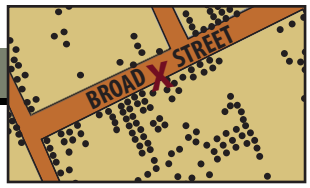
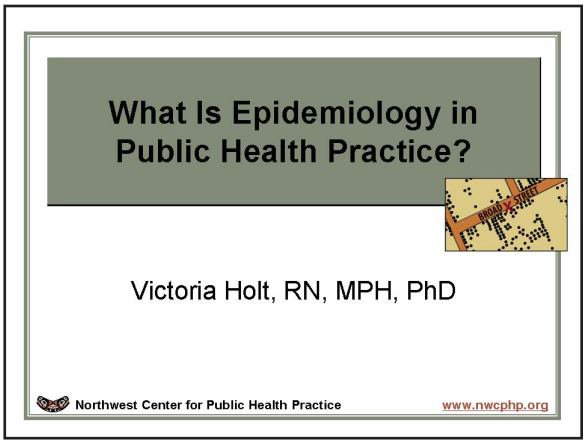
What is Epidemiology in Public Health?
Transcript

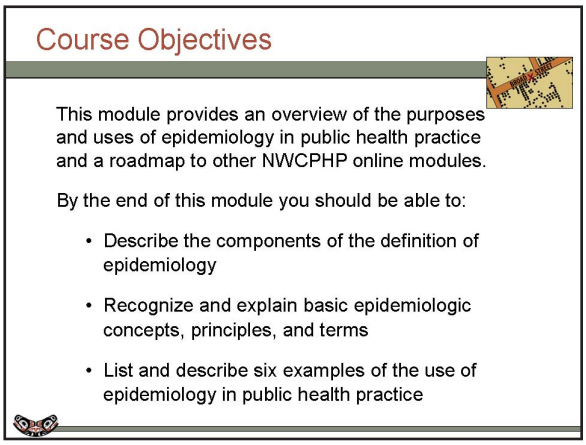


What Is Epidemiology in Public Health Practice?



Welcome to "What is Epidemiology in Public Health Practice?" My name is Victoria Holt. As a nurse, I've worked in a variety of hospital and clinic practice settings, including public health clinics in East Tennessee and North Carolina. More recently, as an epidemiologist, I'm a faculty member at the Northwest Center for Public Health Practice at the School of Public Health and Community Medicine at the University of Washington in Seattle. And for the last 15 years, I have also been a faculty member in the Department of Epidemiology at the University of Washington, where I currently teach classes in epidemiologic methods.

Course Objectives



This three-quarter hour course offers an overview of the purposes and uses of epidemiology in public health practice. In particular, public health professionals who are unfamiliar with epidemiology will find it useful. It should also provide a roadmap to help you use the other online modules on epidemiology, which are available through the Northwest Center for Public Health Practice.

By the end of this 45-minute module you should be able to understand and describe the essential components of the definition of the science of epidemiology.

You should also be able to recognize and explain the core basic epidemiologic concepts, principles, and terms presented in the module.

Finally, you should be able to list and define or describe six commonly occurring examples of the use of the methods and techniques of epidemiology in the field of contemporary public health practice.

Epidemiology Is the Study of...

What is epidemiology? One common definition states that epidemiology is the study of the distribution and determinants of disease in human populations.

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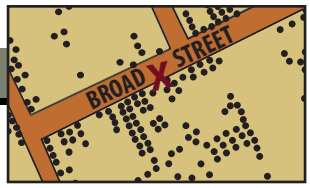
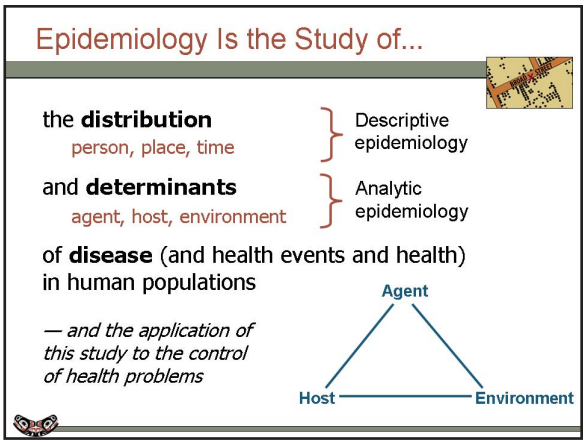




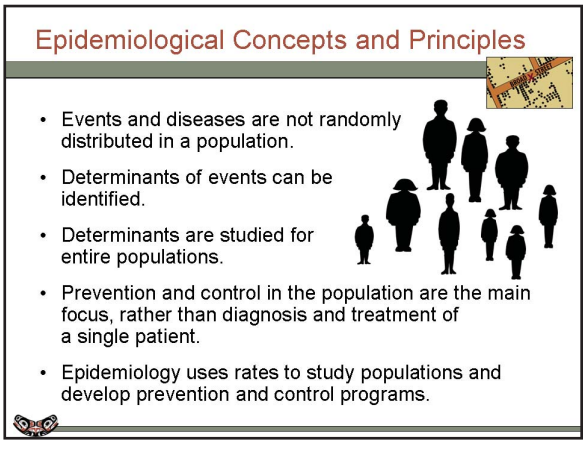
Let's take this definition apart a bit to examine it. Studies of the distribution of disease are often referred to as descriptive epidemiology. In these types of studies we focus on describing the occurrence of disease by describing the types of persons, the places, and the times during which the disease is most likely to occur. These types of studies are often conducted using readily available public health data.

When we study the determinants of disease, we are using analytic epidemiology. In epidemiology, we often talk about the agent, host, environment triangle. The concept of this triangle is useful as we review factors in each of these realms that may be important in causing disease. We'll talk a bit more about this later.

Although our traditional definition of epidemiology focuses on disease occurrence, we can also apply this study process to other events, for instance, injuries. We can also study determinants of health rather than illness.

A crucial aspect of this definition for public health practice is that it includes not just study of diseases or health events, but also requires the application of the results of the study to the control of health problems in the community.

Epidemiological Concepts and Principles



Several core concepts and principles guide the discipline of epidemiology.

First, we assume that health events and diseases are not randomly distributed in a population, but rather that they occur according to a pattern or patterns of some sort. Observing and recording these patterns allows us to identify the determinants, or causes, of health events and diseases.

