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Health

Health is a dynamic state of complete physical, mental, spiritual and social well- being and not merely the absence of disease or infirmity.

The determinant of health

There are many influences on individual and population health. It is generally accepted that the determinant of health include the physical environment, social environment, individual behaviour, genetic inheritance, and health care.

- Physical environment

Physical environment includes both the natural (weather, soil, water, animal life, and other such attributes), and built environment (the structures that people have created for housing, commerce, transportation, and so forth). Health threat may arise from both the natural and built environment. Common health threats related to the natural environment include weather- related disasters such as tornados, hurricanes, and earthquakes, as well as exposure to infectious disease agents that are endemic in region such as *plasmodium falciparum,* the microbe that causes malaria and is endemic in Africa.

Health threats related to the built environment include exposure to toxins and unsafe conditions, particularly in occupational and residential settings where people spend most of their time. Many occupation expose workers to disease causing substances, farm workers are injured from farm machinery and falls that result in sprains, strains, fractures, and abrasions. There are well documented health threats to office workers from indoor air pollution including passive exposure to tobacco smoke, nitrogen dioxide from gas fuelled cooking stoves, formaldehyde exposure, and other health problems encountered in sealed office buildings. In residential settings, exposure to pollutants from nearby industrial facilities, toxic waste sites, or a high volume of traffic presents hazards for many (heavy impact on low-income and minority communities).

- Social environment

The social environment is defined by the major organizing concepts of human life, social network, family, and occupation. Individual's lives are ruled by religious, political, economic, and organizational rules that reflect the cultural standards, values, and beliefs of their particular social context. These rules affect how individuals live and behave; their relationships with others; and what resources and opportunities individuals have to influence their lives. They shape the relationship between individuals and the natural environment and how the built environment is conceived and developed. Important aspects of the social environment are the status, resources, and power that individual's socioeconomic status (a combination of education, occupation, and income/wealth) and an individual's race and/ or ethnicity.

Course Topics

Introduction to Epidemiology

1. A Public Health Approach
2. What Is Epidemiology?
3. Key Concepts and Terms
4. Calculating Rates
5. Approach and Methodology
6. Data Sources and Study Design
7. Investigating an Outbreak

Learning Objectives

After this session, you will be able to

- define epidemiology
- describe basic terminology and concepts of epidemiology
- identify types of data sources
- identify basic methods of data collection and interpretation
- describe a public health problem in terms of time, place, and person
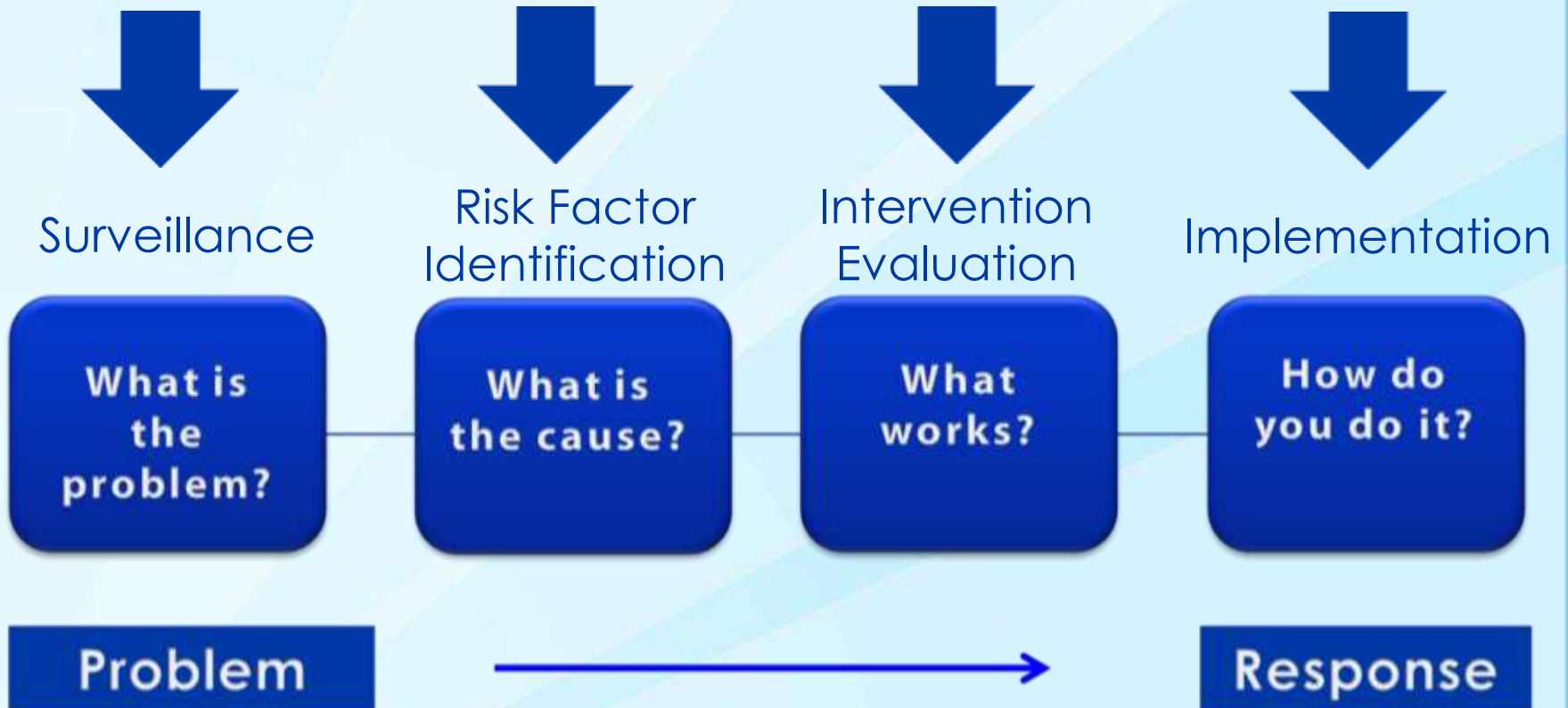- identify the key components of a descriptive epidemiology outbreak investigation

Topic 1
A Public Health Approach

Public health problems are diverse and can include infectious diseases, chronic diseases, emergencies, injuries, environmental health problems, as well as other health threats.

Regardless of the topic, we take the same approach to a public health problem by following four general steps

A Public Health Approach

Surveillance — What is the problem?

Risk Factor Identification — What is the cause?

Intervention Evaluation — What works?

Implementation — How do you do it?

Problem → Response

Public Health Core Sciences

❑ **To implement the public health approach, practitioners use and apply scientific methods. These methods come from a series of core sciences that provide the foundation.**

❑ **These sciences include Public Health Surveillance, which we use to monitor a public health situation.**

❑ **Epidemiology enables us to determine where diseases originate, how or why they move through populations, and how we can prevent them.**

- **Public Health Laboratories support public health by performing tests to confirm disease diagnoses. Laboratories also support public health by conducting research and training.**

- **As we continue to move from the use of paper documents to electronic health records, Public Health Informatics continues to increase in importance. Informatics deals with the methods for collecting, compiling, and presenting health information. It enables us to use electronic data effectively when addressing a public health situation.**

❑ **Prevention Effectiveness is closely linked to public health policy. Prevention effectiveness studies provide important economic information for decision makers to help them choose the best option available.**

❑ **these five core sciences can help us protect and promote the public's health by giving public health practitioners the answers they need. Public health is better able to respond to the situation by using contributions from each of these sciences. One science alone cannot answer the questions and provide a solution**

Topic 2
What Is Epidemiology?

Epidemiology — Defined

Study of the distribution and determinants of health-related states among specified populations and the application of that study to the control of health problems

Epidemiology Purposes in Public Health Practice

- Discover the agent, host, and environmental factors that affect health

- Determine the relative importance of causes of illness, disability, and death

- Identify those segments of the population that have the greatest risk from specific causes of ill health

- Evaluate the effectiveness of health programs and services in improving population health

Solving Health Problems
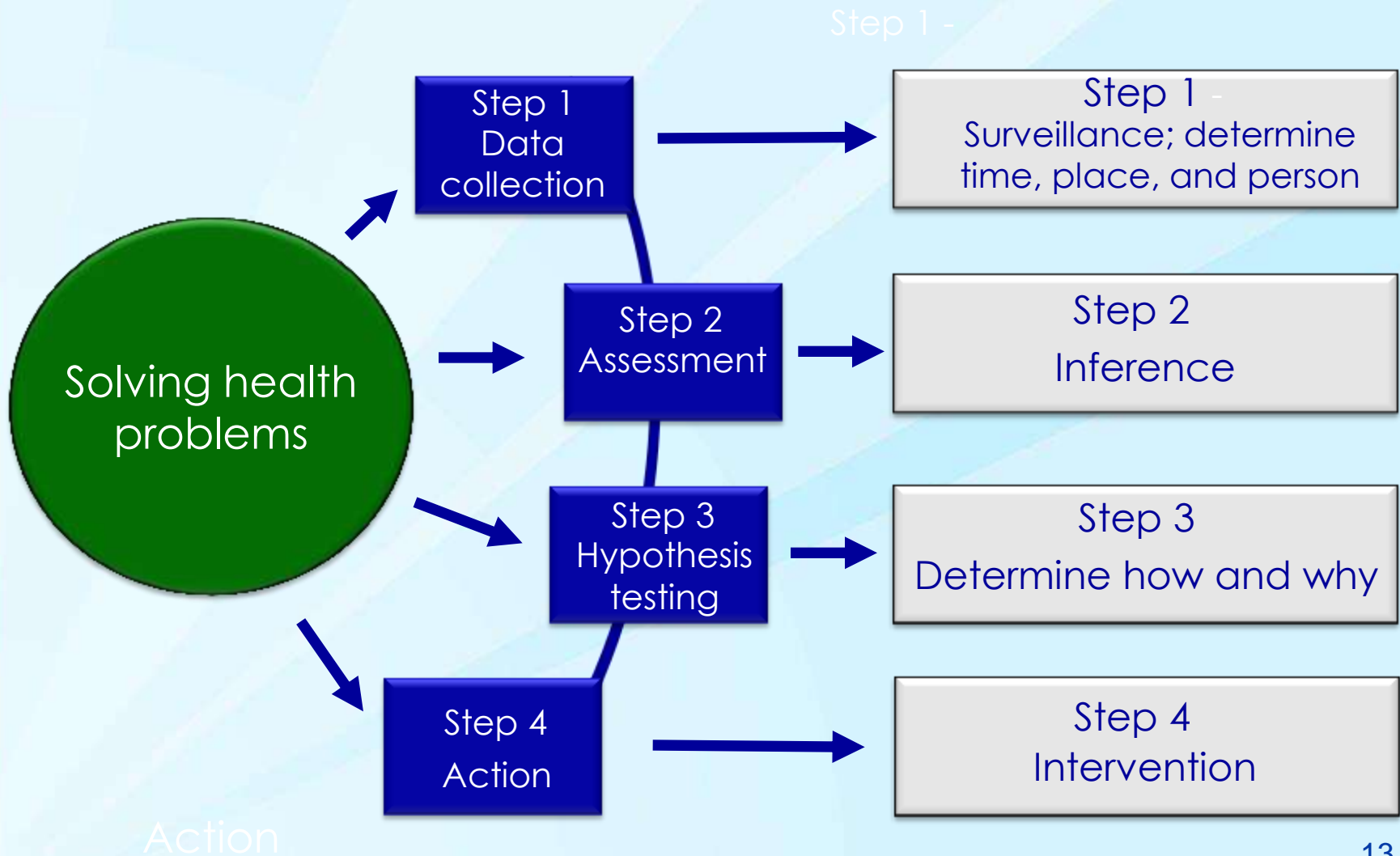
- First, data are collected about health problems occurring among the population through public health surveillance. The data collected include information about when the problem occurred, as well as where and who were affected (that is, time, place, and person). This is known as descriptive epidemiology, and it will be covered in greater detail later in the course.

- Next, the epidemiologist establishes inferences on the basis of the collected data and draws initial conclusions on the basis of those data. From there, he or she uses the information to generate hypotheses about what might be causing the health problem

- Then, the how and why of a condition is determined by conducting tests or studies to determine if the hypothesis is accurate. This determination of how and why is known as analytic epidemiology, which will also be covered later in this course.

- Finally, the epidemiologist takes action. In public health, that action is known as an intervention. We take action to intervene to prevent the condition from spreading further or to promote healthy behaviors. The epidemiologist recommends or implements some form of action at the population level (for example, a community intervention.)

Knowledge Check

All of the following illustrate the purpose of epidemiology in public health, except

A. identifying populations who are at risk for certain diseases.

B. assessing the effectiveness of interventions.

C. providing treatment for patients in clinical settings.

D. determining the importance of causes of illness

Knowledge Check

Epidemiologists use a model for studying infectious disease and its spread that involves the microbe that causes the disease, the organism that harbors the disease, and the external factors that cause or allow disease transmission. This is also known as

      A. host, vector, and transmission.

      B. transmission, host, and environment.

✔   C. host, agent, and environment.

