampling design might have been changed to increase the number of African Americans or Hispanics in the sample. Again, consult your state's BRFSS coordinator.

L Remember that you can always discuss these issues with a statistical expert in your state or local area.

How can aggregate BRFSS data be used to analyze subgroups?

Producing prevalence estimates for subgroups is quite common with the BRFSS. As an example, the BRFSS Summary Prevalence Report examines each health behavior by sex. The demographics section of the questionnaire is a good source for selecting a population subgroup.

Example: Aggregating Data

Let's suppose that we are interested in the prevalence of health care coverage for Hispanics. Figure 2 shows that the sample for three years, 1994-1996, has consistently included less than 42 Hispanic respondents. Since we would not be able to produce a stable estimate from this small number of respondents, we consider aggregating three years of survey data.

Figure 2
1994-96 Behavioral Risk Factor Surveillance Data
Estimated Prevalence and Relevant Statistics for No Health Insurance Among Hispanics*

PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
1994	42	7.53	3.65	(0.38, 11.18)
1995	38	12.32	4.77	(2.97, 17.09)
1996	45	9.62	3.32	(3.11, 12.94)

* HAVING NO HEALTH CARE PLAN. DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

Example: Calculating Aggregated Samples

We know that the three years of data are comparable because the same question was asked each year. Thus, we can proceed to aggregate and calculate the sample size as:

$$42 + 38 + 45 = 125$$

After working with a statistics expert, we have the following aggregated data, shown in Figure 3, for health care coverage among Hispanics. We see that the aggregate BRFSS data, three years of data combined, provide a more stable estimate of health care coverage among Hispanics than a single year alone. By combining multiple years of data, we have a larger sample size which decreases the standard error.

Figure 3
1994-96 Behavioral Risk Factor Surveillance Data
Estimated Prevalence and Relevant Statistics for No Health Insurance Among Hispanics*

PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
1994 - 96	125	9.74	2.73	(4.39, 12.47)

* HAVING NO HEALTH CARE PLAN. DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

Exercise 2: Comparing Regional and State Prevalence Estimates

Instructions: Now it is your turn. Like Zack and Vanessa, you have on your desk Table 3, which shows aggregated data, from 1994-1996, on the smoking prevalence in the three health districts in their state and in the state as a whole. You also have Table 4, which displays these statistics by sex. Use these data to help understand how Health District 3's smoking rates compare with the state as a whole.

Table 3
1994-96 Behavioral Risk Factor Surveillance Data
Estimated Health District Prevalence and Relevant Statistics for Current Smokers*

AREA	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
District 1	3248	17.24	0.69	(15.89, 18.59)
District 2	2254	22.14	0.96	(20.26, 24.02)
District 3	3916	27.77	0.80	(26.20, 29.34)
State C	9609	22.61	0.47	(21.60, 23.53)

* CURRENT SMOKERS INCLUDE BOTH INDIVIDUALS WHO EVER SMOKED 100 CIGARETTES AND CURRENT SMOKERS (EVERY & SOME DAYS).
DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

Table 4
1994-96 Behavioral Risk Factor Surveillance Data
Estimated Health District Prevalence and Relevant Statistics for Current Smokers, By Sex*

	MALES				FEMALES			
PARTICIPANT	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL	SAMPLE SIZE	PERCENT	STANDARD ERROR	95% CONFIDENCE INTERVAL
District 1	1486	18.88	1.09	(16.74, 21.02)	1942	15.67	0.89	(13.93, 17.41)
District 2	957	23.36	1.51	(20.40, 26.32)	1297	20.99	1.19	(18.66, 23.32)
District 3	1565	30.51	1.29	(27.98, 33.04)	2351	25.45	1.01	(23.47, 27.43)
State C	4011	24.44	0.75	(22.97, 25.91)	5598	20.94	0.60	(19.76, 22.12)

* CURRENT SMOKERS INCLUDE BOTH INDIVIDUALS WHO EVER SMOKED 100 CIGARETTES AND CURRENT SMOKERS (EVERY & SOME DAYS).
DENOMINATOR IS PERSONS AGE 18 AND OVER, EXCLUDING THOSE WHO ARE MISSING, DON'T KNOW, AND REFUSED.

