EPI IN THE NEWS,

3:16 pm IST
Feb 8, 2016 ENVIRONMENT

Meteorite Killed Man at Indian College, Says Chief Minister

ARTICLE | COMMENTS (1)

J. JAYALALITHAA METEORITE SPACE TAMIL NADU

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By ADITI MALHOTRA CONNECT

A meteor from the Geminids meteor shower enters the Earth's atmosphere past the stars Castor and Pollux on December 12, 2009 above Southold, New York. — Stan Honda/Agence France-Presse/Getty Images

Should you be concerned?

"An unidentified object left a four-feet deep crater after falling near a cafeteria inside the Bharathidasan Engineering College campus at about 12.30 p.m. on Saturday, G. Baskar, principal of the college in Tamil Nadu's Vellore district, said. "There was a noise like a big explosion," said Mr. Baskar. "It was an abnormal sound that could be heard till at least 3 kilometers [about 2 miles] away," he added.
Advertisement
It would be the first time in modern history that a person has been killed by a meteorite."

Class 10:
Difference Measures

HLSC 2003 – Epidemiology
Faculty of Health Sciences
University of Lethbridge

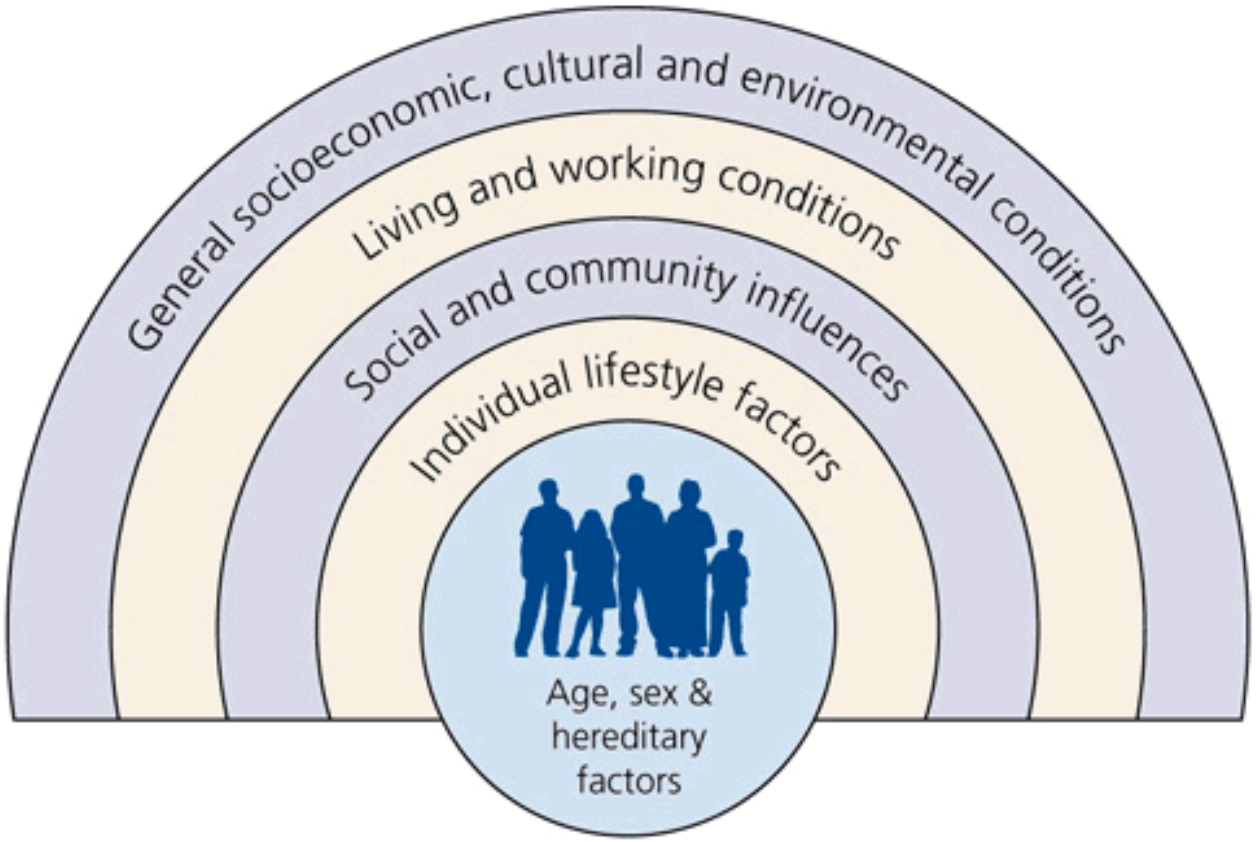
Class 12: Learning Objectives

- Recognize the cause of a disease is **multifactoral**.
- Understand how we use ratio measures & difference measures to determine which determinants to focus on to improve population health.
- Learn to calculate and interpret 4 difference measures:
  1. **Attributable risk**
  2. **Attributable fraction**
  3. **Population attributable risk**
  4. **Population attributable fraction**