      D. organism, transmission, and environment.

Topic 3
Epidemiology Key Terms
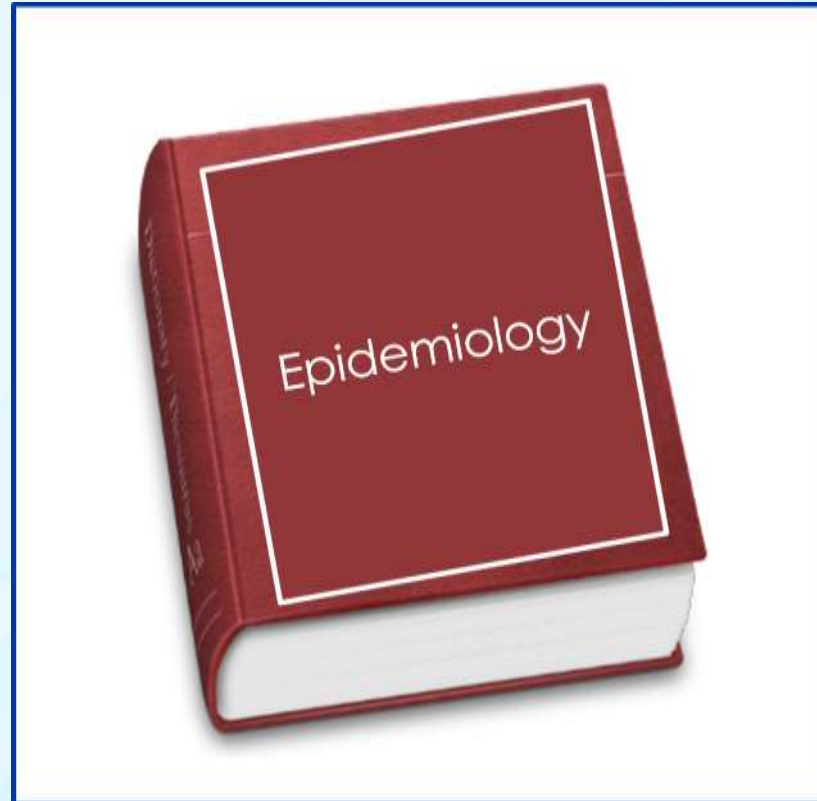
Epidemiology Key Terms

epidemic or outbreak: disease occurrence among a population that is in excess of what is expected in a given time and place.

cluster: group of cases in a specific time and place that might be more than expected.

endemic: disease or condition present among a population at all times.

pandemic: a disease or condition that spreads across regions.

rate: number of cases occurring during a specific period; always dependent on the size of the population during that period.

Knowledge Check

Match each term with the correct example.

A. endemic	B. pandemic	C. epidemic

A. endemic   1. Malaria is present in Africa at all times because of the presence of infected mosquitoes. Malaria is _____ in Africa.

C. epidemic   2. The Ebola virus in parts of Africa is in excess of what is expected for this region. This virus is a/an _____.

B. pandemic   3. HIV/AIDS is one of the worst global diseases in history. It is a/an _____.

Knowledge Check

Choose the correct answer.

A. distribution   B. cluster   C. determinant

In March 1981, an outbreak of measles occurred among employees at Factory X in Fort Worth, Texas.

This group of cases in this specific time and place can be described as a ____cluster____.

Topic 4
Calculating Rates

Comparing Population Characteristics

Rates help us compare health problems among different populations that include two or more groups who differ by a selected characteristic

Rate Formula

To calculate a rate, we first need to determine the frequency of disease, which includes

- the number of cases of the illness or condition

- the size of the population at risk

- the period during which we are calculating the rate

$$\text{Rate (\%)} = \frac{\text{number of cases}}{\text{population at risk}} \times 100$$

Scenario: Unexplained Pneumonia

American Legion
Convention,
Philadelphia,
Pennsylvania

Health care provider at a veterans' hospital
in Philadelphia calls CDC to report cases
of severe respiratory illness among attendees
of the American Legion Convention

| July 21–24 | July 26–Aug 1 | August 2 (Morning) | August 2 (Evening) |

18 deaths
reported among
conventioneers

71 additional
cases reported

- Members of the American Legion gathered for the annual American Legion Convention held July 21 through 24, 1976, in Philadelphia.

- Soon after the convention began, a substantial number of attendees were admitted to hospital emergency departments or were examined in doctors' offices with acute onset of fever, chills, headache, malaise, dry cough, and muscle pain.

- More troublesome is that during July 26 to August 1, a total of 18 conventioneers died, reportedly from pneumonia

- On the morning of August 2, a nurse at a veterans' hospital in Philadelphia called CDC to report cases of severe respiratory illness among convention attendees.

- Subsequent conversations that day with public health officials uncovered an additional 71 cases among persons who had attended the convention.

- The goal was to find out why these conventioneers were becoming ill and, in some cases, dying

Legionnaires' Disease, by Age Group

Hotel A Residents

➡ Time: July 21–24, 1976

	Frequency	Unit size	
Age (yrs)	Sick	Total	Percentage
≥39	3	44	6.8
40–49	9	160	5.6
50–59	27	320	8.4
60–69	12	108	11.1
≥70	11	54	20.4
Unknown	0	2	0

- These cases of unexplained pneumonia were investigated and subsequently given the name Legionnaires' disease because of the association with attendance at the American Legion Convention during July 1976.

- The chart depicts how CDC investigators focused on a particular hotel as the possible source of the outbreak because that was a common factor among all of the ill men. The investigators wanted to find out if any trends existed by age group among hotel guests who became ill. Here you can see the three elements that constituted the epidemiologic rates.

- We can calculate the rate at which each age group became ill after staying at or attending a meeting at Hotel A during the convention by using a basic formula.

Legionnaires' Disease Rate

Hotel A Residents
Time: July 21–24, 1976

	Frequency	Unit	Rate
Age (yrs)	**Sick**	**Total**	**Percentage**
≥39	3	44	6.8
40–49	9	160	5.6
50–59	27	→ 320	8.4
60–69	12	108	11.1
≥70	11	54	→ 20.4
Unknown	0	2	0

Knowledge Check

On Day 1 of a technology conference in San Diego, 15 presenters who were setting up for their sessions in Annex X became ill with flu-like symptoms. During the course of the conference, 20 participants who attended sessions in Annex X also became ill with the same symptoms.

To begin calculating the rate of this outbreak, investigators should first determine
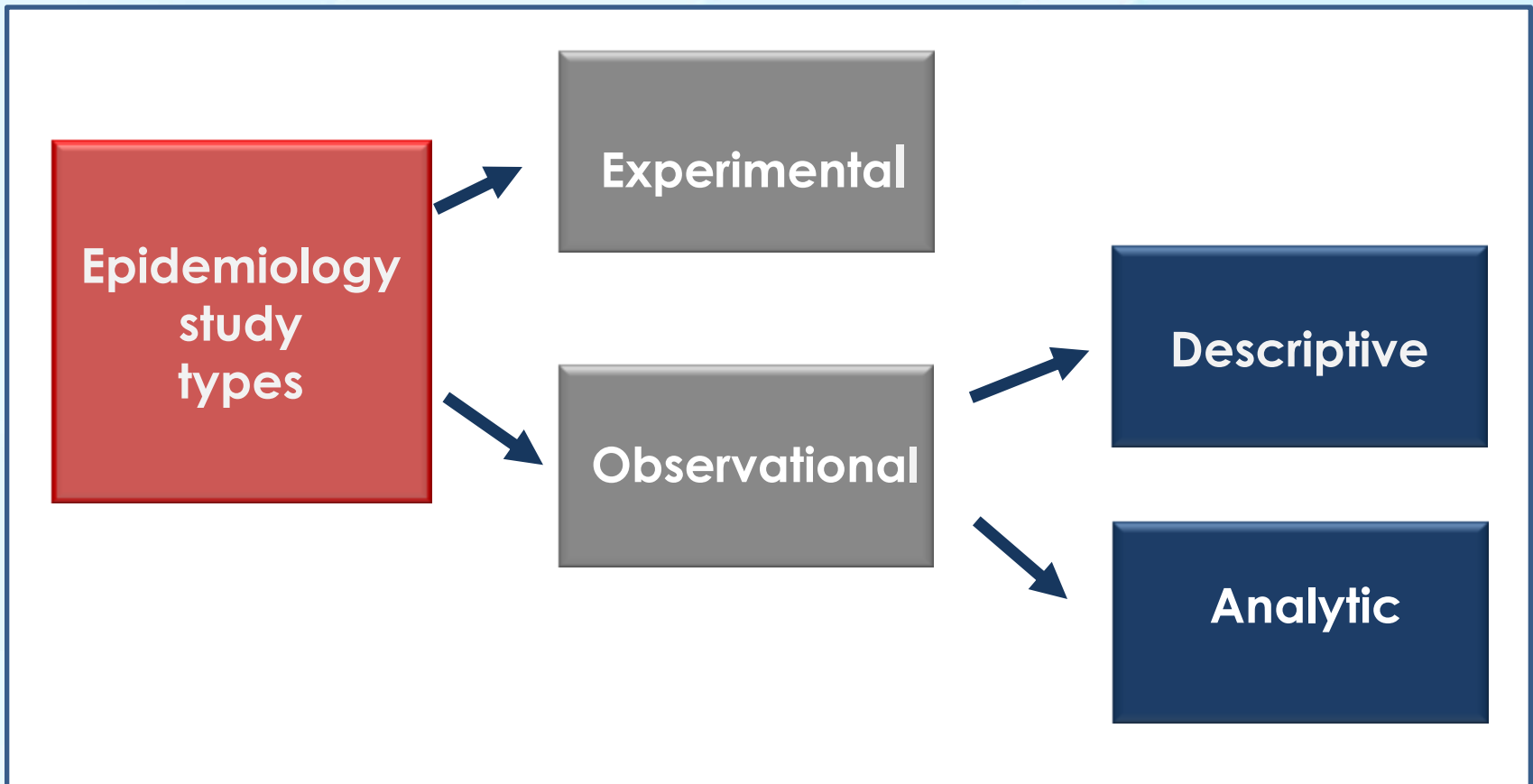
    A.   the size of the conference population.

✓   B.   the number of cases of illness.

    C.   the number of days the conference was held.

    D.   the location of the conference.

Topic 5

Epidemiology Approach and Methods

Epidemiology Study Types

- In an experimental study, the investigators can control certain factors within the study from the beginning. An example of this type is a vaccine efficacy trial that might be conducted by the National Institutes of Health. In such a trial, the investigators randomly control who receives the test vaccine and who does not among a limited group of participants; they then observe the outcome to determine if it should to be used more widely

- In an observational study, the epidemiologist does not control the circumstances. These studies can be further subdivided into descriptive and analytic.

- Descriptive epidemiology is the more basic of these categories and is fundamental to what epidemiologists do. In a descriptive study, the epidemiologist collects information that characterizes and summarizes the health event or problem.

- In the analytic study, the epidemiologist relies on comparisons between different groups to determine the role of different causative conditions or risk factors.

Descriptive and Analytic Epidemiology

| Descriptive epidemiology	Analytic epidemiology
When was the population affected?	How was the population affected?
Where was the population affected?	Why was the population affected?
Who was affected?	

Fatalities Associated with Farm Tractors

In 1982, the number of farm tractor-associated deaths was described in terms of time, place, and person by using records from an existing surveillance system

- In 1982, an epidemiologist in the Georgia Department of Public Health became interested in the number of deaths associated with farm tractors. He determined he could examine this problem by using readily available data — death certificate records that were included in an existing surveillance system. He obtained the death certificate records for all deaths that had occurred in Georgia during 1971 through 1981 that were associated with farm tractor incidents.

- After collecting the data, he used the information to describe the problem in terms of time, place, and person and then generated a hypothesis for further study.

Fatalities Associated with Farm Tractors

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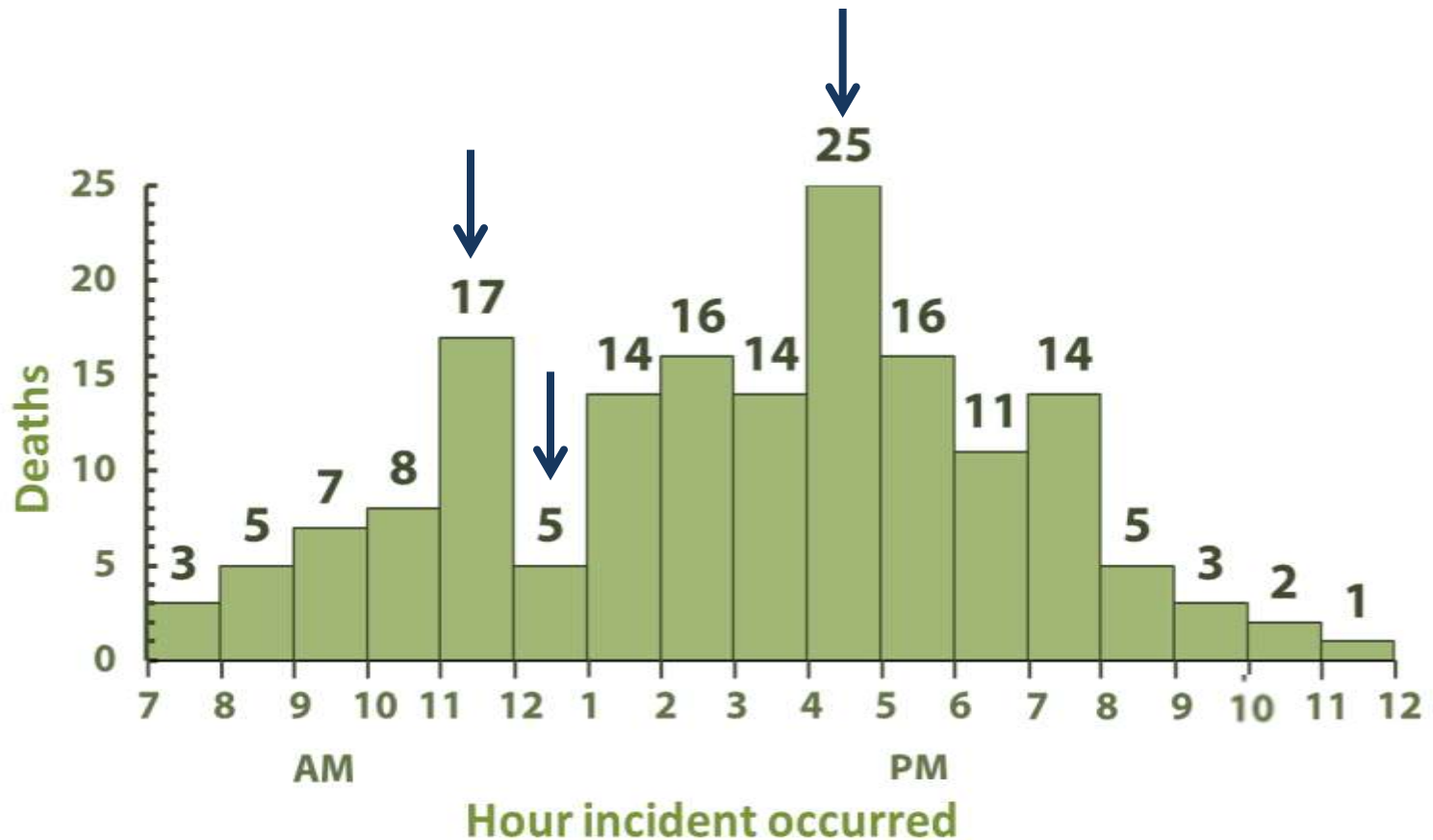
- This graph describes the when for 166 of the farm tractor-associated deaths. We can examine the data by looking at the time of day when the deaths occurred.