1. What is the ratio of the smoking prevalence estimate in District 3 to the State as a whole?

2. Which sex has the higher smoking prevalence in District 3? In the State?

3. Do the confidence limits for all adults in District 3 and the State overlap? Is the difference in smoking preva District 3 and the State statistically significant? (Hint: Refer to Module 2, Section IV)

Now return to the videotape and view Act 3.

Section III. Burden of Disease Risk

Approximately half of all deaths that occurred in 1990 could be attributed to major external (nongenetic) factors: tobacco use, diet and physical activity patterns, misuse of alcohol, microbial agents, toxic agents, firearms, sexual behavior, motor vehicles, and illicit use of drugs.[1] Since many of these factors are dependent on behavioral choices, the ability of public health to affect trends in death, disease, and disability relies in large part on our ability to convince people to adopt healthful behaviors.

The relationship between tobacco and health was first noted more than thirty years ago, in the landmark Surgeon General's Report on Smoking and Health.[2] Based upon extensive analysis, this report concluded that cigarette smoking is a cause of lung cancer and laryngeal cancer in men, a probable cause of lung cancer in women, and the most important cause of chronic bronchitis.

Since that time, successive reports issued by the Surgeon General have documented the health consequences of smoking in terms of deaths caused by cancer, heart disease, and chronic obstructive pulmonary disease (COPD). In 1994, the national smoking-attributable mortality was estimated at 430,700 deaths — or 47% of the deaths due to cancer, heart disease, and COPD; and 19.5% of all deaths that year.[3]

Compared to persons who have never smoked, current smokers are 9 times more likely to die of respiratory disease. The direct medical costs for detecting and treating individuals with these diseases each year is estimated to be more than $50 billion. Adding indirect costs (e.g., for sick leave and disability days due to smoking-related illnesses), the total annual cost is $100 billion.[4]

Knowing the prevalence of disease is critical to the design of effective, targeted prevention and control programs. Equally important, however, are additional data with which to highlight the importance of a program to state and local decision makers. Such data answers questions like: "How many people die from smoking-related illness?" "How much is smoking costing us?" "What would we save if we funded a smoking prevention initiative?"

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[1] McGinnis JM, Foege WH. Actual causes of death in the United States. JAMA 1993; 270(18): 2207-12.

[2] US Department of Health, Education, and Welfare. Smoking and health: Report of the Advisory Committee to the Surgeon General of the Public Health Service. Washington (DC): US Department of Health, Education, and Welfare, Public Health Service, PHS Publication No. 1103, 1964.

[3] Centers for Disease Control and Prevention. Smoking-attributable mortality and years of potential life lost–United States, 1984. (Reprint) MMWR 1997;46:444-51.

[4] Centers for Disease Control and Prevention. Medical-care expenditures attributable to cigarette smoking–United States, 1993. MMWR 1994;43:469-71.

What is relative risk?

In Module 1, you learned about the use of the rate ratio to compare death rates between two sexes and between two different time periods. The rate ratio may also be called a risk ratio or **relative risk.**

Relative risk is a measure of association showing the increase in risk due to certain types of exposure. Relative risk compares the probability of disease or the death rate due to selected causes in one group with the comparable probability of disease or the comparable death rate in another group. The two groups might be differentiated by sex (males vs. females), by age, or by exposure to a suspected risk factor (e.g., tobacco). Frequently, the group of primary interest will be labeled the "exposed" group, while the comparison group will be labeled the "unexposed" group.

Relative risk is a **measure of association** because it quantifies the relationship (association) between an exposure (e.g., tobacco use) and a disease (e.g., lung cancer). In other words, it is the ratio of the rate of illness or death for exposed persons compared with the rate of illness or death for nonexposed persons. The general formula for relative risk is as follows:

$$\textit{Relative risk} = \frac{\textit{Risk of disease or death for exposed persons}}{\textit{Risk of disease or death for unexposed persons}}$$

The numerator is the incidence, prevalence, or mortality rate for the group that you are primarily interested in (the exposed group). The denominator is the incidence, prevalence, or mortality rate for the comparison (unexposed) group. Rates are used to take into account the size of the populations of the two groups are drawn from - and thus, to enable valid comparisons. (You may wish to review the section of Module 1 that first introduced and discussed rates.)