Another core concept in the field of epidemiology is that our focus is not on individuals, but rather on entire populations, in which the distribution and determinants of events and diseases are studied. An important aspect of this focus is that we emphasize disease prevention and control in these populations. This is in contrast to clinical medicine, which

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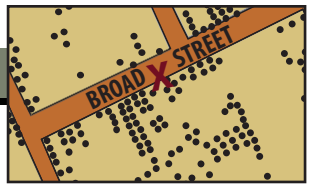
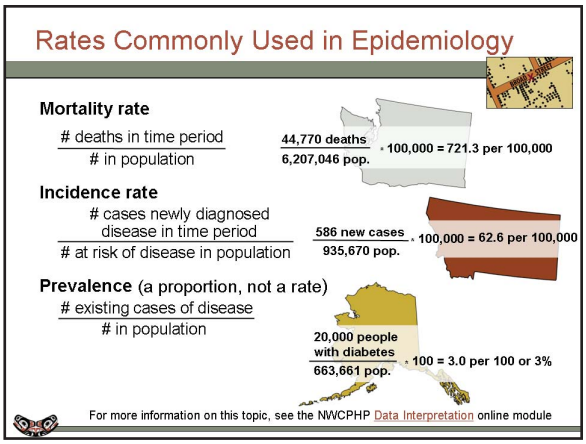


focuses on the diagnosis and treatment of events and diseases in individual patients.

Finally, epidemiology uses rates to compare distributions and determinants of events and diseases among populations of different sizes, providing the basis for the development of public health prevention and control programs. No other public health discipline makes use of rates in such a comprehensive and fundamental way.

Rates Commonly Used in Epidemiology



Because rates are so important in the practice of epidemiology, let's focus here on three key rates commonly used in public health. We are often interested in communicating the occurrence of death, or mortality. Although we might first record and note just the number, or count, of deaths in a community, using mortality rates relates the frequency of these deaths to the size of the population, allowing comparison of the mortality occurrence in populations of different sizes. In calculating mortality rates, we use the number of deaths among a population over a specified time as the numerator and the number of people in the population during that time as the denominator, and then we multiply the result by 1000 or 100,000.

For example, in Washington State, in 2004, 44,770 residents died, and the state's population was 6,207,046 that year. To calculate the mortality rate we divide the number of deaths by the total population and multiply by 100,000, yielding a mortality rate in 2004 of 721.3 per 100,000 population.

Incidence rates are defined and calculated in a similar manner. For example, from January 1 to December 31, 2005, there were 586 new cases of pertussis diagnosed in Montana, and the state's population was 935,670 that year. This gives us a pertussis incidence rate 2005 of 62.6 per 100,000 population during 2005.

Prevalence is another commonly used term in epidemiology; it is actually not a rate because it is not calculated over a period of time. Rather, it's a proportion—the proportion of the population that has a certain disease or characteristic at one point in time. We calculate it by dividing the number of people with the disease of interest by the number in the total population and then multiplying by 100 to express

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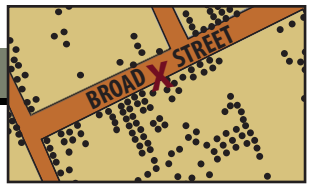
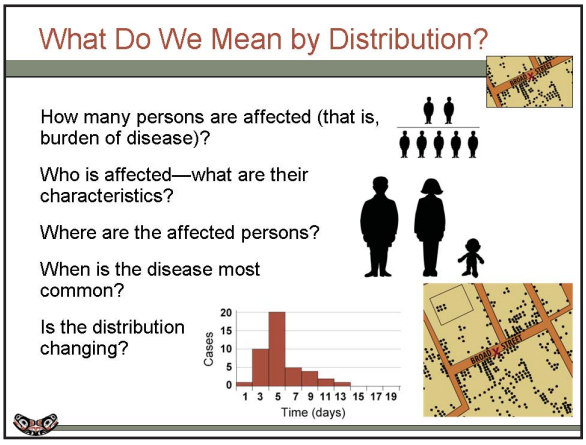


it as a percentage. In Alaska in 2005 there were 20,000 residents living with diabetes, and the total population of Alaska that year was 663,661, for a diabetes prevalence of 3%.

What Do We Mean by Distribution?



Let's go back to our initial definition of epidemiology for a moment. Remember, one part of the definition is study of the distribution of disease, which we called descriptive epidemiology.

What do we mean by distribution? There are four aspects:

The first aspect is the burden of the disease—"how many persons are affected?" As we've just illustrated, although numbers, or counts, are the raw data from which we begin, usually describing the burden of disease in terms of an incidence or mortality rate or prevalence is preferable.

The second aspect of the distribution of a disease is the question "who is getting the disease, or who are the persons affected?" In descriptive epidemiology we often use information readily available from disease reports, vital statistics, or other sources (such as age, race, gender, or sometime marital status) to describe who is getting the disease or experiencing the event.

Third, we describe disease or health in terms of place—"where are the affected persons?" This description can be as broad as noting in which countries the disease rates are highest, or as narrow as which census tracts or neighborhoods.

Finally, we ask questions about the disease in relation to time—"when are persons most commonly affected or when is the disease most common, and is the frequency or distribution changing over time?"

The answers to these descriptive epidemiology questions about a disease or event can be useful in many ways; they can provide us with information to better predict and therefore provide a response to outbreaks, and can also provide clues to the determinants, or causes, of a disease.

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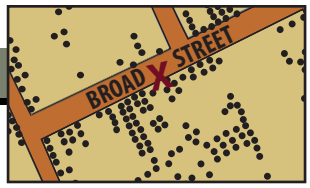
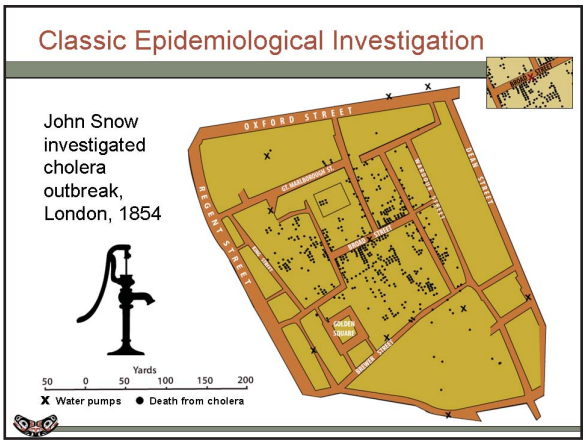


Classic Epidemiological Investigation

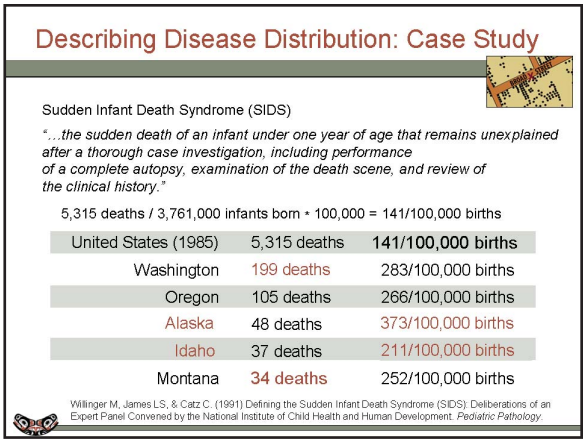
By the way, the module icon you've been seeing at the top of your screen is a map of Broad Street. This represents a well-known and elegant epidemiologic investigation by John Snow in 1854. Dr. Snow, sometimes called the father of epidemiology, used descriptive and analytic epidemiologic techniques to determine the source of a cholera outbreak in London. Cholera is transmitted through contaminated water, and Dr. Snow implemented a successful public health intervention by removing the handle of the water pump on a contaminated well.