- What inferences can we make from this graph?

  Peaks in deaths occurred just before lunch and during late afternoon.

We can infer that deaths occur when farmers are probably most fatigued right before lunch, which might lead to the increase in deaths in late morning. More deaths occur in late afternoon when children are home from school. Conversely, fewer deaths occur while the farmers are probably eating their lunch.
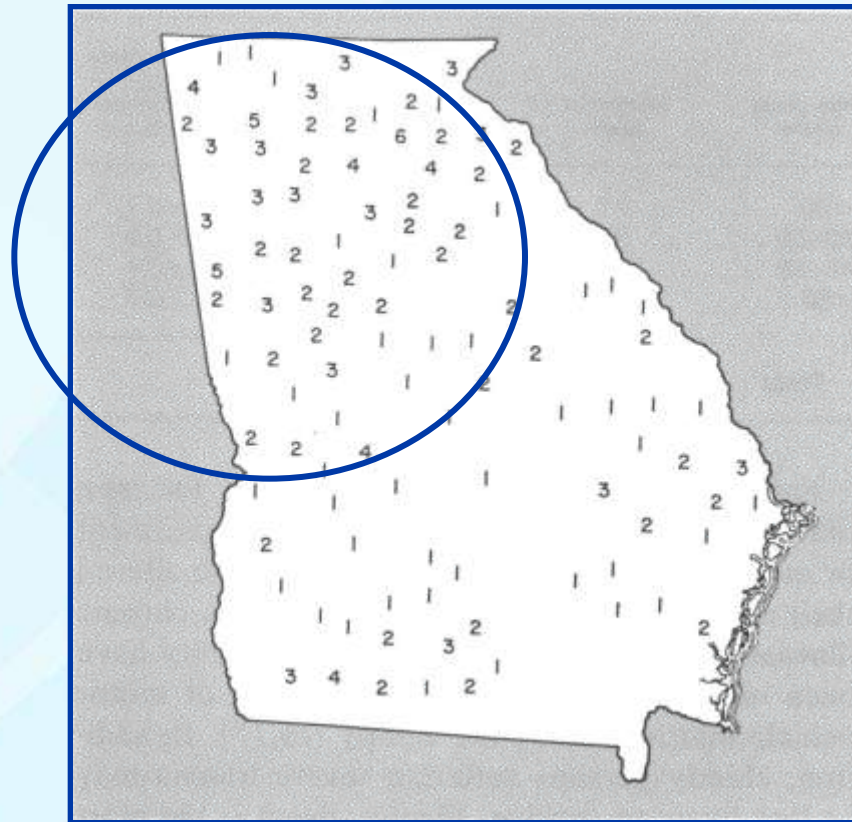
Fatalities Associated with Farm Tractors
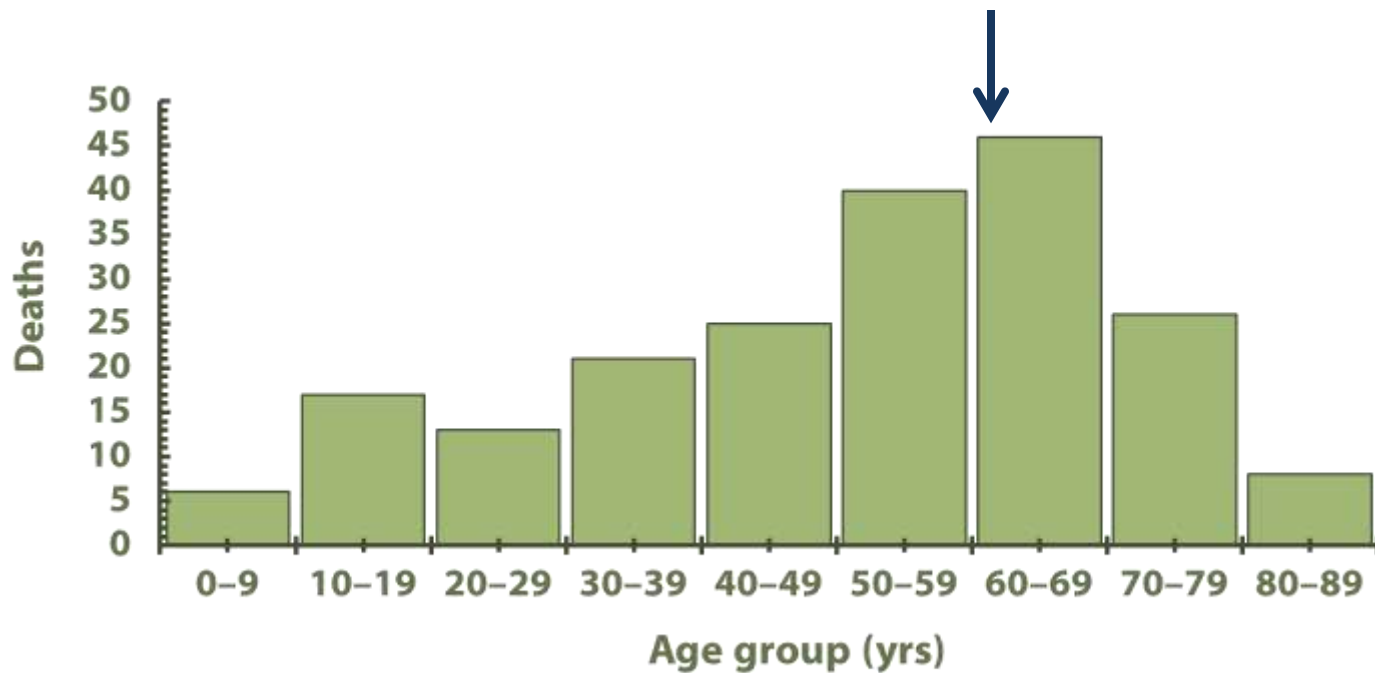
An increase in the number of deaths occurred among older persons, which again, is part of the descriptive analysis.

Fatalities Associated with Farm Tractors

Most of the deaths occurred in the northern areas of Georgia, which has a more mountainous terrain. Fewer deaths occurred in south-central Georgia, which is characterized by much flatter farmlands.

Knowledge Check

Choose the correct answer from the following choices:

A. Qualitative   B. Experimental   C. Observational

C. Observational   An epidemiologist is doing a study on the sleep patterns of college students but does not provide any intervention. What type of study is this?

Knowledge Check

Match each term to the correct example below.

A. Descriptive   B. Analytic

B. Analytic   1.   A study of heart disease comparing a group who eats healthy foods and exercises regularly with one who does not in an effort to test association

A. Descriptive   2.   A study to describe the eating habits of adolescents aged 13–18 years in Community X

Topic 6

Epidemiology Data Sources and Study Design

Data Sources and Collection Methods

Source	Method	Example
Individual persons	• Questionnaire • Survey	• Foodborne illness outbreak • Health data on U.S. residents
Environment	• Samples from the environment (river water, soil) • Sensors for environmental changes	• Collection of water — check for chemical
Health care providers	• Notifications to health department if cases of certain diseases are observed	• Report cases of meningitis to health department
Nonhealth–related sources (financial, legal)	• Sales records • Court records	• Cigarette sales • Intoxicated driver arrests

Conducting Studies

Studies are conducted in an attempt to discover associations between an exposure or risk factor and a health outcome

Cross-Sectional Study

Patient studied based on being part of a group.

Ex. Newyorkers

women

Tall people

Cross-Sectional Study

- Frequency of disease and risk factors identified
  - how many have lung cancer
  - how many smoke
- Patient not followed for month/years
- The main outcome of this study is prevalence
  - -50% of New Yorker smoke
  - -25% of New Yorkers have lung
- May have more than one group
  - -50% of men have lung cancer and 25% of women have lung cancer
- Group not followed over time

Cross-Sectional Study

Example 1: New Yorkers were surveyed to determine whether they smoke and whether they have a morning coffee the study found a smoking prevalence of 50% among responders 25 percent reported morning coffee

- what type of study?

- what can be determined?

Cross-Sectional Study

Example 2: using a national u.s. database rates of lung cancer were determined among New Yorkers Texans and Californians lung cancer prevalence was 25% in New York 30% in Texas and 20% in California

- the researchers concluded that living in Texas is associated with higher rates of cancer so some key points here because there are different groups this might confuse you and make you think that this is some type of case control or cohort study but it's not note that there is a lack of a time frame

Cross-Sectional Study

Example 3: researchers discover a gene that they believe leads to development of diabetes a sample of 1000 patients is randomly selected all patients are screened for the gene presence or absence of diabetes is determined from a patient questionnaire it is determined that the gene is strongly associated with diabetes

- key points here note the lack of a time frame they're not following patients for years so this makes it very likely it's a cross-sectional study note that the patients are not selected by disease or exposure which is the way they're selected for cohort and case-control studies

Cohort Study

- compare a group with exposure to a group without and it's very important that you remember that this is the way patients are identified they are identified by exposure so for example if we wanted to whether smoking causes lung cancer we would identify patients based on whether they smoke or not. by monitoring them over time whether exposure changes the likelihood of disease

Cohort Study

- most cohort studies are what's called prospective it means they identify patients with without the exposure and monitor them going forward in time sometimes they're done

- retrospectively so you can look back in time and see whether or not they had disease

Cohort Study

- the main outcome measure of a cohort

study is a relative risk which is defined by the risk ratio represents how much exposure increases the risk of disease

- an example of the results you might get from a cohort study you might find that 50% of smokers get lung cancer within five years 10% of non-smokers get lung cancer within 5 years this would give you a risk ratio of 50 divided by 10 or 5 and this means that smokers are 5 times more likely to get lung cancer than non-smokers

Cohort Study

- Example: a group of 100 New Yorkers who smoke were identified based on a screening questionnaire at a local hospital these patients were compared to another group that reported no smoking both groups received follow-up surveys asking about development of lung cancer annually for the next three years the prevalence of lung cancer was 25 percent among smokers and 5 percent among non-smokers.

- what type of study ? it's a prospective cohort study

Case-Control Study

Subjects identified as having a disease or condition are compared with subjects without the same disease or condition

Case-Control Study

- the opposite of a cohort study instead of identifying exposure and looking for disease in this case we're looking for disease first and then exposure

- an example of a case control study might be people with lung cancer and your cases have to have a mixture of exposed and unexposed you can't just identify smokers with lung cancer you've got to have some smokers and some non-smokers and then you've got to go and find a control group and the control group also has to contain a mixture of smokers and non-smokers exposed or unexposed patients once you've

Case-Control Study

- Example: a group of 100 New Yorkers with lung cancer were identified based on a screening questionnaire at a local hospital these patients were compared to another group that reported no lung cancer both groups were questioned about smoking status within the past 10 years the prevalence of smoking was 25 percent among lung cancer patients and 5 percent among non lung cancer patients

Knowledge Check

Which of the following are examples of a health-related source of data collection?

    A. Intoxicated driver arrests.

✔   B. Electronic health records.

✔   C. Measurement of toxins in a river.

    D. Medical board action against a physician.

Match each study with correct definition.

_____

2. A study of women aged 50–60 years in a community located close to a nuclear power facility.

_____

3. Subjects who have received nutritional counseling and who have exercised twice a week are compared with subjects who have not.

QUESTIONS?

DEMOGRAPHY

Demography is defined as "the study of populations, especially with reference to size and density, fertility, mortality, growth, age distribution, migration, and vital statistics and the integration of all these with social and economic conditions" Vital statistics include births, deaths, population by age, sex, by location of residence, marital status, socioeconomic status, and migration. Birth data are derived from mandatory reporting of births and mortality data from compulsory death certificates. Other sources of data are population registries including marriage, divorce, adoption, immigration as well as economic and labor force statistics compiled by governmental agencies, census data, and data from special household surveys. These form the basic data sets for demographers. Demography measures trends over time of indices such as birth and death rates, rural-urban residential patterns, marriage and divorce rates and migrations, as well as social and economic conditions. Since public health deals with disease as it occurs in the population, the definition of populations and their characteristics is fundamental.