Example: Relative Risk

Suppose we were interested in estimating the relative risk that smokers have of dying from lung cancer. To calculate this risk, we would compare the lung cancer death rate among smokers with the lung cancer death rate among nonsmokers. The "exposed" group would be those who smoke, while the "unexposed" group would be those who did not.

$$\textit{Relative risk} = \frac{\textit{Risk of dying from lung cancer among smokers}}{\textit{Risk of dying from lung cancer among nonsmokers}}$$

These measures of risk (death rates due to lung cancer among smokers and nonsmokers) are not commonly available. Death certificates do not typically indicate whether the deceased person smoked and information from the BRFSS does not indicate whether the person interviewed has died. Relative risk estimates are based on data from the American Cancer Society's (ACS) Cancer Prevention Survey II (CPS-II). ACS began the CPS-II in 1982, with volunteers recruiting 1.2 million participants aged 30 years and above in all 50 states. The health status of these participants has been followed over time, with the study still ongoing.[5] Information from a special study such as this is needed to measure the relative risk of death due to causes associated with smoking.

Interpreting relative risk

A relative risk of 1.0 means that the two groups you are comparing have exactly the same risk of disease or death.

A relative risk greater than 1.0 tells you that the exposed group (in the numerator) is at greater risk of disease or death than the unexposed group (in the denominator).

A relative risk less than 1.0 indicates a smaller risk for the exposed group (in the numerator) - perhaps because of a protective effect from the "exposure."

Relative risk of death from smoking

To determine if smokers are more likely to die from a particular cause of death, you would use the ratio of the death rate for current or former smokers compared with the death rate for those who never smoked:

$$\text{Relative risk (or rate ratio)} = \frac{\text{Death rate for current or former smokers}}{\text{Death rate for those who never smoked}}$$

[5] US Surgeon General. Reducing the health consequences of smoking: 25 years of progress. A report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. 1989. DHHS Publication No. (CDC) 89-8411.

Example: Relative Risk of Death

Suppose the average death rate for the 5-year period, 1990-1994, from lung cancer for smokers was 0.57 per 1000, while the comparable lung cancer death rate for nonsmokers was 0.07. The relative risk of lung cancer among smokers would be:

$$0.57 \div 0.07 = 8.1$$

This means that individuals who smoke have more than 8 times greater risk of dying from lung cancer than individuals who do not smoke.[6]

What is attributable risk?

Attributable risk takes the concept of risk a step further by actually helping us measure the public health impact of an exposure (in our case tobacco). ***Attributable risk is defined as the proportion of disease or death due to selected causes among those exposed that can be attributed to the exposure.***

To calculate attributable risk, we assume that the occurrence of disease or death in a group not exposed to the factor represents the baseline or expected risk for that disease. Any risk above that level is due to exposure. Thus, the attributable proportion (or risk) is the proportion of disease or death in the population that is attributable to the exposure. Conversely, the attributable risk represents the expected reduction in disease or death if the exposure could be removed (or if it never existed in the first place).

Example: Attributable Risk

Let's say that we want to estimate the attributable risk of dying from lung cancer due to smoking. In this case, not all of the lung cancer deaths among smokers can be attributed to smoking. Some lung cancer deaths would have occurred anyway since some nonsmokers will die of lung cancer. Thus, the attributable risk is the proportion of lung cancer deaths among smokers that is attributable to smoking.

The formula for calculating attributable risk is as follows:

$$\textit{Attributable risk} = \frac{\textit{(Risk for exposed group) - (Risk for unexposed group)}}{\textit{Risk for exposed group}} \times 100\%$$

6 Source: Office on Smoking and Health, CDC.

Attributable risk of death from smoking

To specifically apply the formula for attributable risk to deaths due to smoking, you would substitute the death rate due to a particular cause of death for “risk” in the general formula above:

$$\text{Attributable risk} = \frac{\text{(Death rate for exposed group) - (Death rate for unexposed group)}}{\text{Death rate for exposed group}} \times 100\%$$

Example: Deaths Attributable to Smoking

Suppose that you want to calculate the attributable risk of death from lung cancer due to smoking. Continuing the example we used to compute relative risk:

$$\begin{aligned}\text{Attributable risk} &= [(0.57 - 0.07) \div 0.57] \times 100\% \\ &= [(0.50) \div 0.57] \times 100\% \\ &= .8772 \times 100\% \\ &= 87.72\%\end{aligned}$$

This means that about 88% of the lung cancer deaths among smokers may be attributable to their smoking. Approximately 12% of the lung cancer deaths would have occurred anyway.