Describing Disease Distribution: Case Study

Let's use the example of Sudden Infant Death Syndrome, or SIDS, to illustrate the process of obtaining descriptive epidemiologic information, and the and usefulness of this information.

SIDS is defined as the sudden death of an infant less than one year of age that remains unexplained after a thorough case investigation, including performance of a complete autopsy, examination of the death scene, and review of the clinical history.



SIDS was first recognized as a clinical diagnosis in 1975, and during the 1980s there was much interest in determining if the problem was increasing, and finding the determinants of SIDS risk. As a first step, the burden of disease was assessed. Remember, burden refers to how many people are affected.

In the US in 1985, there were 5,315 SIDS deaths. The denominator for the SIDS rate is the number in the population who are at risk of SIDS, that is, who are biologically capable of becoming SIDS cases. Since SIDS is a diagnosis of infants less than one year of age, the denominator used for the US SIDS rate for a year is the number of infants born during that year—in 1985 3,761,000 infants were born, so the SIDS rate was 141/100,000 live births that year.

For the northwest states, we find that the number of SIDS deaths ranged from 34 to 199 that year, with rates ranging from 211 per 100,000 live births in Idaho to 373 per 100,000 live births in Alaska.

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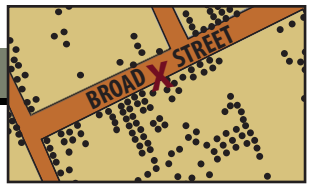
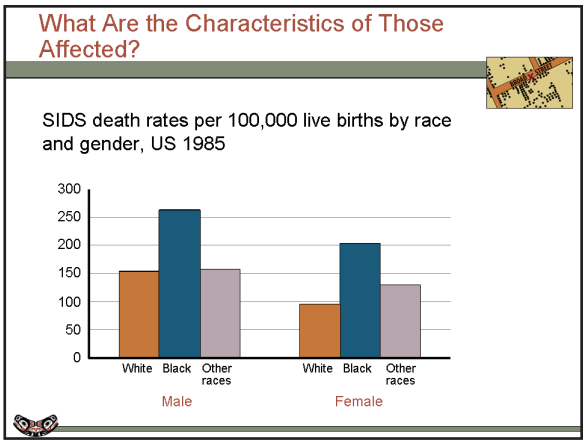


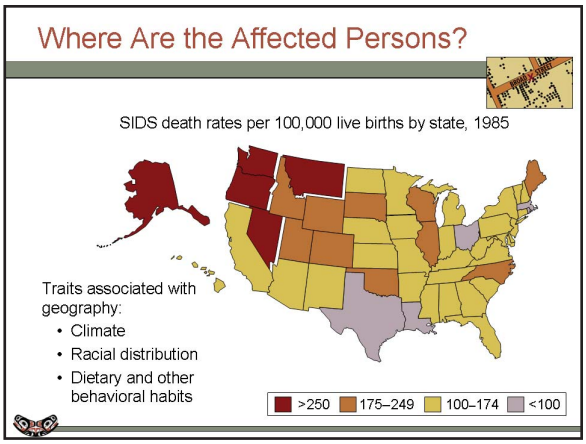
What Are the Characteristics of Those Affected?



Because death certificates provide information for mortality outcomes on race and gender, we often report these factors as part of the descriptive epidemiology. Here we see that in 1985, among both male and female infants, the SIDS death rates were higher for blacks compared to whites or infants of other races. We also see that within each race, the rates for males are somewhat higher than those for females.

Often readily available descriptive information like this gives us the first clues to the possible determinants of a disease. In this instance, you might speculate about the reason for the gender differences in SIDS risk based on other differences you know about between male and female infants. One of these factors is size; on average male infants are larger and heavier than female infants of the same age.

Where Are the Affected Persons?



As we have already discussed, another aspect of descriptive epidemiology concerns place. Where are the affected persons? We saw previously that the northwest states had higher SIDS rates in 1985 than did the US as a whole. Here we see graphically that there seems to be a concentration of SIDS deaths in the west—and particularly in the northwestern states. Alaska, Washington, Oregon, Montana, and Nevada all had SIDS rates higher than 250/100,000 live births that year, in contrast to Texas with a SIDS rate less than 100/100,000.

Many characteristics are associated with geography in the US—climate, racial distribution, and dietary and other behavioral factors to name a few. Often looking at the geographic distribution of disease using maps such as this one can help in the generation of hypotheses about disease determinants.

When Is the Problem Most Common?

A final aspect of descriptive epidemiology is the examination of the distribution of disease or health event by time. We can learn a lot by

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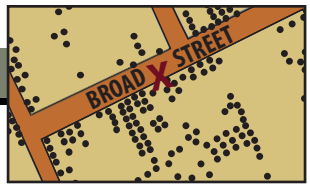
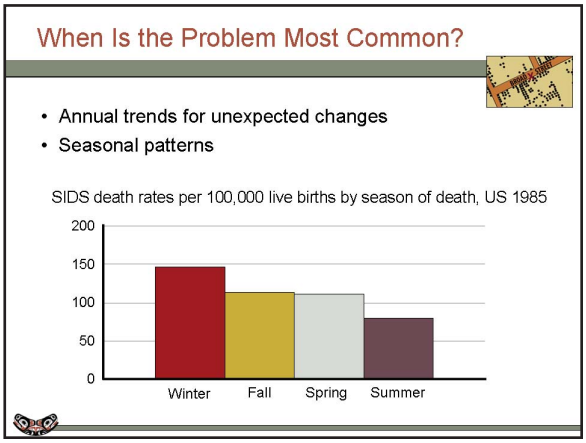


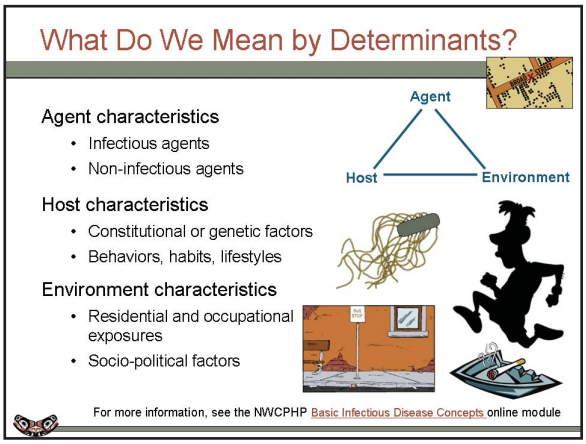
examining how a condition has changed between two time periods. We may examine annual trends, monitoring a health condition for expected or unexpected increases or decreases. We may also consider patterns of disease occurrence by season as we have here, looking at the distribution of SIDS cases by the rates of occurrence in different seasons during the year.