A census is an enumeration of the population recording the identity of all persons in every residence at a specified time. The census provides important information on all members of the household, including age, date of birth, sex, occupation, national origin, marital status, income, relation to head of the household, literacy, education levels, and health status (e.g., permanent handicapping conditions). Other information on the home and its facilities include type of building, number of rooms, electricity, major home appliances (e.g., stove, refrigerator), toilet and bathroom facilities (e.g., bathtub, shower), car ownership and home heating (stove or central), food purchases, and spending on clothing, entertainment, and other consumption items. Usually census surveys are carried out to determine trends in important economic or demographic data such as family incomes, nutrition, employment, and other social indicators. Accuracy of such a complex and costly process cannot be 100%, but great care is taken to assure maximum response

and standardization in interview methods and processing to assure precision. Despite its limitations, the census is accepted as the basis of statistical definition of a population.
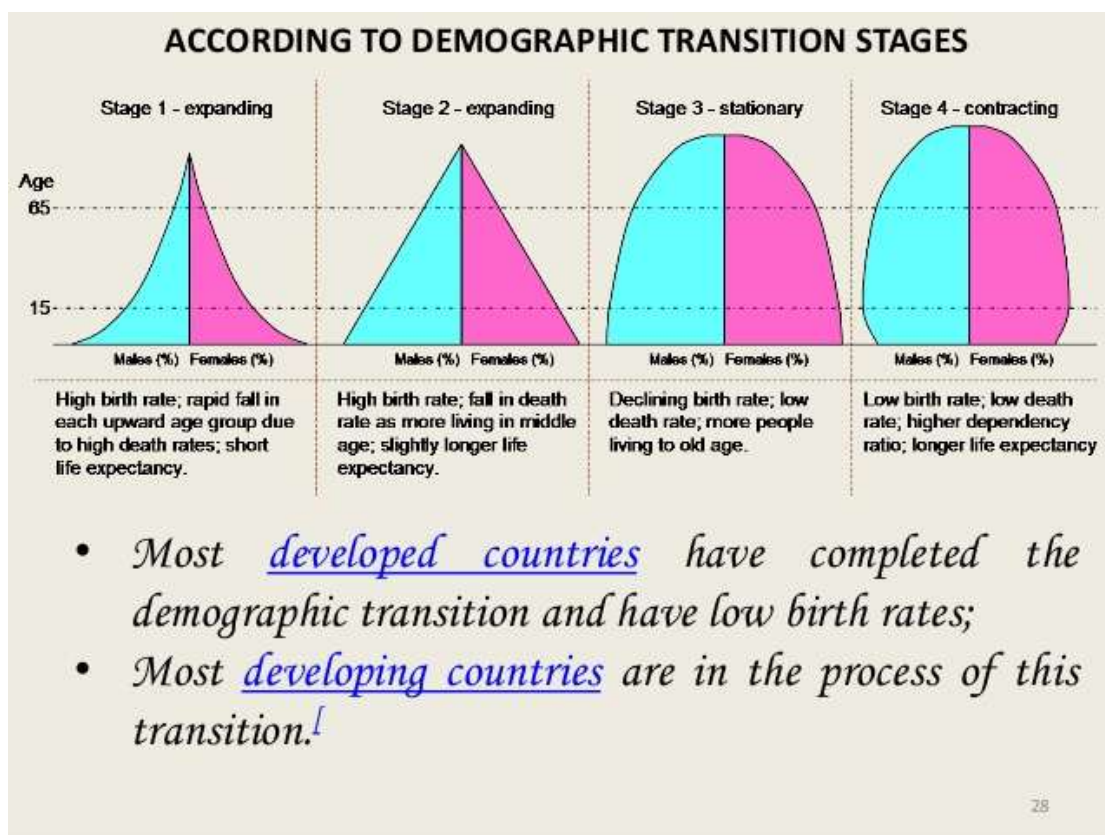
A demographic transition occurs when there is a substantive change in the age distribution of a population. Population growth is mainly affected by birth and death rates, although other factors such as migration, war, political chaos, famine, or natural disasters may affect population distribution. Changing population patterns also accompany economic development, a process known as demographic transition. This is often characterized by the following stages:

1. Traditional: high and balanced birth and death rates;

2. Transitional: falling death rates and sustained birth rates;

3. Low stationary: low and balanced birth and death rates;

4. Graying of the population: increased proportion of elderly as a result of decreasing birth and death rates, and increasing life expectancy;

5. Regression: migration or increasing death rates among young adults due to trauma, AIDS, early cardiovascular disease or war resulting in steady or declining longevity (demographic regression).

Population Pyramid

A population pyramid provides a graphic demonstration of the age and sex at a point in time. A country or region with a wide population base has a high birth rate and a large percentage of its population under age 15, usually accompanied by limited resources and is a formula for continued poverty. A population pyramid with a narrow base (i.e., few young people) and a growing elderly population will have a smaller work force to provide for the "dependent age" population (i.e., both the young and the old). With a smaller working age population to support these costs, adverse economic consequences may prejudice costly pension and health services. Other factors may also affect the population pyramid, for example, the loss of a large number of people during wartime. This loss affects a particular age-sex group as well as

fertility patterns both during and after the war, for example, a post-war "baby boom."

- *Most developed countries have completed the demographic transition and have low birth rates;*
- *Most developing countries are in the process of this transition.*[

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Population trends

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Three major factors determine the population dynamics of a population:

- Births (fertility)
- Deaths (mortality)
- Migration

If some groups within a population grow or decline faster than others, the composition of the whole is altered. These three factors determine the most basic characteristics of a population, as well as its demographic future.

- Birth add to the population, while deaths subtract from population. Migration can either add or subtract from population.
- Therefore, the growth of nations population is determined by number of births minus the number of deaths plus the net migration rate

▸ $P_t = P_0 + B - D \pm M$, where

P_t = population at the time in the future

P_0 = the base population

B = births between time 0 and t

D = deaths between time 0 and t

M = net migration

P_t, and P_0 which can be obtained through census

D and B which can get through vital registration.

Fertility

- **The number of births that occur to an individual or in a population**

- In 1998, fertility rates of national populations ranged from an average of 1.2 children per woman in Italy, Latvia , Spain, and several other European countries to 7.4 children per woman in the West African country of Niger.

- In US average was 2.0

- For the world it is 2.9

Fecundity

The physiological ability of individuals or couples to have children.

- Some are infecund due to disease or genetic dysfunction.
- Mothers could be infecund when they breastfeed.

Factors accounting for fertility fecundity gaps

There are usually gaps between fertility and fecundity. What are the factors that may account for the gaps:

Cultural, economic, and health factors interfere with the process of human reproduction.

- **Cultural values** e.g. (Does the society value large or small families?)

Fertility Proximate determinants

- In US. and most developed countries *contraceptive use and abortion* are the most important proximate determinants. The rate of contraceptive use in US, Brazil, Australia, and few East and South East Asia have contraceptive use rates of $>= 75\%$.

- **Spain** recorded **the lowest fertility rate** in a nation 1.15 births per woman of rep age. Basically due to 72% using contraceptives. **Russia** achieved low fertility rates due to having easier access to **abortion.**

Proximate determinants

- When contraceptive and abortion prevalence rates are low, the postpartum infecundity and marriage determinants are more important.

- African countries:

  women marry early and bring more children, but they breast feed for 2-3 years, thus prolonging the period of infecundity following childbirth.

Fertility Measurement
Birth Rate

- **The birth rate (also called the crude birth rate)**

- **It is the most easily obtained and most common reported Definition:** It gives the average annual number of births during a year per 1,000 persons in the population at midyear;

The birth rate is usually the •
dominant factor in determining
the rate of population growth.
It depends on both the level of
fertility and the age structure of
.the population

Fertility Measurement
Crude Birth Rate

- *There were 24 births per 1,000 population in Kuwait in 1994 :*

Number of births (38,868) divided by the Total population (1,620,086) x K (1,000)= 24.0

- In Jordan it is 26.79 est. 2011.

- Around the world, birth rates vary widely.

- In Western Sahara's, a very high birth rate 47 per 1,000 in 1996, while
- Italy's it is very low, 9 per 1,000, also in 1996,

Fertility Measurement
General Fertility Rate

- **The general fertility rate GFR, (also called the fertility rate) ,is the number of live births per 1,000 women ages 15-49 in a given year.**

- The GFR is a somewhat more refined measure than the birth rate because it relates births to the age-sex group at risk of giving birth (usually defined as women ages 15-49).

General Fertility Rate

- The GFR sums up, in a single number, the fertility of all women at a given point in time.

- Yemen's general fertility rate in the early 1990s was 238 live births per 1,000 women ages 15-49— (34 yrs) one of the highest in the world. (TFR =7)
  The Czech Republic's, it was very low at a rate of 34 per 1,000 women aged 15-49 in 1996.   (TFR = 1)

Mortality

Death Rate: Definition: It is the average annual number of deaths during a year per 1,000 population at midyear; also known as **crude death rate.** The death rate, while only a rough indicator of the mortality situation in a country, accurately indicates the current mortality impact on population . growth

- The dramatic reduction in death rates over the last two centuries can be explained by changes in the social and economic determinants of health and to lesser extent by public health intervention.
- Death rates for infants are higher than death rates for older children. One explanation is that infants are less resistant to disease.

Crude Death Rate

- In the early 1990s, the death rate in Turkey was 6.6 per 1,000 population.

    Number of deaths (405,000)/ Total population (61,644,000) x K (1,000) = 6.6

- In the early 1990s, Guinea's death rate was 20 per 1,000 population, while Singapore's was 5 per 1,000.

- **In Jordan 2.69 deaths/1,000 population (July 2011 est.)**

Infant Mortality Rate

- **Definition:** This entry gives the number of deaths of infants under one year old in a given year per 1,000 live births in the same year; included is the total death rate, and deaths by sex, *male* and *female*. This rate is often used as an indicator of the level of health in a country.

Migration

- Migration could be immigration or emigration. Immigration refers to people moving in and emigration refers to people moving out. Young people between the ages of 20 and 30 are the most mobile. Compared to the people in a population who do not migrate, migrants have a higher levels of education. The donor area loses the investment in those individuals. The recipient area get a young, motivated, and educated citizen and has to pay nothing for that persons development.

Maternal Mortality Ratio

- The maternal mortality ratio is the number of women who die as a result of complications of pregnancy or childbearing in a given year per 100,000 live births in that year.

- Deaths due to complications of spontaneous or induced abortions are included.

- **a maternal death** is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Life Expectancy

- Life expectancy is an estimate of the *average* number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for the rest of his or her life.

- Life expectancy is a hypothetical measure because it is based on current death rates and actual death rates change over the course of a person's lifetime.

- Each person's life expectancy changes as he or she grows older and as mortality trends change.

Population Composition
Age and Sex Composition

- Age and sex are the most basic characteristics of a population.

- Every population has a different age and sex composition— **the number and proportion of males and females in each age group—**

- This structure can have considerable impact on the population's social and economic situation, both present and future.

Population Composition
Age and Sex Composition

- Populations could be relatively young / developing countries, About 40 % less than 15 years e.g. Africa.. Jordan . Less than 4% are older groups.

- Relatively old populations (aging), developed countries, more than 10% over 65 years e.g. Europe/ Less than 25% of pop less than 15 years.

Age and Sex Composition

- Young and old populations have markedly different age compositions; as a consequence, they also have different proportions of the population in the labor force or in school, as well as different medical needs, consumer preferences, and even crime patterns.

NON COMMUNICABLE DISEASE
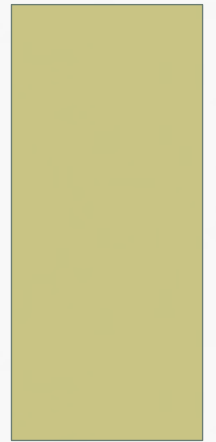
NCD IS A MEDICAL CONDITION OR DISEASE

- which is not infectious

- with long duration

- relatively slow in progress

- which a person is unaware of the disease unless or otherwise examined

- a silent killer of people

MAJOR NCDS

- Cardiovascular diseases- (heart attacks and strokes)

- Cancer

- Diabetes

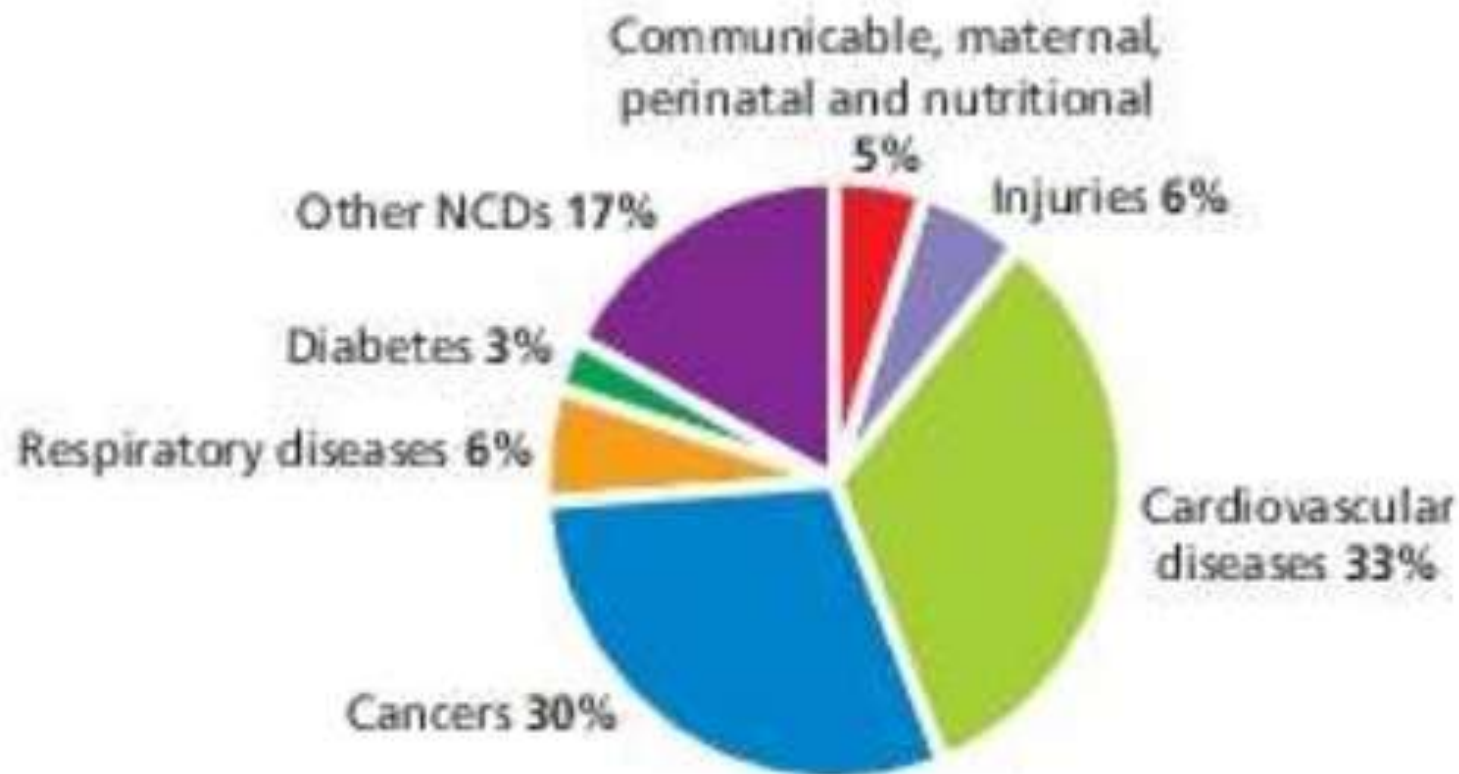- Chronic respiratory diseases – (asthma)

WHY ... IMPORTANT TO KNOW ABOUT NCDS ??