Now further suppose that you want to know how many lung cancer deaths could have been averted if these smokers never smoked. You know that 2,023 lung cancer deaths occurred among the smokers. So, you multiply the attributable risk times the number of deaths:

$$2{,}023 \times 87.72\% = 1{,}774$$

And you discover that 1,774 lung cancer deaths would not have occurred if the smokers had not smoked.

What is population attributable risk?

Population attributable risk is the percentage of disease or death <u>in the population</u> that is attributable to an exposure. By contrast, the attributable risk percent is the percentage of disease or death in **<u>the exposed group</u>** that is attributable to the exposure.

There are many formulas that can be used to calculate this value. A common formula is:

$$\text{Population attributable risk} = P(RR - 1) \div [P(RR - 1) + 1] \times 100\%$$

where *P* = *prevalence of the exposure in the entire population*
RR = *relative risk of disease or death from that exposure in the population*

The values for the population attributable risk are affected by the **prevalence of exposure** in the population while the attributable risk is unaffected by prevalence. Both measures are presented as percentages.

To calculate the population attributable risk of death from lung cancer due to smoking, you would use the following formula:

$$\frac{\text{Prevalence of smoking in the population} \times (\text{Relative risk of dying from lung cancer} - 1)}{\text{Prevalence of smoking in the population} \times (\text{Relative risk of dying from lung cancer} - 1) + 1}$$

Example: Population Attributable Risk

Assume that you need to know the population attributable risk of lung cancer death from smoking. If the prevalence of smoking in the population is 30.8%, your calculation would look like this:

$$\text{Population attributable risk} = \frac{[.308\,(8.1 - 1)]}{[.308\,(8.1 - 1) + 1]} \times 100$$

$$= \frac{[.308\,(7.1)]}{[.308\,(7.1) + 1]} \times 100$$

$$= \frac{2.19}{3.19} \times 100$$

$$= 68.7\%$$

Thus, 68.7% of the lung cancer deaths in the population could have been averted if smokers had never smoked.

How can population attributable risk be used?

Once you know the population attributable risk percentage, you can use it to estimate the total number of cases or deaths that could be averted in a population if all exposures were eliminated. For example, you could estimate the number of deaths from lung cancer that could be prevented if no one smoked, using the formula:

Number of deaths attributable to the exposure =

Population attributable risk x Number of cases or deaths in the population

Example: Deaths Attributable to Smoking

Suppose we wanted to estimate the number of lung cancer deaths that would have been prevented in an entire state if no one smoked. Assume that the population attributable risk of lung cancer deaths due to smoking was 68.7%, and the total number of deaths in the state from lung cancer was 2,582. The number of deaths due to smoking would be:

$$68.7\% \times 2{,}582 = 1{,}774$$

Thus, 1,774 lives could have been saved if smoking were eliminated.

Summary

To help you remember these measures, we have summarized their definitions as they apply to smoking and health:

- **Relative risk** is a measure of strength of association showing increase in risk (relative risk greater than 1.0) among the exposed (ever smokers).

$$\textit{Relative risk} = \frac{\textit{Death rate for current or former smokers}}{\textit{Death rate for those who never smoked}}$$

- **Attributable risk** (percent) measures the proportion of lung cancer deaths among ever smokers that can be attributed to smoking. Nationally, at least 3 out of 4 lung cancer cases among ever smokers are attributed to smoking.

$$\textit{Attributable risk} = \frac{\textit{(Death rate for exposed group) - (Death rate for unexposed group)}}{\textit{Death rate for exposed group}} \times 100\%$$

- **Population attributable risk** (percent) measures the proportion of lung cancer deaths in the population that can be attributed to smoking. At least 3 out of 5 lung cancer deaths in the U.S. population are attributed to smoking.

Population attributable risk of death from lung cancer due to smoking =

$$\frac{\textit{Prevalence of smoking in the population} \times \textit{(Relative risk of dying from lung cancer - 1)}}{\textit{Prevalence of smoking in the population} \times \textit{(Relative risk of dying from lung cancer - 1) + 1}}$$

Exercise 3: Calculating the Burden of Risk

Instructions: Table 5, below, provides you with data on lung cancer deaths in District 3, aggregated for 1994-1996. These data are broken down by sex and age. Use the data to calculate relative risk, attributable risk, and population attributable risk - and to analyze their implications.