Again, this description of disease distribution may give us helpful information for determining causes of disease. This graph illustrates that SIDS has higher rates during the winter. This observation leads us to consider whether SIDS may have an infectious etiology, as in the winter in the US people are indoors in close proximity more often, and infectious agents are said to circulate more among persons under those conditions.

Interactive Exercise 1

What Do We Mean by Determinants?

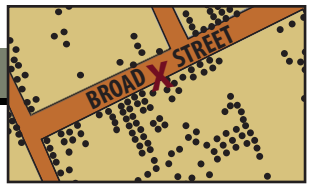


The second part of the definition of epidemiology involves the study of the determinants of disease and health events in the population.

What do we mean by determinants? Traditionally, epidemiologists speak of a triad of agent, host, and environment. This framework was applied initially to the study of infectious diseases, an early activity of epidemiologists, but it has proven useful also in guiding our thinking about investigating determinants of non-infectious diseases.

The presence of agents results in disease. Infectious agents are the bacteria, viruses, or other organisms that infect people. Noninfectious agents may be things such as vitamins, toxins, or radiation.

Host characteristics have been a focus of much epidemiologic research, especially into chronic diseases such as cancer or heart disease. We have long looked at constitutional factors such as body weight or body mass index, but now we also look at differences between people in some genes that might affect disease risk. We also look at behaviors, habits, and lifestyle characteristics such as diet,

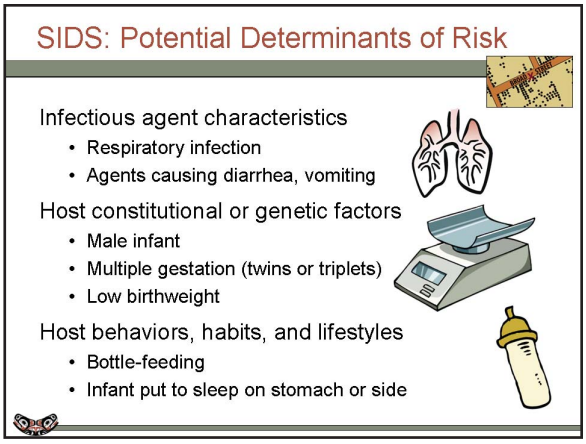


exercise, and smoking that have been shown to affect the risk of many diseases or health events.

Characteristics of the environment may have an important role in disease causation. Residential or occupational factors may increase or decrease exposure to substances such as irritants, toxins, and carcinogens. Examples of such factors include the availability of personal protective equipment in a factory handling toxic material, and air conditioning during a heat wave.

And increasingly there is the realization that in addition to the individual's personal environment, factors may operate on a neighborhood or community level to affect the health of all residents, for example, the availability of sidewalks or "walkability" of the neighborhood.

SIDS: Potential Determinants of Risk



Let's look at the investigation of the determinants of SIDS risk for examples of the categories of determinants we just explored.

One of the first hypotheses about SIDS was that an infectious agent might be involved, based in part on the seasonal differences in SIDS rates noted in the early 1980s. Consequently, epidemiologic studies were carried out to determine the presence of respiratory infection in infants who died of SIDS in comparison with other infants, as well as the presence of agents that cause diarrhea or vomiting.

Descriptive epidemiology pointed toward several constitutional or genetic factors in the host (the SIDS victims) that were subsequently investigated in more detail in analytic epidemiology studies. One of these was the fact that a higher percentage of SIDS victims were male than female. Also, SIDS was found to occur more often than you would expect among infants who were part of a multiple gestation (that is, twins or triplets) and also occurred more often among low birthweight infants.

Finally, descriptive studies indicated that SIDS was more frequently found in countries in which bottle-feeding and putting infants to sleep on their stomach or side were common than in countries without these practices. On the basis of these descriptive studies, analytic studies of individuals with and without SIDS were conducted to further investigate these factors.

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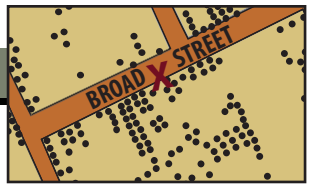
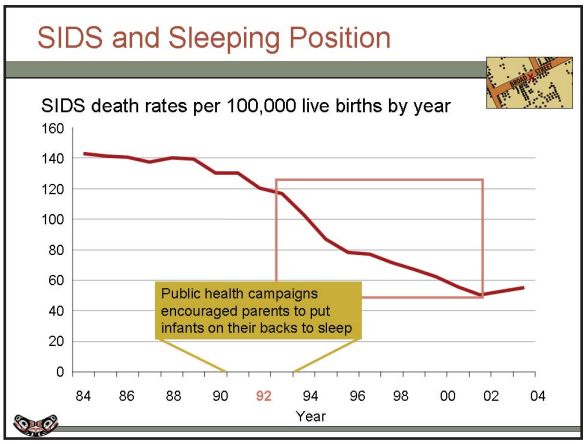


SIDS and Sleeping Position

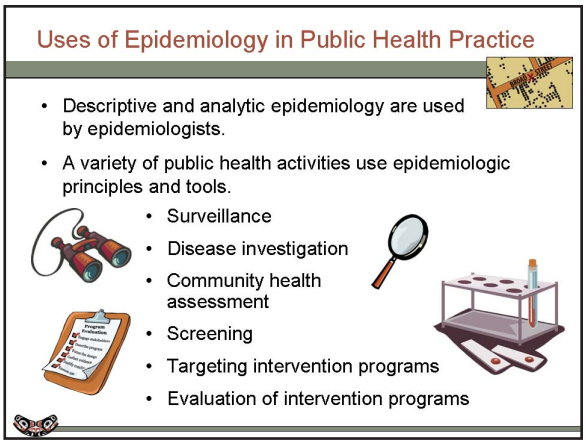


One of these factors—positioning an infant to sleep on his or her stomach or side—was so strongly associated with increased SIDS risk in these analytic studies that in the US in early 1992 the American Academy of Pediatricians endorsed placing infants on their backs to sleep. And in the early 1990s public health campaigns were begun in the US and elsewhere encouraging parents to adopt this practice.

We can see in this graph a fairly immediate and substantial drop in SIDS rates during the next decade, supporting the hypothesis that sleep position is an important determinant of SIDS risk.