- The number one cause of death in the world. (more than 36 million people)

  - Cardiovascular diseases- 48%
  - Cancer-   21%
  - Diabetes-   3%
  - Chronic respiratory diseases – 12%

- More than 9 million deaths are premature (under 60 years of age) and could be prevented

STATUS OF NCDS IN CANADA

Mortality by cause of death (% of all deaths), 2008

Communicable, maternal, perinatal and nutritional 5%

Injuries 6%

Other NCDs 17%

Diabetes 3%

Respiratory diseases 6%

Cardiovascular diseases 33%

Cancers 30%

http://www.commonwealthofnations.org/wp-content/uploads/2013/08/mcd-canada_CHP13.jpg

CHARACTERISTICS OF NCDS :

- Not caused by an acute infection

- Have common risk factors

- Cause long-term harm

- Need a long-term (or even life-long) treatment

- Cause both men and women equally

- Sometimes, cause disability

CAUSES FOR NCDS (RISK FACTORS)

- Unhealthy diet
- Tobacco usage
- Physical inactivity
- Stress factors
- Overweighed (obese)
- Genetics
- Harmful use of alcohol
- Environmental factors

IF YOU ...

- Have a person in your family ever had one of the NCDs

- Have High blood pressure

- Have High cholesterol level

- Are obese (over weight)

- Are exposed to air pollution

- Have raised blood glucose level

- Are exposed to Environmental factors

- **YOU ARE AT RISK !!!!!!!!!**

CLASSIFICATION OF RISK FACTORS

- **Background risk factors-** age, sex, level of education and genetic composition

  -cannot be changed

- **Behavioral risk factors-** tobacco and alcohol use, unhealthy diet and physical inactivity

  -can be modified

- **Intermediate risk factors-** elevated blood lipids, diabetes, high blood pressure and overweight/obesity

  -can be controlled
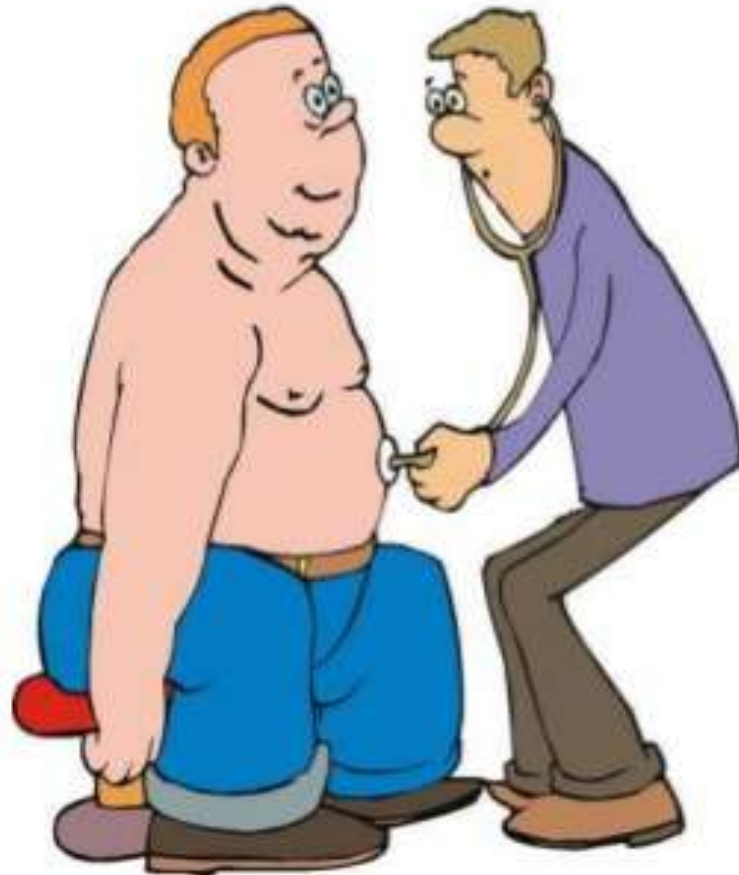
IF... MAJOR RISK FACTORS ARE CONTROLLED

⦿ Around three-quarters of heart diseases,

⦿ Stroke

⦿ Type 2 diabetes

⦿ 40% of cancer

would be prevented

HOW TO MINIMIZE THE RISK ?

- Healthy diet

- Regular exercise

- Change the environment

- Modify the habits

- Regular medical check-ups

CONCLUSION

- The NCDs may not be able to cure completely
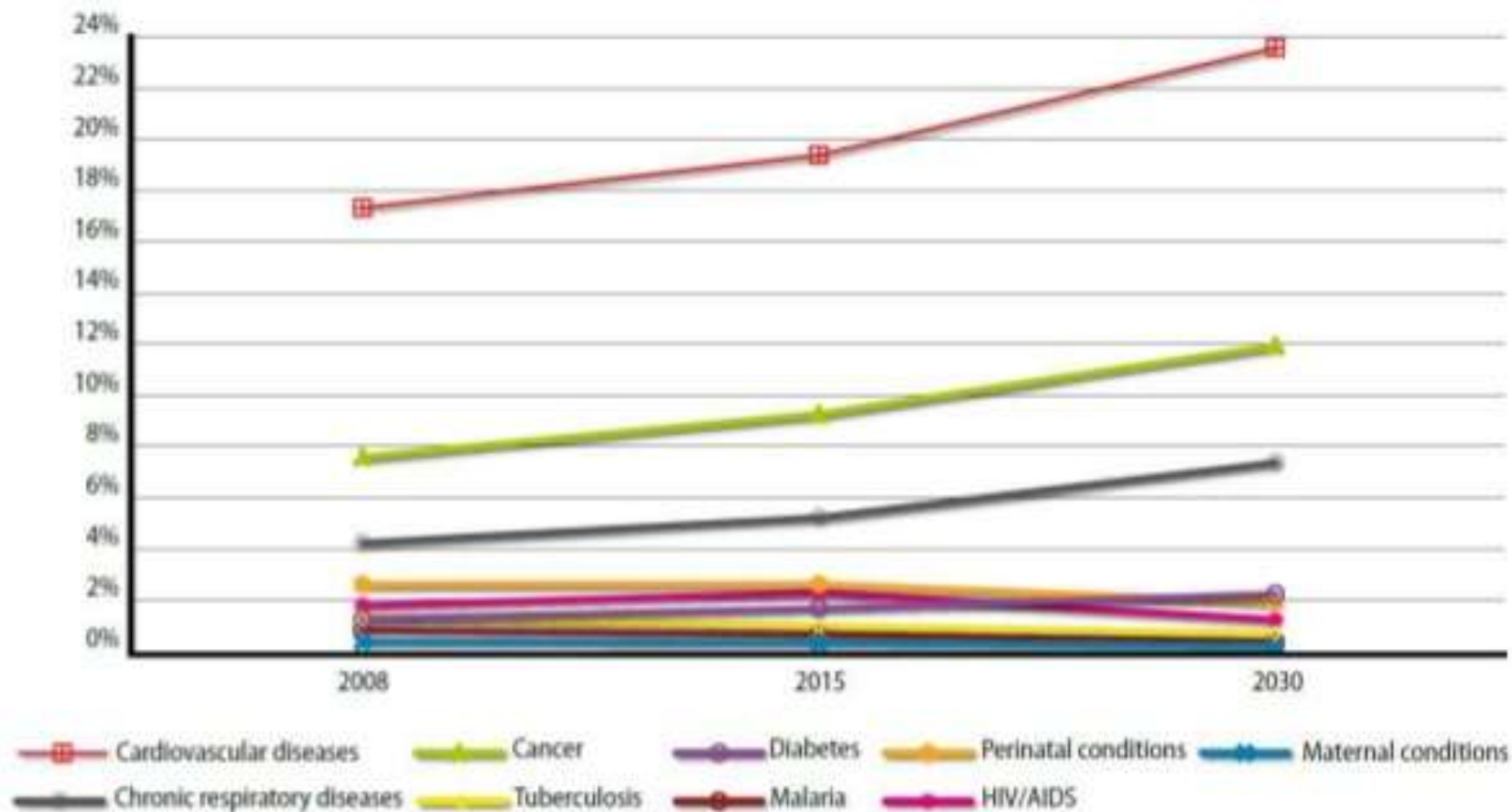
   BUT

- Can be **controlled**

   AND

- **are preventable** through effective interventions that tackle risk factors

Figure 101 Graph showing the projected mortality trends from 2008 to 2030 for NCDs, CVDs and communicable diseases (5).

Legend:
- Cardiovascular diseases
- Cancer
- Diabetes
- Perinatal conditions
- Maternal conditions
- Chronic respiratory diseases
- Tuberculosis
- Malaria
- HIV/AIDS

Treating NCDs is costly.

Canada's declining deaths from heart disease due in part to an increase in treatment.
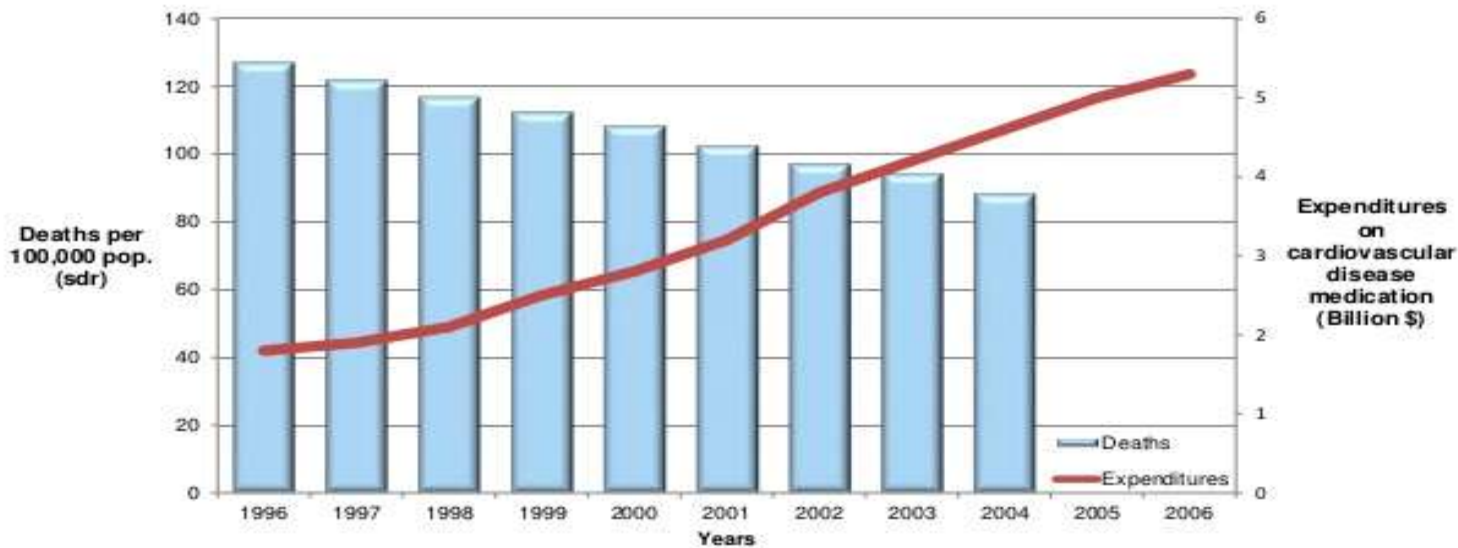
Source: Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from OECD HEALTH DATA 2010; and CMAJ, July 7, 2009 - 1881 (1-2).

Public Health Agency of Canada | Agence de la santé publique du Canada

25

Intervention for prevention works...

For every **$1 invested** in labelling on cigarette packages there is a **saving of $52** for the Canadian economy including **$8** for Government[1]

For Worksite Health Promotion, the Atlantic Health and Wellness Institute found that **returns per dollar** ranged from **$1.64** to **$3.98** based on employee risk factors after 3 months of intervention[2]

Sources: [1]Health Canada, 2011.
[2]Spencer & Associates, 2002.