Table 5
Smoking-related Lung Cancer Deaths, Health District 3, 1994-96

Group	Population	Lung Cancer Deaths	Death Rate per 1000 Population	Smoking Prevalence (Percent)
NEVER SMOKERS				
Males				
Ages 35-64	75,429	7	.093	0
Ages 65+	24,398	13	.533	0
Females				
Ages 35-64	87,932	7	.080	0
Ages 65+	37,524	10	.266	0
EVER SMOKERS				
Males				
Ages 35-64	90,349	41	.454	54.5
Ages 65+	19,404	113	5.824	44.3
Females				
Ages 35-64	63,936	20	.313	42.1
Ages 65+	24,808	51	2.056	39.8

1. Compute the relative risk of dying from lung cancer for males and females who have ever smoked, ages 35-64 and age 65 and older. Record your answer in the Relative Risk column on Table 6, below. Show your answers rounded to two decimal places.

2. Which group of smokers has the strongest association between lung cancer deaths and smoking? Which group has the lowest association? [Hint: Use the relative risk figures to answer this question.] Why do you think the risk might be higher for males?

3. Now, calculate the attributable risk of death from lung cancer due to smoking in each sex and age group. Record your answers in the Attributable Risk (Percent) column, showing them as percents rounded to one decimal place.

Table 6
Burden of Lung Cancer, Health District 3, 1994-96

Group	Relative Risk	Attributable Risk (Percent)	Population Attributable Risk
EVER SMOKERS			
Males			
Ages 35-64			
Ages 65+			
Females			
Ages 35-64			
Ages 65+			

4. What can you conclude from the attributable risk percents? (Circle your answers)
   a. The proportion of the population over 35 that died of lung cancer.
   b. The proportion of lung cancer deaths among smokers probably due to smoking.
   c. The proportion of lung cancer deaths in the population probably due to smoking.
   d. None of the above.

5. How many lung cancer deaths could have been averted among males 65 years of age and older?

6. How many lung cancer deaths could have been averted among all individuals (both male and female) 35 years of age and older who smoked?

7. Finally, compute the population attributable risk for each sex and age group. Record your answers in the Population Attributable Risk column as a percent rounded to one decimal place.

8. How many lung cancer deaths would have been averted if no one in District 3 over the age of 35 had ever smoked? How does this answer compare with your answer to #6? [Hint: The population attributable risk applies to all deaths due to lung cancer.]

What is SAMMEC?

SAMMEC is the acronym for "Smoking-Attributable Mortality, Morbidity, and Economic Costs." It is a software program, developed by CDC, that can be used to estimate the disease impact of smoking for the entire United States and each of the states.

The software was designed primarily for use by the states, but is also applicable to communities and counties if their population is more than a few hundred thousand persons. CDC provides each state with one copy of the software and documentation.

What are the disease impact measures in SAMMEC?

SAMMEC calculates both epidemiologic and economic measures of the disease impact of smoking. The specific measures are:

Smoking-attributable Mortality	Number of deaths due to cigarette smoking.
Death (or Mortality) Rates	Age-specific and age-adjusted smoking-attributable death rates for persons 35 years of age and older.
Years of Potential Life Lost (YPLL)	Years of life lost due to premature death from smoking. This measure is sensitive to both numbers of deaths and the prematurity of death. It helps us describe the years of life lost prior to a particular age (typically, age 65 or 85) or prior to full life expectancy.
YPLL Rates	Age-specific and age-adjusted rates for smoking attributable YPLL for persons 35 years of age and older.
Indirect Mortality Costs	Productivity losses, measured as earnings losses, due to premature death from smoking-related diseases and associated medical conditions. When people die prematurely, their future earnings are forfeited. This measure estimates the present value of those future earnings. While YPLL assesses the human cost of premature death in terms of person years, indirect mortality costs reflect the economic cost.

Indirect Mortality Cost Rates	Age-specific and age-adjusted rates for mortality costs for persons 35 years of age and older.

What data does SAMMEC use?