Interactive Exercise 2

Uses of Epidemiology in Public Health Practice



We've talked so far about the definition of epidemiology, and two aspects of the field: descriptive and analytic epidemiology. Both of these aspects are used by epidemiologists in public health practice, and a variety of public health activities use epidemiologic principles and methods.

The six activities listed here: surveillance, disease investigation, community health assessment, screening, targeting intervention programs, and evaluation of intervention programs are not the only epidemiologic activities in public health practice, they're just the most common.

Let's focus a bit on each of these activities.

Public Health Surveillance

Surveillance is one of the cornerstones of epidemiologic practice in public health settings.

The Centers for Disease Control and Prevention, or CDC, defines this activity as follows: public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of information or data about a health-related event to those who need to

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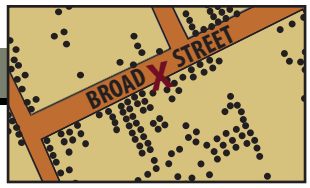
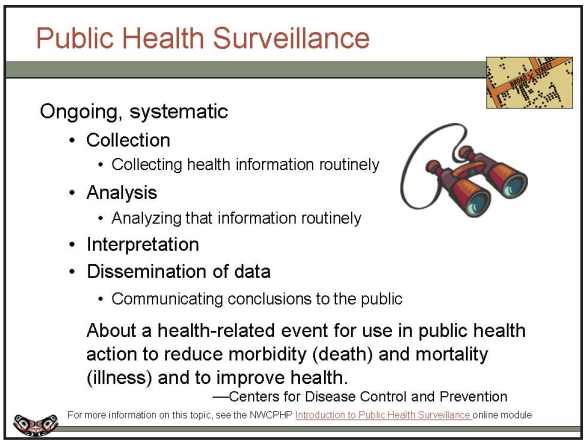


know so that action may be taken to reduce morbidity and mortality and to improve the public's health.

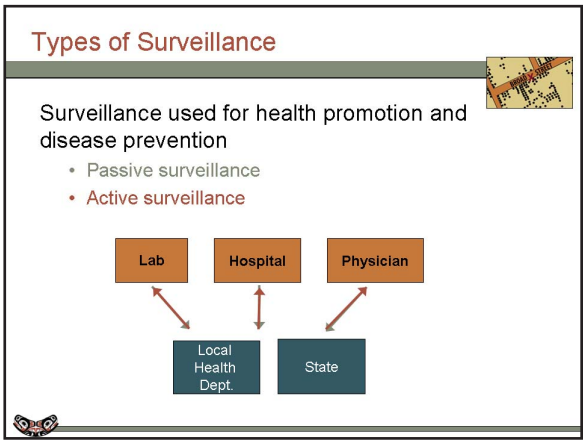
Thus, public health surveillance involves these key activities: collecting health information routinely, examining or analyzing that information—also routinely, and communicating your conclusions about the information to the public and others.



Types of Surveillance

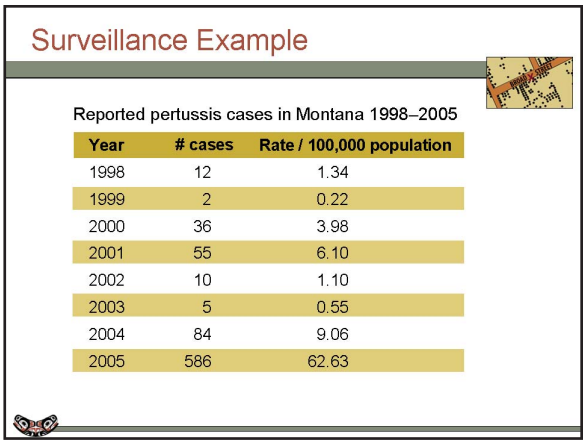
Surveillance data are used by a variety of individuals and organizations for health promotion and disease prevention purposes, and many types of surveillance systems exist to collect these data.

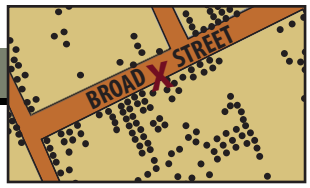
On the state level, there are surveillance systems that start with a state-specific official list of reportable diseases. These systems use passive surveillance, in which cases or data are reported by health care providers and laboratories either to local health jurisdictions or directly to the state health agency. For some reportable diseases or conditions active surveillance may be used instead. In active surveillance state or local public health personnel actively reach out to providers and laboratories, making periodic personal visits or phone calls asking about the recent occurrence of the disease or condition under surveillance. Active surveillance may be used also under special conditions such as community or school outbreaks.



Surveillance Example

Here's an example from Montana of one disease tracked in an ongoing surveillance system of reportable diseases. This table shows the number of cases of pertussis, a reportable disease in Montana, during the years 1998 through 2005, and the corresponding incidence rates per 100,000 population. Although there was a fair amount of variability in incidence rates from 1998 to 2003, the existence of the ongoing surveillance data made it clear in 2004 that there was



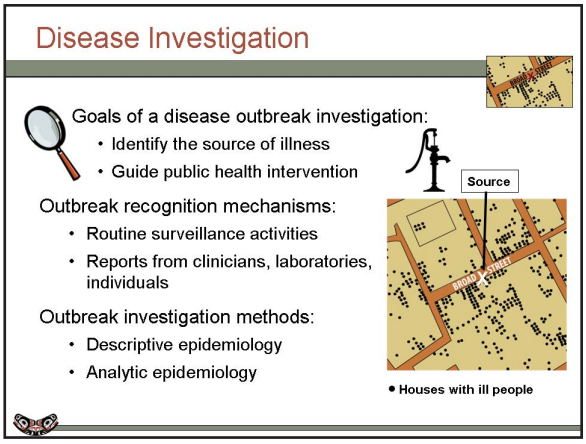


a substantial increase in pertussis incidence, and in 2005 an epidemic of the disease was apparent.

Although an increase in cases may be attributable to increased case-finding and completeness of reporting, ongoing surveillance systems such as this one that use incidence rates to compare disease occurrence over time or across categories within the population are an important tool for communicable disease control. And surveillance systems are increasingly being used to track noninfectious conditions such as cancer.

Now let's look at disease investigation.

Disease Investigation



Disease investigation is a core epidemiologic function in public health, and it is most often used in situations of short-term outbreaks of infectious diseases such as those associated with food or environmental contamination. The first goal of a disease outbreak investigation is to identify the source of the illness of which there is an apparent outbreak or sharp increase in occurrence. This information will help you develop and implement the appropriate intervention to control the outbreak as well as develop prevention policies necessary to protect the public's health.

Outbreaks can be recognized through several mechanisms, including analysis of routinely submitted notifiable disease surveillance data, such as just discussed, or through reports from health care providers, from clinical laboratories, or from the individuals who are themselves affected by the illness in question. In some instances health department personnel first learn of outbreaks through media inquiries.