What is a communicable disease

- Can be transmitted from
- Also called, infectious, transmittable
- Spread by infectious agent (pathogens)
  - bacteria, viruses, parasites

Non-communicable diseases

- Not causes by infectious agents
- Not transmissable from person to person
  - They may be inheritable genetically
- Examples
  - Hypertension, diabetes, heart disease

Historical Pandemics

- The Black Death (plague): started in 14th century, killed 75 million people
- Cholera: killed tens of millions during the 19th century, remains a public health concern
- Influenza
- Measles
- Smallpox
- Malaria
- AIDS

Clinical classification of communicable dz

- Diarrheal diseases
  - Symptoms: diarrhea, abdominal pain
  - Ex: cholera
- Respiratory diseases
  - Symptoms: shortness of breath, cough
  - Ex: pneumonia
- Febrile illness
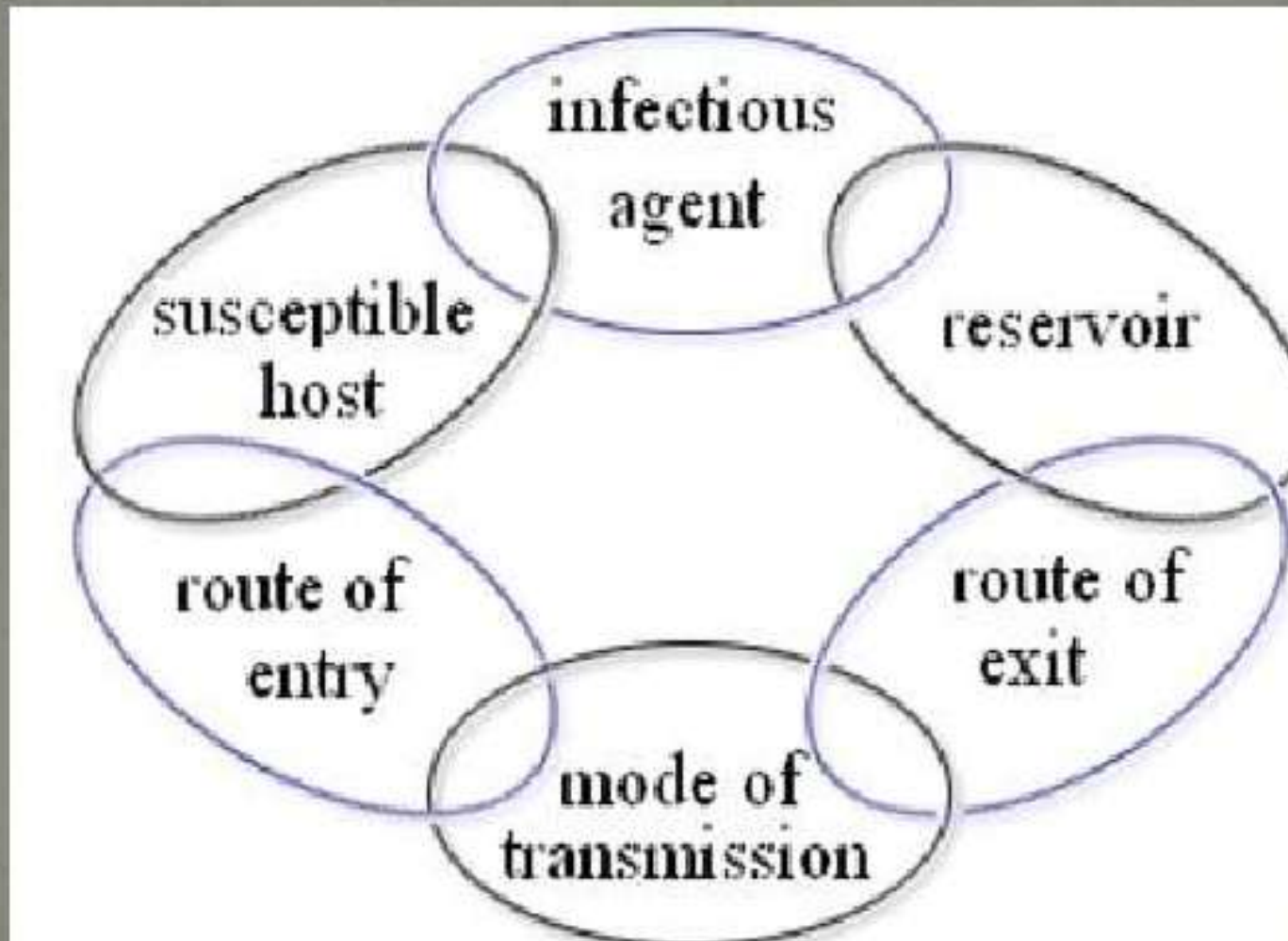 - Symptom: fever
  - Ex: Malaria

Epidemiological classification of communicable dz

- Waterborne: contaminated water
  - Ex: cholera
- Foodborne: contaminated food
  - Ex: salmonella
- Airborne: transmitted through air
  - Ex: TB
- Vector-borne: vectors like mosquitos or rats
  - Ex: malaria

Factors in disease transmission

Modes of transmission:
the route by which infectious agent is transmitted

Direct

- Physial contact
- Sexual contact
- Biting
- Direct projection of droplets
- Across placenta

Indirect

- Air bourne
- Vector-borne
- Vehicle-borne

Reservoirs of infections agents:
where pathogens normally stay before infecting humans

- Human/animal reservoirs = infected host

  - Examples
    - Animals: dogs / rabies vrus
    - Improperly handled food: raw fish/ **Opisthorchis viverrini**
    - **Enviornmental reservoirs**
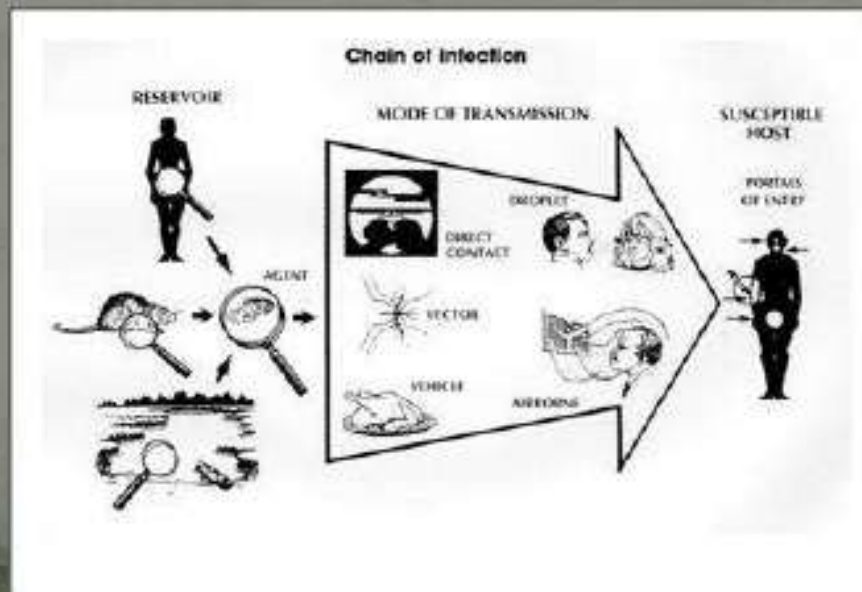
Route of Entry:

the site through which the pathogen enters the host

- Respiratory tract: breathed in through lungs
  - Ex: Mycobacterium Tuberculosis

- Gastrointestinal tract: enter through the mouth
  - Ex: diarrheal diseases
- Skin: breaks in skin integrity
  - Ex: malaria parasite after mosquito bite

Susceptible host and Risk factors

- Not every exposure results in disease
- Susceptible hosts develop the disease after exposure
- Factors that increase susceptibility: Risk factors
  - Poor or no immunity
  - Lack of vaccination
 - Poor nutrition
  - Coexistent disease

Influenza

- Viral infection
  - Affects mammals and birds
- Common symptoms
  - Chills, fever, body pain, soar throat, weakness
- Transmitted through air
  - Cough or sneeze
  - Also direct contact with bird dropping/secretions
  - Can be killed by sunlight, detergent, disinfectant

Influenza

- Global seasonal epidemics
  - 250,000-500,000 deaths annually
- Major influenza pandemics in 20th century
  - H5N1 (2009): avian flu (Asia)
  - Influenza A H1N1 (2009): swine/avian flu (N. America)
- Vaccination available for specific strains
  - Not widely available
  - Usually in developed countries
  - Usually to high risk populations

H5N1 pandemic 2009
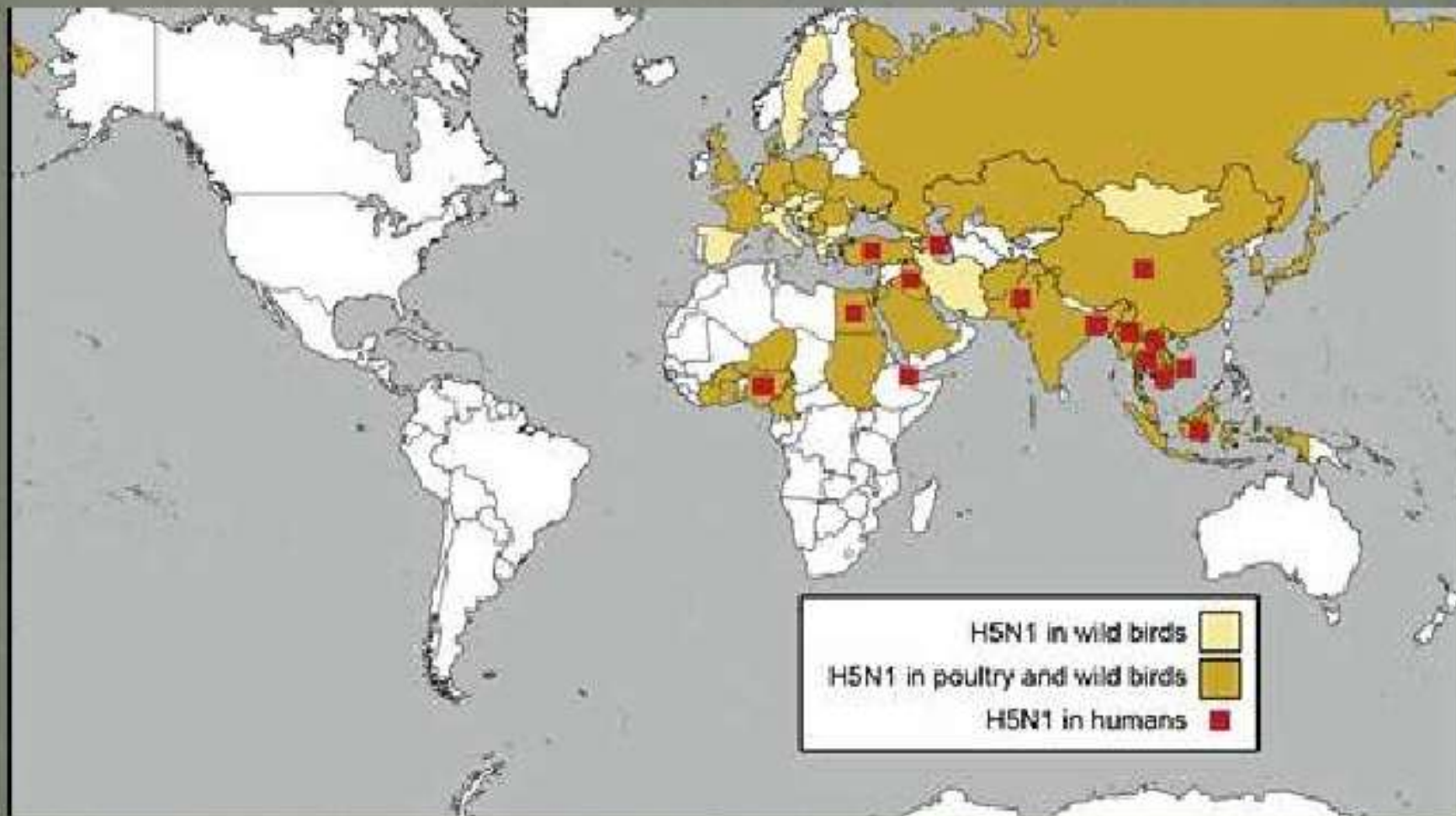
Severe Acute Respiratory Syndrome
SARS

- Viral respiratory disease in humans
- Hong Kong, 2009 epidemic
- 8422 cases, 900 deaths
  - 10% fatality
  - Spread to 37 countries in a few weeks
- Did not reach pandemic proportions

Tuberculosis

- Most deadly infectious disease
  - Soon will be overtaken by AIDS
- Caused by bacteria, *Mycobacterium tuberculosis*
- Spread through the air from infected cough/sneeze
- Classic symptoms:
  - Chronic cough, blood tinged sputum, fever, night sweats, weight loss
- One third of global population infected with TB bacteria
  - 1 new infection every second

HIV/AIDS

- Globally : 33 million people living with HIV
  - 0.8% of adult population
  - 2.6 million newly infected in 2009
  - Most new infecting in developing countries
  - New cases decreased 16% from 2001-2009
  - Women account for 51% of people living with HIV
- SEAR: 3.5 million people living with HIV
  - India, Indonesia, Myanmar, Nepal, Thailand

Malaria (mainly *P. falciparum*)

- Impact:
  - > 2 billion people at risk
  - +/- 300 million cases/yr
  - +/- 2 million deaths/yr., mainly African kids
- Biology:
  - Vector-borne (Anopheles mosquito)
  - Gradually acquired, incomplete immunity

Malaria: Control

- Bednets, especially when insecticide-treated
- Early diagnosis & treatment requires access to functioning lab, effective drugs
- Domiciliary spraying
- Control of larval breeding
  - Environmental, chemical, biological
- Chemoprophylaxis of selected groups
- Vaccine: not yet

- Multiple organisms
  - Rotavirus and other viruses, various types of *E. coli*, Salmonella, Shigella, Campylobacter, giardia, cryptosporidia, ? helminths etc.
- Different types/patterns of diarrhea:
  - acute watery, dysentery, chronic
- Main mechanism of death, esp. in acute watery dd
  - Dehydration
- Risks:
  - unsafe drinking water, poor sanitation, unavailable washing water, malnutrition, not breast feeding, probably HIV, traditional treatment practices, and misuse of medication
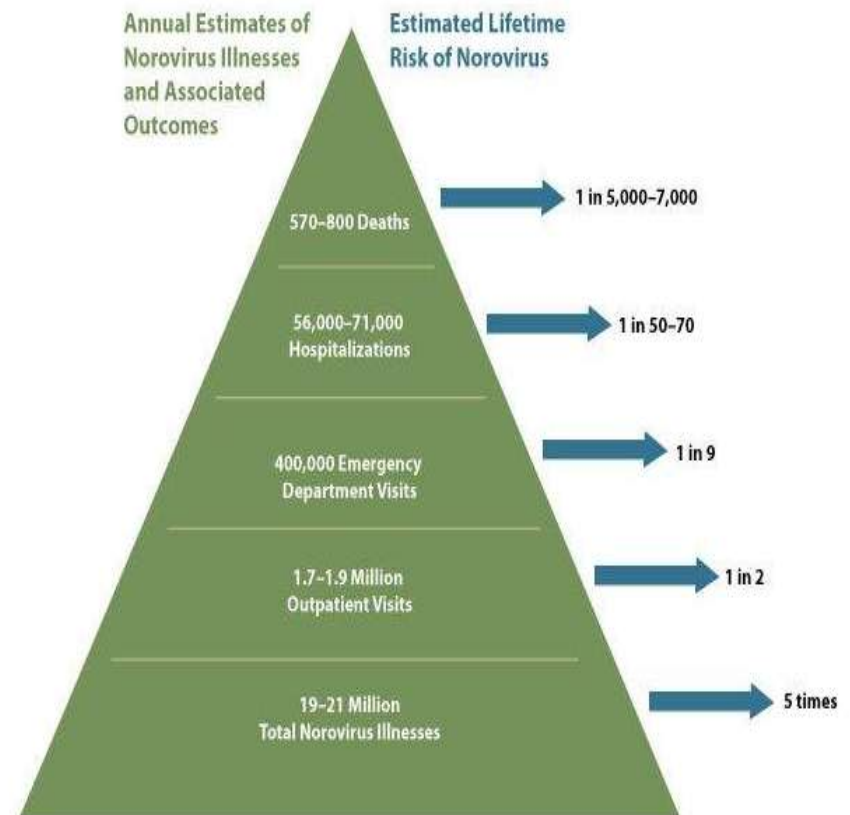
Diarrhea: Prevention & Management

- Prevention:
  - Better drinking water, better sanitation, more washing water, food safety, hygiene, breast feeding & food safety, immunization
  - ??rotavirus vaccine

- Management
  - Oral rehydration with appropriate fluid (cereal-based ORS probably better)
  - Continued breast (or other feeding if weaned)
  - Avoid dangerous traditional practices (withholding oral intake, purges etc.)
  - Train health workers that ORS, not medicines, is the treatment (except for dysentery).