The beauty of SAMMEC is that it relies on data that is readily available in all states:

Smoking prevalence	Prevalence of current and former smokers for persons ages 35 to 64 and 65 and above. This can be derived from the BRFSS.
Mortality statistics	Numbers of deaths from smoking-related causes by sex and 5-year age category for persons 35 years of age and older, perinatal deaths, and deaths from smoking-related fires. This can be derived from death certificates.
Population data	Population data for the group of interest by sex and 5-year age categories for persons 35 years of age and older. This can be obtained from state population estimates.

How does SAMMEC calculate smoking-attributable mortality?

SAMMEC uses three types of data to calculate the number of deaths related to smoking:

- prevalence of current and former smoking
- relative risk of dying from a smoking-related cause of death among current smokers compared to never smokers and among former smokers compared to never smokers
- number of deaths for smoking-related diseases.

The relative risk estimates are based on data from the CPS-II. Figure 4 reproduces these estimates for the entire United States population. Diseases considered to be related to smoking include some types of cancer (neoplasms), cardiovascular diseases, and respiratory diseases.

What are some cautions when using SAMMEC?

It is not necessary to calculate SAMMEC estimates every year; an interval of every 3-5 years is quite sufficient. This is because relative risk estimates, prevalence, and number of deaths will change only slightly from year to year. Producing annual estimates may therefore confuse policymakers and the public, and may waste precious staff time.

SAMMEC can be used for smaller geographic areas in the U.S., but the area should have at least 400,000 residents. This is because:

- Estimates for smaller populations may be unreliable.
- The CPS-II population, from which the relative risks were developed, differ from the U.S. population in that they include a more highly educated population, and underrepresent African-American and Hispanic populations.
- Estimates may not be generalizable for smaller populations, particularly if the population has a different pattern of smoking than the CPS-II population.

In addition, SAMMEC should not be used for worksite analysis, since employed persons tend to be healthier than the general U.S. population and since sample sizes (including number of deaths) tend to be small.

Figure 4
Relative Risk of Dying from a Smoking-related Cause of Death

ICD-9-CM Code	Causes of Death	Males: Current Smoker	Males: Former Smoker	Females: Current Smoker	Females: Former Smoker
NEOPLASMS					
140-149	Lip, oral cavity, pharynx	27.48	8.80	5.59	2.88
150	Esophagus	7.60	5.83	10.25	3.16
157	Pancreas	2.14	1.12	2.33	1.78
161	Larynx	10.48	5.24	17.78	11.88
162	Trachea, lung, bronchus	22.36	9.36	11.94	4.69
180	Cervix uteri	NA	NA	2.14	1.94
188	Urinary bladder	2.86	1.90	2.58	1.85
189	Kidney, other urinary	2.95	1.95	1.41	1.16
CARDIOVASCULAR DISEASES					
390-398	Rheumatic heart disease	1.85	1.32	1.69	1.16
401-404	Hypertension	1.85	1.32	1.69	1.16
410-414	Ischemic heart disease				
	Ages 35 to 64	2.81	1.75	3.00	1.43
	Ages 65+	1.62	1.29	1.60	1.29
415-417	Pulmonary heart disease	1.85	1.32	1.69	1.16
420-429	Cardiac arrest/other heart disease	1.85	1.32	1.69	1.16
430-438	Cerebrovascular disease				
	Age 35 to 64	3.67	1.38	4.80	1.41
	Age 65+	1.94	1.27	1.47	1.01
440	Atherosclerosis	4.06	2.33	3.00	1.34
441	Aortic aneurysm	4.06	2.33	3.00	1.34
442-448	Other arterial disease	4.06	2.33	3.00	1.34
RESPIRATORY DISEASES					
010-012	Respiratory tuberculosis	1.99	1.56	2.18	1.38
480-487	Pneumonia, influenza	1.99	1.56	2.18	1.38
490-492	Bronchitis, emphysema	9.65	8.75	10.47	7.04
493	Asthma	1.99	1.56	2.18	1.38
496	Chronic airways obstruction	9.65	8.75	10.47	7.04
PERINATAL CONDITIONS*					
765	Short gestation/low birth weight	1.76		1.76	
769	Respiratory distress syndrome	1.76		1.76	
770	Respiratory conditions-newborn	1.76		1.76	
798.0	Sudden infant death syndrome	1.50		1.50	
OTHER CONDITIONS					
890-899	Burn deaths	NA	NA	NA	NA

* Deaths among infants < 1 year old.
Source: US Department of Health and Human Services. SAMMEC 3.0: Smoking-attributable mortality, morbidity, and economic costs; computer software and documentation. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Public Health Service, August 1996.