Investigation of an outbreak uses the epidemiologic methods we have already discussed. An early step is often to describe the outbreak in descriptive terms: "Who is affected, where are they, and when did they become ill?" Next the investigation seeks to identify the determinants of the outbreak by using analytic epidemiologic methods, including conducting analytic studies and calculating disease rates or risk associated with specific foods, behaviors, and other factors.

What is Epidemiology in Public Health?
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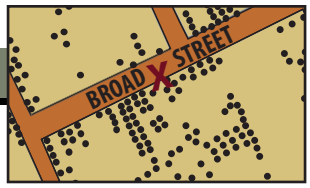
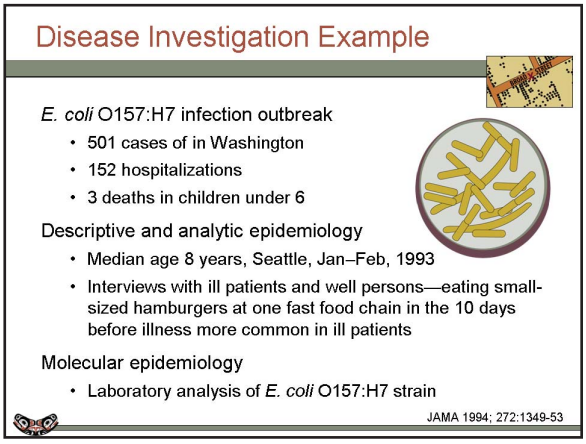


Disease Investigation Example



Here's an example of a large and serious disease outbreak of a disease caused by *E. coli*.

In this outbreak, the 501 cases occurring in Washington State presented with bloody diarrhea that was culture positive for the pathogen *E. coli* O157:H7 or with postdiarrheal hemolytic uremic syndrome. One hundred and fifty two of these cases were hospitalized, and three died—all children under the age of six.

Descriptive and analytic epidemiologic techniques were used to determine the source of illness in these cases. Data collected on cases indicated that the ill-ness occurred primarily in children—the median age of the cases was eight years. The illness was first recognized in the Seattle area. The first case was reported in January 1993, and by the end of February there were 501 confirmed cases in Washington State.

Based on initial talks with ill persons, an analytic study was done by interviewing the ill persons and well persons—who were neighborhood friends of the same age who were not ill—to see if their eating patterns in the previous 10 days differed. This study found that a much higher percentage of ill persons than well persons had recently eaten small-sized hamburgers at one fast food chain.

Molecular epidemiology was also used to determine if the outbreak cases were related to each other. Molecular analysis of all tested stool samples from primary or secondary cases found that they had the same strain of *E. coli* O157:H7, suggesting a common source for the infecting organisms. These were shown to have come from contamination during the beef slaughtering process. Effective control measures, including cooking of all hamburgers to at least 160 degrees, were then put in place.

Now let's look briefly at the community health assessment activity of epidemiology.

Community Health Assessment

Assessment is one of the three core public health functions defined by the Institute of Medicine in its 1988 report. These three functions, which include assurance and policy development in addition to assessment, have been shown to be a useful way to categorize a vari-

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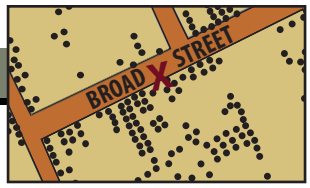


ety of public health activities in the US. The assessment function uses epidemiologic principles and methods.

In public health, assessment refers to a systematic process that periodically provides pertinent information to assess the health of a community.

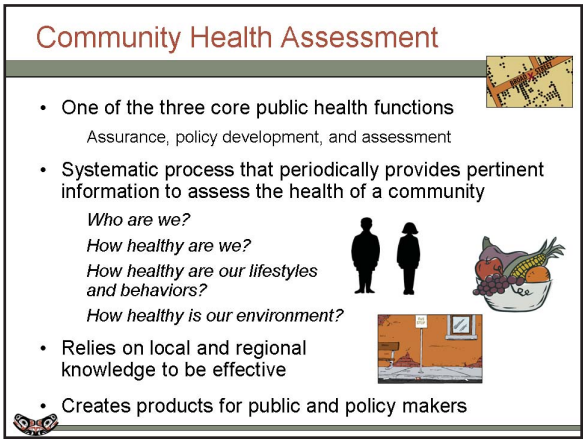
When doing community health assessment, we use descriptive epidemiology tools to answer the questions:

Who are we? This is often noted in terms of age, gender, and race distribution.

How healthy are we? Here we look at disease incidence and mortality rates.

How healthy are our lifestyles and behaviors? We might need to gather new information on these factors from individuals in the community.

And finally, how healthy is our environment? To answer this question, we might want to collect information about the pollution levels in our community, for instance, or conduct a study to determine the walkability of our neighborhoods.



Knowing what information to gather and how to interpret it requires local and regional knowledge of the community. Most commonly, an advisory group including engaged members of the community, is involved in all stages of the assessment. This provides the most effective picture of a community's health.

The goal of a community health assessment is to provide a product to share with the public and with local policy makers. Consequently, completing a community health assessment requires not only technical skills related to data collection and analysis, but also skills in group process, interpersonal communication, and data presentation and interpretation for the community.

Community Health Assessment Example

Here's an example of part of a community health assessment done in King County, the largest county in Washington State. Through the CDC's Behavioral Risk Factor Surveillance System, data on health behaviors and health status are routinely collected by telephone survey from residents of all 50 states. State-level data are available from this survey, and, for large urban counties, enough residents are

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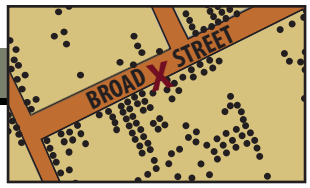
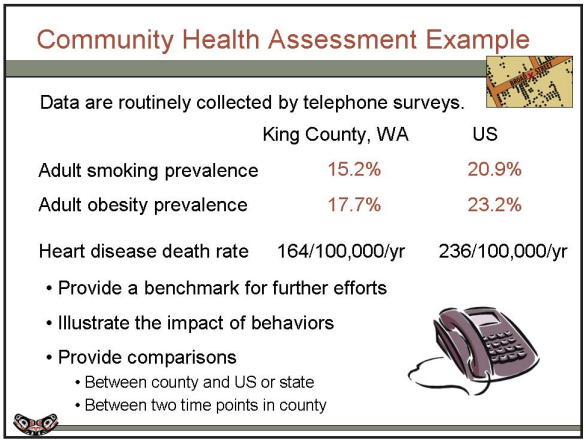


surveyed to enable estimates of county-level values as well. From this surveillance system we know that in 2004 in the US overall, nearly 21% of persons over the age of 18 smoked and more than 23% were obese (that is, had a body mass index over 30)—both of which are risk factors for heart disease. In King County, the prevalence of these risk factors was lower: 15% for smoking, and under 18% for obesity. Perhaps reflecting these differences in risk behaviors, the heart disease death rate was lower in King County in 2004 than in the US overall.