Introduction

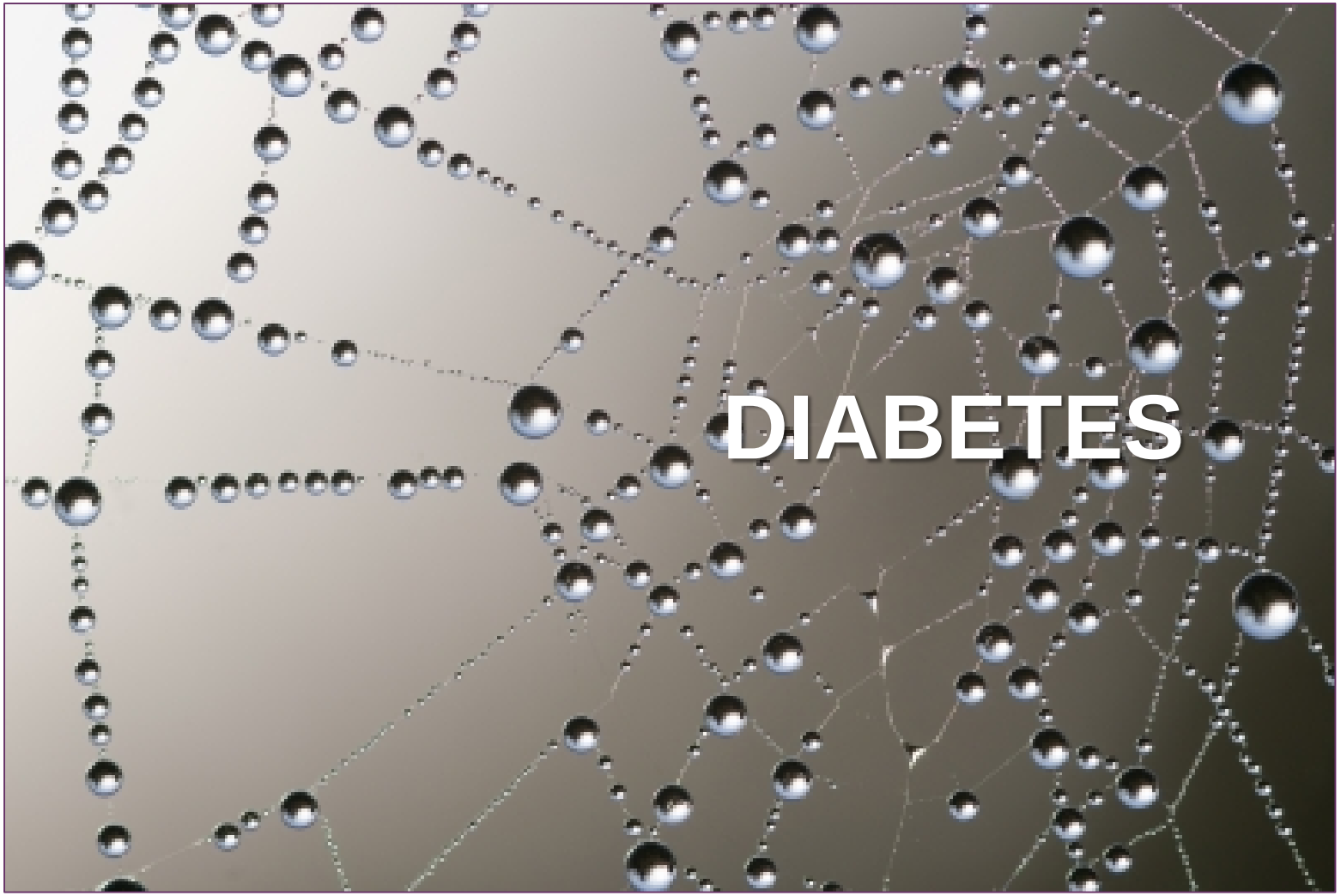
- **Key goal in epidemiology**: Present research findings in meaningful and interpretable way.
  - "Epi-speak"
- So far you have learned how to interpret incidence, prevalence, odds ratios, relative risk ratios. These are key measures used in epidemiology, BUT
- **Now** we will expand your knowledge a bit more so you can really become knowledgeable **consumers of epidemiologic research and communicate more effectively with non-epi-speakers.**