Exercise 4: Preparing a Fact Sheet

Instructions: Using all of the information you have collected and analyzed thus far, you are now in a position to help Zack and Vanessa design a fact sheet on the impact of smoking in their health district. A few samples of possible graphics are provided in Figures 5-7. Use them to answer the following questions.

1. What are the major points you wish to get across?

2. In what order do you wish to present the major points?

3. How will you depict the data (e.g., descriptive paragraphs, tables, bar graphs, pie charts, etc.)?

4. What additional information might you include in the fact sheet?

Now return to the videotape to view Act 4, which concludes Module 3 — and this course.

Figure 5
Estimated Smoking Prevalence

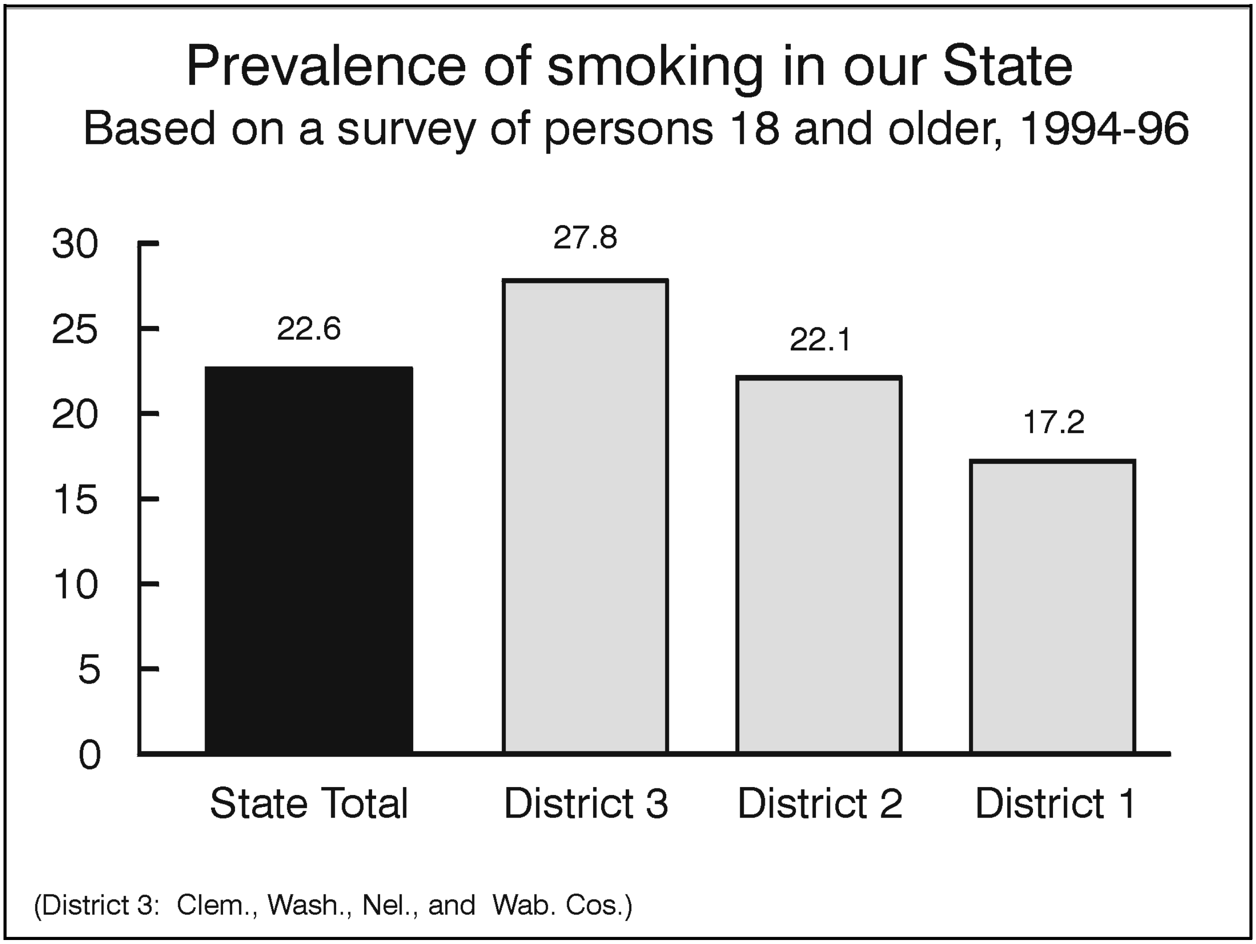

Figure 6
Relative Risk

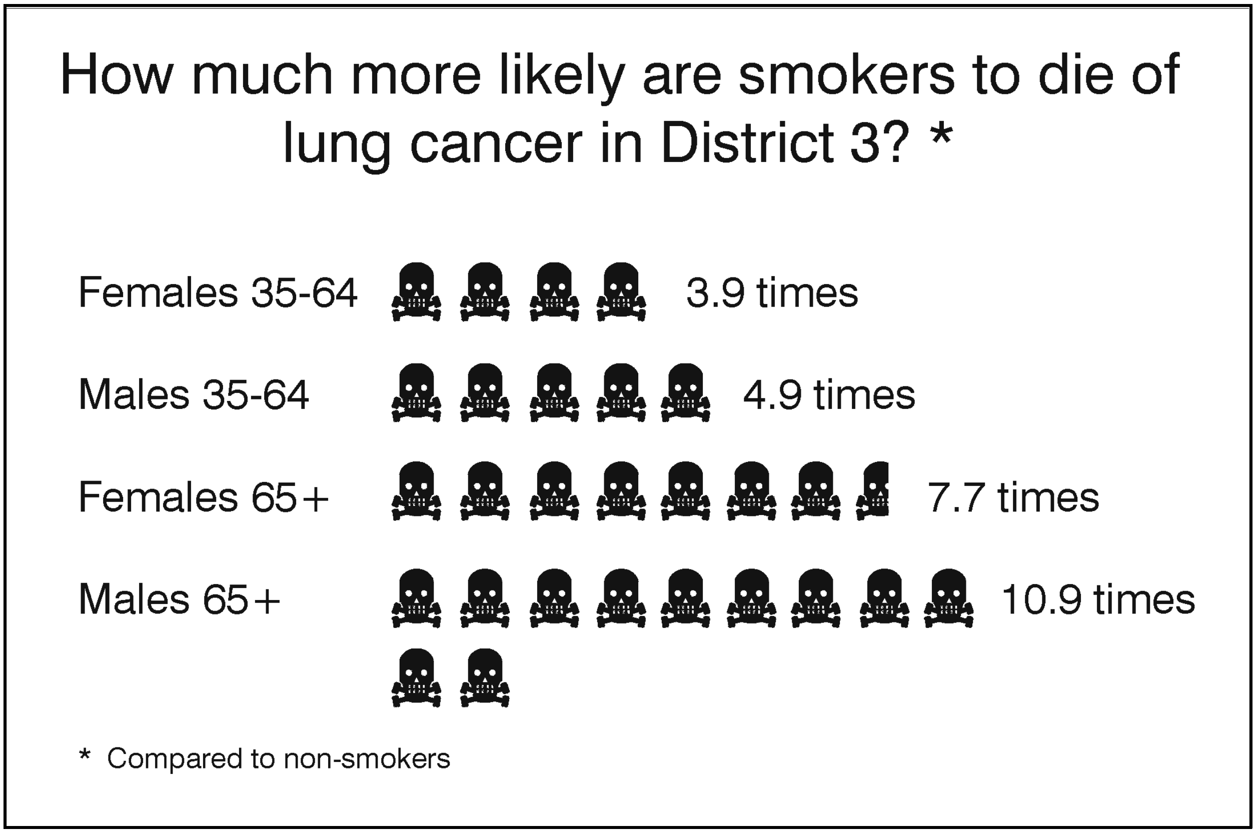

Figure 7
Attributable Risk

195 Deaths due to lung cancer could have been averted in District 3 from 1994-96

	Deaths due to lung cancer in District 3	*Percent of deaths that could have been averted**	*Number of deaths that could have been averted*
Males, Ages 35-64	48	67.8	33
Ages 65+	126	81.5	103
Females, Ages 35-64	27	55.2	15
Ages 65+	61	72.8	44
Total	**262**	**NA**	***195***

* Population attributable risk