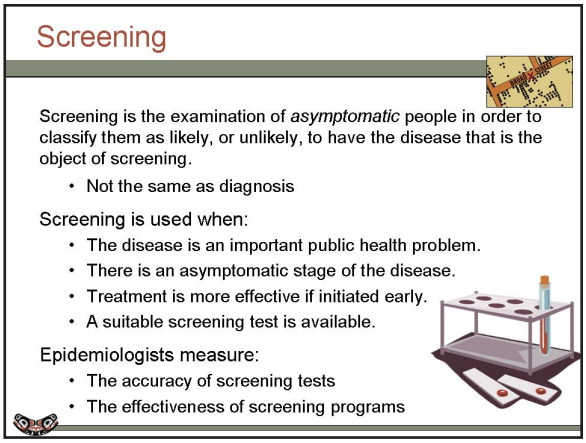


Comparisons such as these can provide a community with a benchmark in terms of the need for further efforts to decrease health risk behaviors, and illustrate the impact of these behaviors on the community's health status. Although this example involved a comparison between a single county and the US, other comparisons are frequently useful, for example, a comparison between your county and the rest of the state, or comparisons between two time points within a single county.

Screening

Screening is another aspect of public health practice that involves the use of epidemiology.

The classic definition of screening is "the examination of asymptomatic people in order to classify them as likely, or unlikely, to have the disease that is the object of screening." This is not the same as diagnosis, that is, you are not saying they do or do not have the disease, just that it is likely or unlikely that they do.



In public health we consider that screening is appropriately used if the following criteria are met:

First, the disease is an important public health problem, otherwise it's hard to justify the expense and burden on screenees.

Second, there is an asymptomatic, or symptom-free, stage of the disease—because asymptomatic persons are the ones screened. If there is no or a short asymptomatic stage of the disease, few persons will screen positive and therefore benefit from the screening program.

Third, treatment for the disease must exist and it must be more

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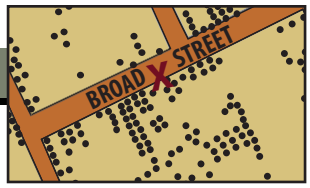
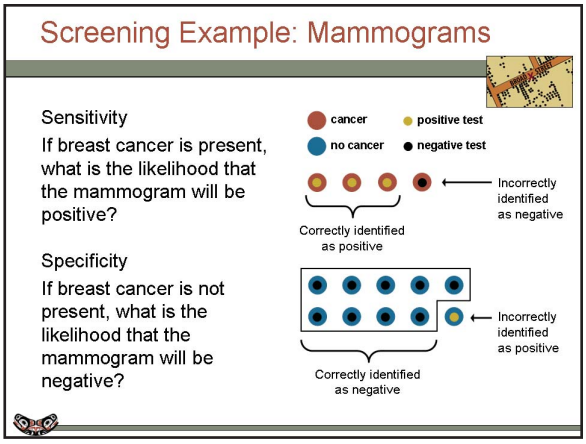


effective if it's initiated early, otherwise early recognition and diagnosis of disease is not helpful and may be harmful to affected persons.

And finally, a suitable screening test must be available. This means the test must be affordable, must not harmful, at best is not invasive, and should be accurate.

Epidemiologists measure both the accuracy of screening tests and the effectiveness of screening programs.

Screening Example: Mammograms



Let's talk for a minute about the kinds of information epidemiologists calculate about the accuracy of screening tests. One example of a screening test for breast cancer is the use of mammography, an x-ray of the breast tissue.

The first concept is sensitivity. Sensitivity is a measure of how good the test is at correctly identifying people who have the disease for which you're screening.

In this example, sensitivity answers the question: "If someone has breast cancer, what's the likelihood that the screening mammogram will be positive?" The sensitivity of mammograms is around 75%—that is, the screening test is positive 75% of the time in women with breast cancer. Remember, screening is not the same as diagnosis, and a positive screening test will lead to the recommendation for further diagnostic procedures such as biopsy. A sensitivity of 75% for mammography means that 25% of women who actually have breast cancer will screen negative.

Another key concept in screening is specificity. In this example, specificity answers the question "If someone does not have breast cancer, what is the likelihood that the mammogram used to screen for the disease will be negative?" The specificity of mammograms is around 92% overall—that is, 92% of the time in women without breast cancer the mammogram will indicate that they do not have breast cancer. This means that in women without breast cancer, 8% of the time the mammogram will be positive, and they will be referred for further diagnostic testing.

Now let's discuss intervention programs.

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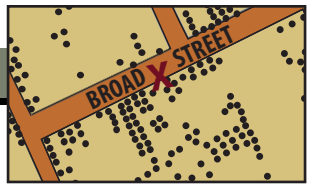
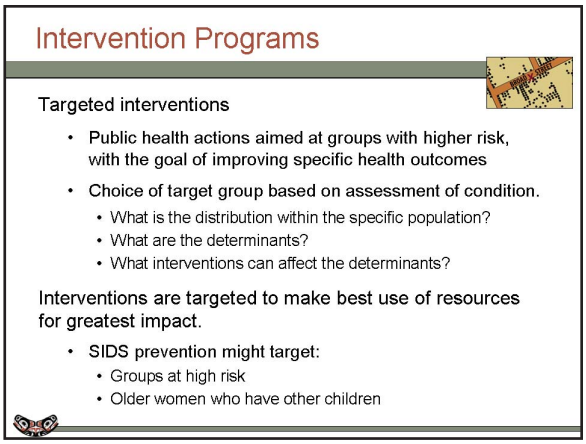


Intervention Programs



After determinants of diseases or health events are identified through descriptive and analytic epidemiologic studies, public health interventions are developed targeting the segment of the population found to be most at risk for the problem, and most likely to have important risk factors or disease determinants, with improving specific outcomes as the goal.

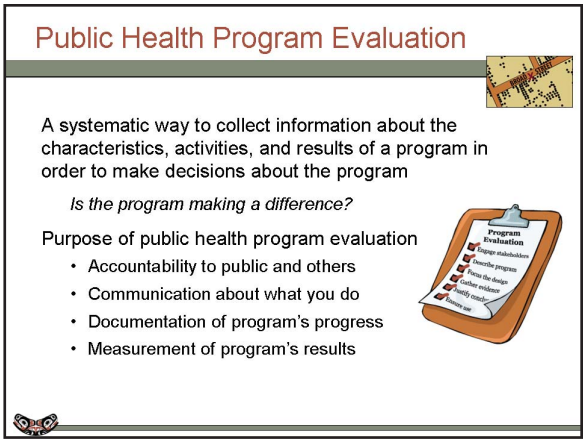
The choice of the target group and the intervention are based on the public health assessment of the specific condition. What is the distribution of the disease within the specific population? For groups with higher rates of the disease, what are the determinants? Finally, what interventions can affect these determinants?