NOROVIRUS

NOROVIRUS

- Norovirus is very contagious.
- Is the most common cause of acute gastroenteritis in the US.
  - Causes 19-21 million illnesses
  - Contributes to 56,000-71,000 hospitalizations
  - 570-800 deaths
- Can spread quickly in closed places, such as daycare centers, nursing homes, schools and cruise ships.
- Causes acute but self-limited diarrhea, often with vomiting, abdominal cramping, fever and fatigue.
  - Most individuals recover from acute symptoms with 2-3 days, but can be more severe in vulnerable populations.

Annual Estimates of Norovirus Illnesses and Associated Outcomes

Estimated Lifetime Risk of Norovirus

570–800 Deaths → 1 in 5,000–7,000

56,000–71,000 Hospitalizations → 1 in 50–70

400,000 Emergency Department Visits → 1 in 9

1.7–1.9 Million Outpatient Visits → 1 in 2

19–21 Million Total Norovirus Illnesses → 5 times

NOROVIRUS

- Norovirus was first identified as the cause of a gastroenteritis outbreak in Norwalk, Ohio, in 1968

- Noroviruses are a group of nonenveloped, single-stranded RNA viruses classified into the genus *Norovirus* (previously referred to as Norwalk-like viruses or small round-structured viruses) of the family *Caliciviridae*.

- Noroviruses can be divided into at least five genogroups, designated GI--GV, based on amino acid identity in the major structural protein. The strains that infect humans are found in GI, GII, and GIV, whereas the strains infecting cows and mice are found in GIII and GV, respectively

NOROVIRUS OUTBREAKS

- Periodic increases in norovirus outbreaks tend to occur in association with the emergence of new strains that evade population immunity. These emergent strains rapidly replace existing strains predominating in circulation and can sometimes cause seasons with unusually high norovirus activity

NOROVIRUS IN HEALTHCARE FACILITIES

- Norovirus is a recognized cause of gastroenteritis outbreaks in healthcare facilities.

- Healthcare facilities are the most commonly reported settings of norovirus gastroenteritis outbreaks in the US.

- Outbreaks of gastroenteritis in healthcare settings pose a risk to patients, healthcare personnel, and to the efficient provision of healthcare services.

SETTING OF NOROVIRUS OUTBREAKS REPORTED THROUGH THE NATIONAL OUTBREAK REPORTING SYSTEM (NORS), 2009-2012

Exposure setting	Number of Outbreaks	Percentage of Outbreaks
Health care facility	2189	62.7%
Restaurant or banquet facility	771	22.1%
School or day-care facility	214	6.1%
Private residence	69	1.9%
Other/multiple settings	251	7.2%

Data on specific settings are restricted to outbreaks with a single exposure setting; for foodborne outbreaks, setting refers to the setting where implicated food was consumed.

CLINICAL DISEASE

- Infectious dose: 18-1000 viral particles

- Incubation period: 12-48 hours

- Acute-onset vomiting and/or diarrhea
  - Watery, non-bloody stools
  - Abdominal cramps, nausea, low-grade fever
  - 30% infections asymptomatic

- Most recover after 12-72 hours
  - Up to 10% seek medical attention; some require hospitalization and fluid therapy
  - More severe illness and death possible in elderly and those with other illnesses

VIRAL SHEDDING

- Primarily in stool, but can also be present in vomitus
- Shedding peaks 4 days after exposure
- In some individuals, shedding may occur for at least 2-3 weeks
- May occur after resolution of symptoms
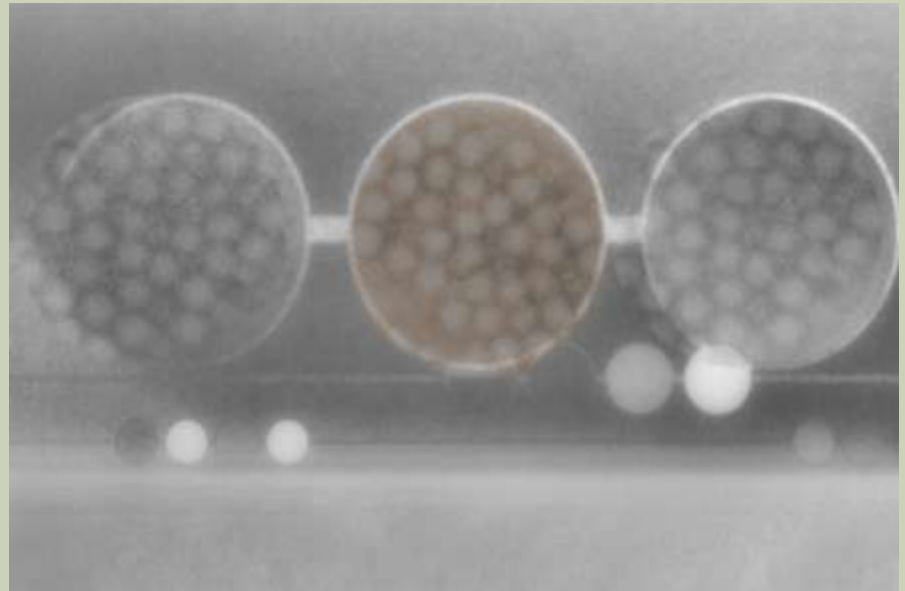
TRANSMISSION OF DISEASE

- Person to person
  - Direct fecal-oral
  - Ingestion of aerosolized vomitus
  - Indirect via fomites or contaminated environment

- Food
  - Contamination by infected food handlers

- Recreational and Drinking Water
  - Well contamination from septic tank
  - Chlorination system breakdown

- **In healthcare, the most likely and common modes of transmission are through direct contact with infected persons or contaminated equipment**

IMMUNITY TO NOROVIRUS

- Short-term immunity after infection

- There is little cross protective immunity (against different genotypes)

- No long-term immunity
  - Protection believed to last less than one year, and in some studies, protection may only last a few months

- Genetic susceptibility
  - A portion of the population may be genetically resistant to norovirus infection
  - Currently no commercially available test to identify those who might carry genes conferring resistance to norovirus infection

LABORATORY CONFIRMATION OF NOROVIRUS

- Reverse transcription polymerase chain reaction (RT-PCR) confirmation is the preferred diagnostic for norovirus
  - Differentiate genogroup I and genogroup II norovirus

- Rapid commercial assays have recently been cleared by FDA for preliminary identification of norovirus when testing multiple specimens during outbreaks
  - Poor sensitivity (50%)
  - Samples that test negative should be confirmed by second technique

WHAT SHOULD STAFF DO IF THEY SUSPECT NOROVIRUS?

- Key Infection Control Activities
    - Rapid identification and isolation of suspected cases of norovirus gastroenteritis
    - Communicating the presence of suspected cases to Infection Preventionists
    - Promoting increased adherence to hand hygiene, particularly the use of soap and water after contact with symptomatic patients
    - Enhanced environmental cleaning and disinfection

- Promptly initiate investigations
    - Collection of clinical and epidemiological information
    - Obtain clinical samples

INFECTION CONTROL:
PATIENT ISOLATION OR COHORTING

- In healthcare settings where risk of transmission is high, use of isolation precautions is often the most effective means of interrupting transmission

- CONTACT PRECAUTIONS – single occupancy room with a dedicated bathroom, strict adherence to hand hygiene, wear gloves and gown upon room entry
  - Use Contact Precautions for a minimum of 48 hours after the resolution of symptoms
  - Symptomatic patients may be cohorted together
  - Exclude ill staff members and food handlers in healthcare facilities for a minimum of 48 hours following resolution of their symptoms
  - Exclude non-essential personnel and visitors

INFECTION CONTROL: HAND HYGIENE

- Wash hands with soap and water after contact with symptomatic patients
- Alcohol-based hand sanitizers
  - Currently available products appear to be relatively ineffective against norovirus
  - Consider using FDA-compliant alcohol-based hand sanitizers for other indications (e.g., before contact with norovirus patient)

INFECTION CONTROL:
ENVIRONMENTAL CLEANING AND DISINFECTION

- The use of chemical cleaning and disinfecting agents are key in interrupting norovirus spread from contaminated environmental surfaces

- Increase the frequency of cleaning and disinfection of patient care areas and frequently touched surfaces
    - e.g., increase ward/unit level cleaning to twice daily, with frequently touched surfaces cleaned and disinfected three times daily

- It is critical to follow manufacturer instructions for methods of application, amount, dilution and contact time.

INFECTION CONTROL:
OTHER CONSIDERATIONS

- To reduce transmission, and depending on the magnitude of the outbreak, cohort staff to care for patients who are
  - Asymptomatic unexposed
  - Asymptomatic, potentially exposed
  - Symptomatic

- Remove shared food items for staff or patients for the duration of the outbreak

- Group activities for patients may need to be suspended; minimize patient movements within a patient care area to help control transmission

SURVEILLANCE FOR NOROVIRUS CASES

- Units can use a "line list" to track symptomatic staff and patients

- During an outbreak, collect key information to assist with controlling the outbreak and to inform outbreak details

- Suggested line list elements
  - Case (staff/patient) identifier
  - Case location
  - Symptoms
  - Outcome/Date of Resolution
  - Diagnostics submitted

REPORTING OUTBREAKS

- Internal Communication
  - Report gastroenteritis outbreaks (e.g., 2 or more suspected or confirmed cases among staff or patients) to infection control units
  - Outbreaks should also be reported to clinical management
  - Important to include communications, laboratory, environmental services, admitting, occupational health departments

Zika Virus

- Background: virology
- Epidemiology
- Research
- Public Health recommendations
- Future: vaccines
- Where to get more information

What is Zika?

Zika is a virus primarily transmitted by certain types of mosquitoes

In pregnant women, Zika infection is linked to microcephaly – a birth defect in which a baby's head is smaller than expected

There is no vaccine or treatment for the Zika virus

Where is Zika Found?

The virus has been known about since 1947, but was not present in the US

Previously outbreaks occurred in Africa, Southeast Asia, and the Pacific Islands

Recently, it has been spreading throughout Latin America and the Caribbean and outbreaks are occurring in many countries

How is Zika Spread?

Mosquitos:

- *Aedes* family of mosquitos
- Known as "tiger" mosquitoes
- Different from West Nile mosquitos
- *Aedes* mosquitos bite during the day and at night
- Need small amounts of water to reproduce (amount of water in a bottle cap)

Zika Virus Symptoms

• Asymptomatic infections are common, only one in four people infected with ZIKV are believed to develop symptoms.

• The disease symptoms are usually mild and last for 2 to 7 days.

• Signs and symptoms suggestive of Zika virus infection may include a combination of the following:

• Maculo-papular rash (90%)

• itching or pruritus

• fever (65%)

• headache (45%)

• arthralgia or arthritis (65%)

• myalgia (48%)

• lower back pain

• retro-orbital pain (39%)

• oedema (19%)

• vomiting (10%).

From a pregnant woman:

If a woman is pregnant and becomes infected with Zika through a mosquito bite or sexual transmission, her fetus is at risk for Zika

How is Zika Spread?

Sexual contact:

If a man with Zika virus (even if he doesn't show symptoms) engages, he can transmit the virus to his partner

Through travel:

If someone travels to an area with Zika transmission and gets Zika, then returns and gets bitten by a mosquito, that

Baltimore for example has the mosquitoes that transmit Zika

Baltimore's urban landscape makes an ideal breeding ground

Lots of travel, especially in summer months

How do I know if I have Zika?

Only 1 of 5 people will even show symptoms

Symptoms include:

mild fever

rash

joint aches

red eyes
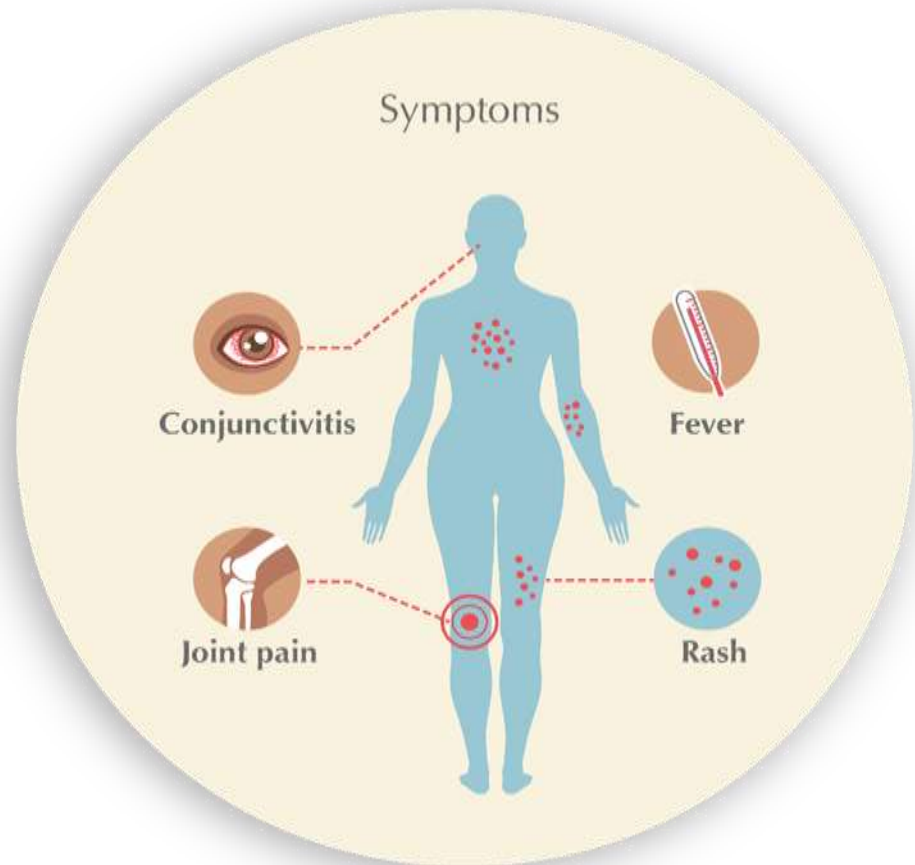
How do I treat Zika?

There is no vaccine for Zika

There are no medications to treat Zika

Prevention is the best way to protect yourself

Mosquito season starts at the beginning of May- be prepared!

How do I prevent mosquito bites?

Reduce breeding grounds! Eliminate standing water!

Empty or turn over anything that has collected water such as buckets, planters, toys, pools*, birdbaths, flowerpots, or trash containers

Properly dispose of unwanted objects like old tires, broken toys, etc.

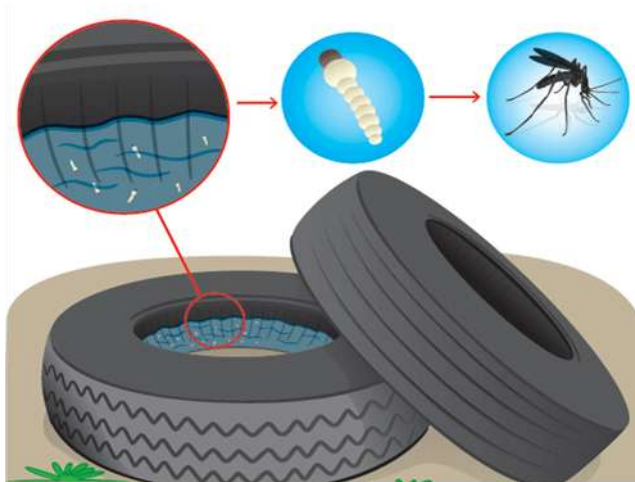Cover trash cans or other items or containers that can collect water

Check inside and outside your home

*chlorinated pools are ok

How do I prevent mosquito bites?

Pick up trash and litter in your neighborhood— the amount of water in a bottle cap is enough for mosquitoes to lay eggs

Join a community cleanup to target problem areas where trash may be accumulating

How do I prevent mosquito bites?

Keep mosquitoes out of your home

Keep screens on your windows and doors and repair any holes

Use air conditioning

when possible

How do I prevent mosquito bites?

Wear light weight, long sleeved shirts and pants

Treat clothing with permethrin spray

Permethrin is an insecticide that kills mosquitoes

Do not use permethrin on skin

Follow instructions on package

How do I prevent mosquito bites?

Use safe and effective repellents- Always follow product instructions

Do not spray repellent on skin under clothing- spray the clothing

If using sunscreen, put sunscreen on first, then insect repellent

How do I protect my family from mosquitos?

For babies and children:

Cover stroller and baby carrier with mosquito netting when outside

Do not use products containing oil of lemon, eucalyptus or para-menthanediol on children younger than 3 years old
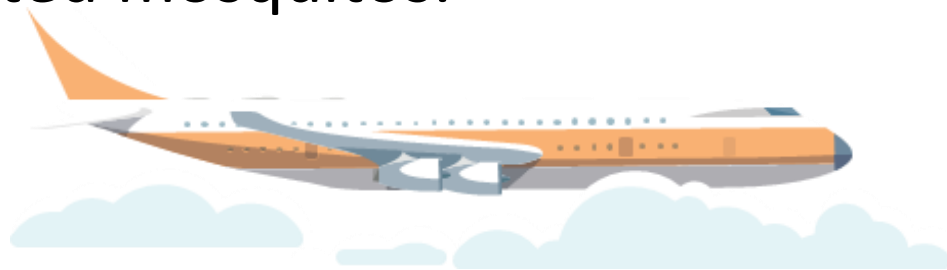
Do not use insect repellents on babies younger than 2 months old

What should I do if I travel to an area with Zika?

Strictly follow steps to prevent mosquito bites to protect yourself and your family

Even if you do not feel sick, take steps to prevent mosquito bites for 3 weeks after you return

This will help prevent the spread of Zika to uninfected mosquitos.

Women who are planning pregnancy

After a woman leaves an area with active Zika virus transmission, it is recommended that she should avoid becoming pregnant for 8 weeks

- Should also consider partner's status..

What should pregnant do ?

Delay travel to areas with Zika transmission. If you travel, talk to your doctor before your trip

If you want to get pregnant, talk to your doctor before you travel

Take extra precautions to avoid mosquito bites

What do I do if I get bitten?

If you get bitten and start showing Zika symptoms (fever, rash, joint pain, red eyes) call your health care provider

Your health care provider will determine whether or not you should receive Zika testing
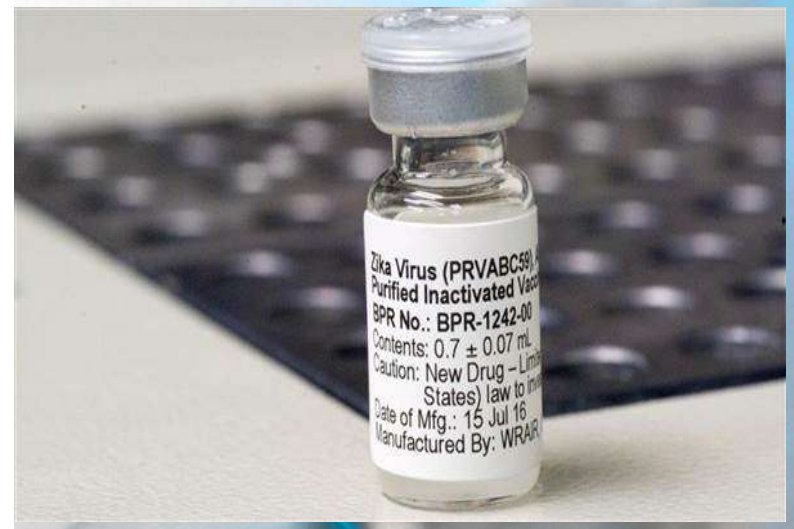
What is the Health Department doing?

Surveillance to determine where Aedes mosquitoes are present

Responding to standing water reports to eliminate standing water

If you see standing water in your neighborhood, eliminate if possible.

Vaccines

- US National Institute for Allergy and Infectious Disease has already created vaccine platforms for other flaviviruses that can be used as a starting point for a Zika vaccine.

- Several vaccine approaches:
  - A DNA-based vaccine that uses a strategy similar to a flavivirus vaccine for West Nile Virus (already tested in phase 1 trials)
  - A live-attenuated Zika vaccine building on a similar vaccine approach for dengue virus.

Congratulations!
This is the last lecture

WHAT'S FLU TO YOU? STOMACH "FLU" VERSUS INFLUENZA

Dr. Shaymaa A. Majed
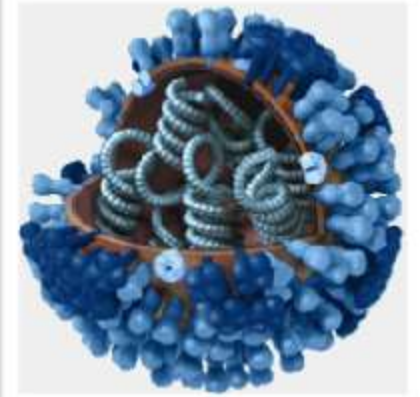
"I HAD THE FLU…"

"I HAD THE FLU…"

INFLUENZA = "FLU"

INFLUENZA ≠ STOMACH "FLU"

INFLUENZA

Influenza pandemics—frequency

- Occur about every 30 years, or about three times each century

- New strain of flu not recognized by the immune systems of the population

- Rapidly spread worldwide

www.globalchicago.org

The Spanish Flu Pandemic of 1918

Killed more people than any other disease in history

Caused more deaths than WWI, WWII, the Korean War, and the Vietnam War combined

Unusually high attack rates among young and otherwise healthy adults (soldiers)

Doughboys - 1918
Info.detnews.com

INFLUENZA

- A common seasonal respiratory disease associated with high levels of morbidity and mortality each winter.

- Common symptoms:
  - Fever
  - Cough
  - Sore throat
  - Headache
  - Body aches
  - Chills

- Less common: vomiting (mostly in children)

CLINICAL DISEASE

- Abrupt onset of respiratory disease typically lasting 3-7 days, with related malaise and cough lasting up to two weeks.

- Common complications include: pneumonia, bronchitis, sinus and ear infections and exacerbation of existing respiratory issues.

- High risk groups: children, the elderly, pregnant woman and immunocompromised individuals.

- Incubation period: 2 days.

TRANSMISSION

- Infected persons can spread influenza about one day prior to symptom onset, and 5 to 7 days after symptom development. Children may be able to spread the virus for longer than 7 days.

- Influenza is mainly transmitted via respiratory secretions in droplet form. Contact within contaminated surfaces is a secondary source of transmission.

- General prevention efforts include:
  - **Vaccination**
  - Hand washing
  - Disinfection of surfaces
  - Not touching face with unwashed hands
  - Staying home when ill and avoiding others who are ill
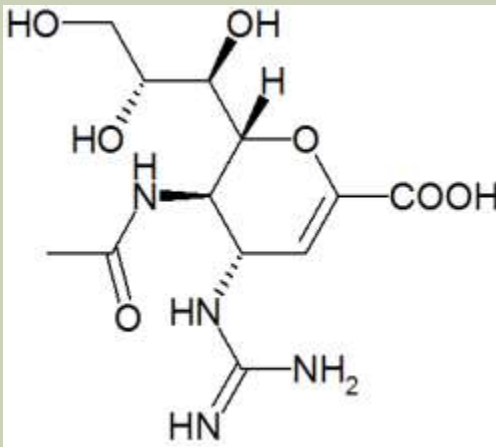
LABORATORY CONFIRMATION

- **Positive influenza lab tests are**
  - **PCR**
  - **Respiratory Viral Panel (RVP)**

INFLUENZA ANTIVIRALS
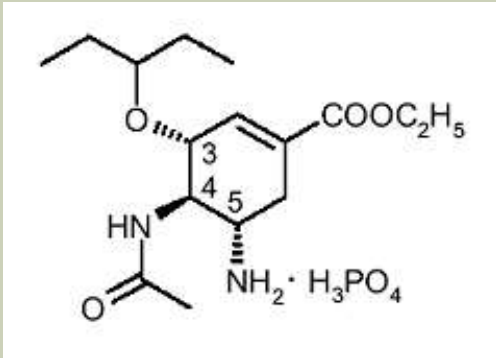
Oseltamivir (Tamiflu)

Zanamivir (Relenza)

Treatment with influenza antivirals is recommended in a hospital setting for all confirmed and suspected cases of influenza when the patient is in a high-risk category. **The recommendation is to NOT WAIT for a positive test to begin antiviral treatment.**

INFLUENZA ANTIVIRALS

In facilities with residents, treatment or prophylaxis with influenza antivirals are recommended for:

- All confirmed and suspected cases of influenza when the patient is in a high risk category (treatment dose).

- All resident contacts of confirmed and suspected cases of influenza when the contact is in a high-risk category (prophylactic dose):
  - Roommates
  - partners
  - Residents on the same floor/wing/etc.

- *NEW!* All long term care staff contacts of confirmed and suspected cases during H3N2 seasons when the vaccine is poorly matched to the circulating strain (like 2014-15, prophylactic dose).

INFECTION PREVENTION:
VACCINATION

Yearly seasonal influenza vaccination is recommended for patients, residents, family members and health care workers.

- Different kinds of seasonal influenza vaccines are available.

- No current recommendations for particular vaccine types over others.

INFECTION CONTROL:
ACTIVE SURVEILLANCE

- Daily active surveillance of residents, staff and visitors for a health care facility should be initiated during outbreaks.

- Active surveillance should continue for one week after the most recent case is identified.

- Active surveillance provides situational awareness and can guide other infection control measures.

INFECTION CONTROL

- Placing ill patients/residents in a private room. OR place residents suspected of having influenza together.
- Masking of staff and visitors when entering the room of patient/resident (dispose of mask upon exit).
- Masking of the patient/resident during transport.

- Duration: 7 days after onset OR 24 hours after the resolution of fever and respiratory symptoms (or longer).

INFECTION CONTROL:
EMPLOYEE/VISITOR SCREENING

Screen employees and visitors for respiratory illness:

- Employees:
  - Track employee health
  - Have ill employees stay home

- Visitors:
  - Discourage ill visitors from entering facility
  - Require masking of visitor
  - Restrict all visitors or young visitors during active outbreaks (facility discretion)
  - Post signs!

INFECTION CONTROL:
CLEANING AND DISINFECTION

- Proper cleaning in infection are important to controlling influenza and other respiratory viruses that can live on surfaces for several hours.

- Routine cleaning is typically sufficient:
  - Clean and disinfect surfaces and objects that are touched often
  - Use cleaning/disinfecting products approved for effectiveness against influenza A viruses (alternative: solution of one tablespoon of bleach to 4 cups water)
  - For visibly dirty surfaces, clean with a general cleaner, rinse with water.
  - Consider disinfecting wipes for often used electronic items, such as phones and computers

REPORTING

Influenza "outbreaks" in health care institutional settings are reportable.