Interventions are targeted to make the best use of public health resources to gain the greatest effect as measured by health outcomes.

For example, to use a targeted intervention approach for SIDS prevention you might identify which groups within your population are at higher risk of SIDS. Or if you are focusing specifically on a sleep position intervention, you could identify groups who might be more likely to place their infants in the prone position for sleep—such as older women who have other children and may have established their infant care patterns at an earlier time. Then you would develop interventions such as educational programs likely to reach those groups.

Now let's look at program evaluation.

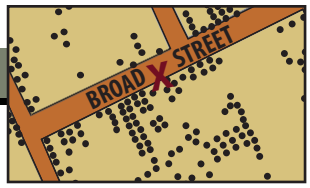
Public Health Program Evaluation



Public health program evaluation is a systematic way to collect information about the characteristics, activities, and results of a program in order to make decisions about the program.

In other words, you use evaluation to gather evidence to determine the value of a program—is it worthwhile, useful, important? Program evaluation helps you to answer the key question: Is this program making a difference?

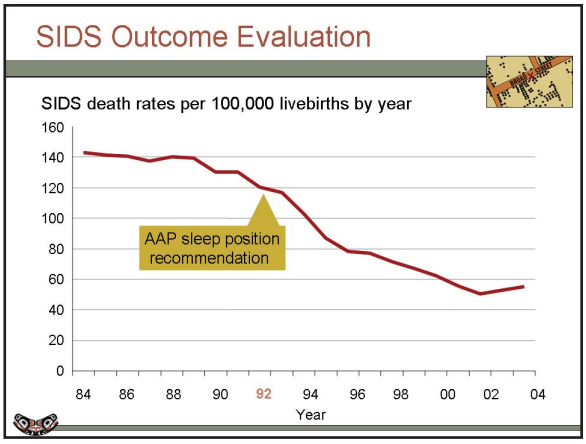
Evidence you gather through evaluation enables you to be accountable to the public and others, and allows you to



communicate clearly about what you do. You can use evaluations to document a program's progress and to measure its effectiveness.

Let's look at how the principles and methods of epidemiology that we've discussed are used in program evaluation settings.

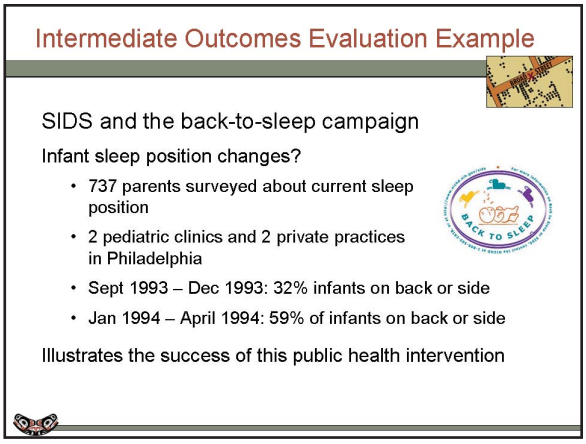
SIDS Outcome Evaluation



Remember this slide? It illustrates the substantial and fairly dramatic decrease in the rate of SIDS deaths in the US after 1992. As you recall, this was the date of the recommendation by the American Academy of Pediatricians that infants be positioned on their backs for sleeping, and the onset of a widespread Back-to-Sleep public health campaign in this country.

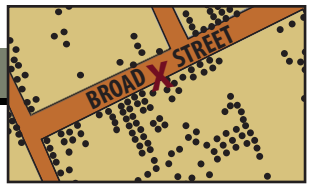
This examination of time trends in SIDS rates before and after the recommendation and the campaign is an example of an outcome evaluation. Here we are comparing the rate of the outcome (that is, SIDS) fairly broadly in the entire country in relation to the approximate timing of the implementation of the Back-to-Sleep SIDS prevention program. Outcome evaluations can be more specific and precise than this one as well, with outcomes assessed only among those known to have received the programmatic intervention, in comparison to outcomes among those known not to have received the intervention.

Intermediate Outcomes Evaluation Example



Program evaluations can also be made using intermediate outcomes—often the health behavior targeted as the risk factor for the disease or health problem of interest. In the context of SIDS for this type of evaluation the question asked is "Have parents changed the position in which they place their infants to sleep as a result of the AAP sleep position policy and the Back-to-Sleep campaign?"

To answer this question a survey was conducted among 737 parents whose children were patients at two pediatric clinics and two private practices in Philadelphia during the relevant time period (which was late 1993 and early 1994). This study found that there was a sharp increase in



the percentage of parents who said they placed their infants on their backs or sides for sleep in a very short time—nearly a doubling—from 32% to 59%.

This increase is large enough that it's reasonable to assume that it wouldn't have occurred by chance, and is likely a consequence of the publicity about recommended sleep positioning, illustrating the success of this public health intervention.

Summary

We've talked in this module about the definition and uses of epidemiology in public health.

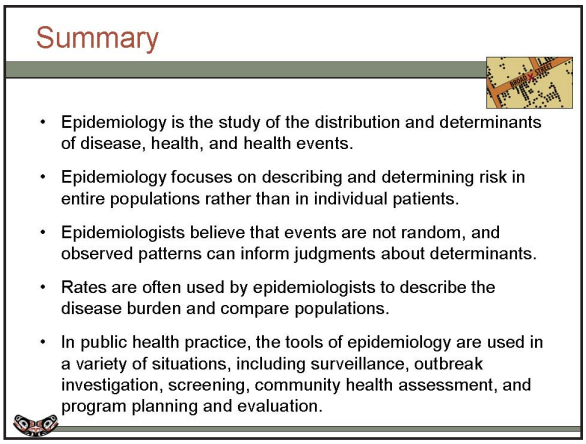
To recap a bit—the discipline of epidemiology is the study of the distribution and determinants of disease, health, and health events.

Epidemiology focuses on describing and determining risk in entire populations rather than in individual patients.

Epidemiologists believe that events are not random, and observed patterns can inform judgments about determinants.

Rates are often used by epidemiologists to describe the disease burden and to compare populations.

And finally, in public health practice, the tools of epidemiology are used in a variety of situations, including surveillance, outbreak investigation, screening, community health assessment, and program planning and evaluation.



Resources

To learn about the topics in this module in more depth, see the other online epidemiology modules produced by the Northwest Center for Public Health Practice:

- Basic Infectious Disease Concepts in Epidemiology
- Introduction to Public Health Surveillance
- Introduction to Outbreak Investigation
- Data Interpretation for Public Health Professionals
- Program Evaluation in Environmental Health