What Determines Health? A Good Framework to Use

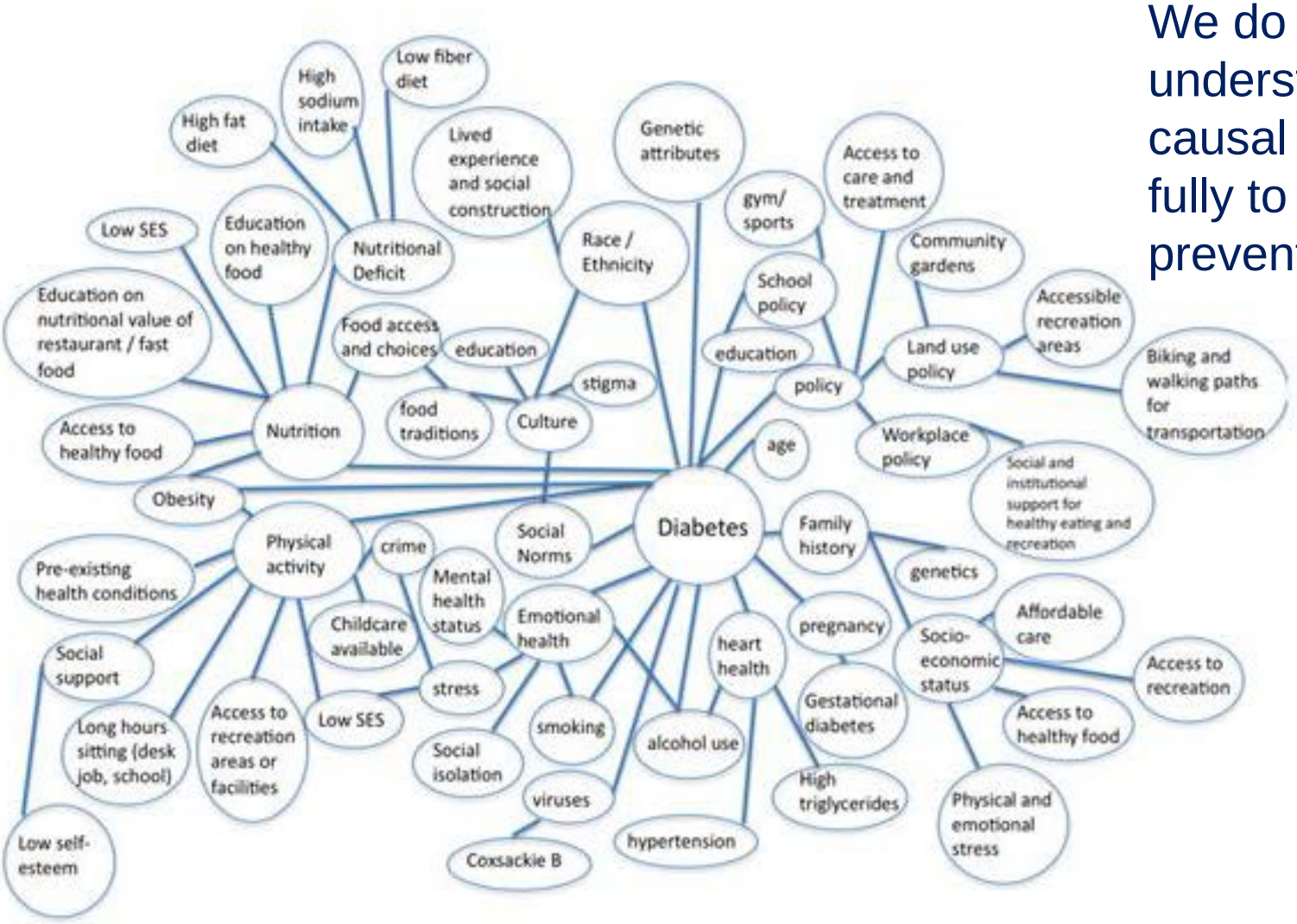


Dahlgren & Whitehead, 1991

Web of Causation



Web of Causation: Diabetes



The Good News!

We do not have to understand this causal web of factors fully to intervene and prevent disease.

We use measures of absolute and relative effects to determine **which factors to target** for prevention.

Answering different questions using Measures of Effect:

Relative Risk answers the question: *Is there an association between exposure and outcome, and what is the strength of that association?*

But now we want to know….*How much of the disease that occurs can be attributed to a certain exposure?*
This is answered with a calculation of
ATTRIBUTABLE RISK **(among other names)**

Ratio vs. Difference Measures

+

Ratio Measures (relative effects)

- Tell us **how many times more likely** it is that someone who is ‘exposed’ to something will experience a particular health outcome than someone who is ‘not exposed’.

- Do not, however, tell us anything about **the actual amount of disease occurring** in either group.

Ratio Measures Example

- *Example 1:*

  Incidence in exposed = **0.5**

  incidence in unexposed = **0.1**

  Relative risk = 5.0

- *Example 2*:

  Incidence in exposed = 50

  incidence in unexposed = 10

  Relative risk = 5.0

The incidence of disease in Example 2, however, is 100x greater than in example 1

*The purpose of an attributable risk is to communicate this vital public health information.

Difference Measures:

1. attributable risk
2. attributable fraction
3. population attributable risk
4. Population attributable fraction

- Tell us **how much extra disease is occurring among those exposed** to something compared to those who are not exposed.

- Tells us **how much disease could potentially be prevented** by removing the exposure.

Unless you are dead, there is rarely no risk… even among the unexposed.

There is a **baseline amount** of disease in a population.

Difference measures tell us how much "**extra disease**" there is because of an exposure.

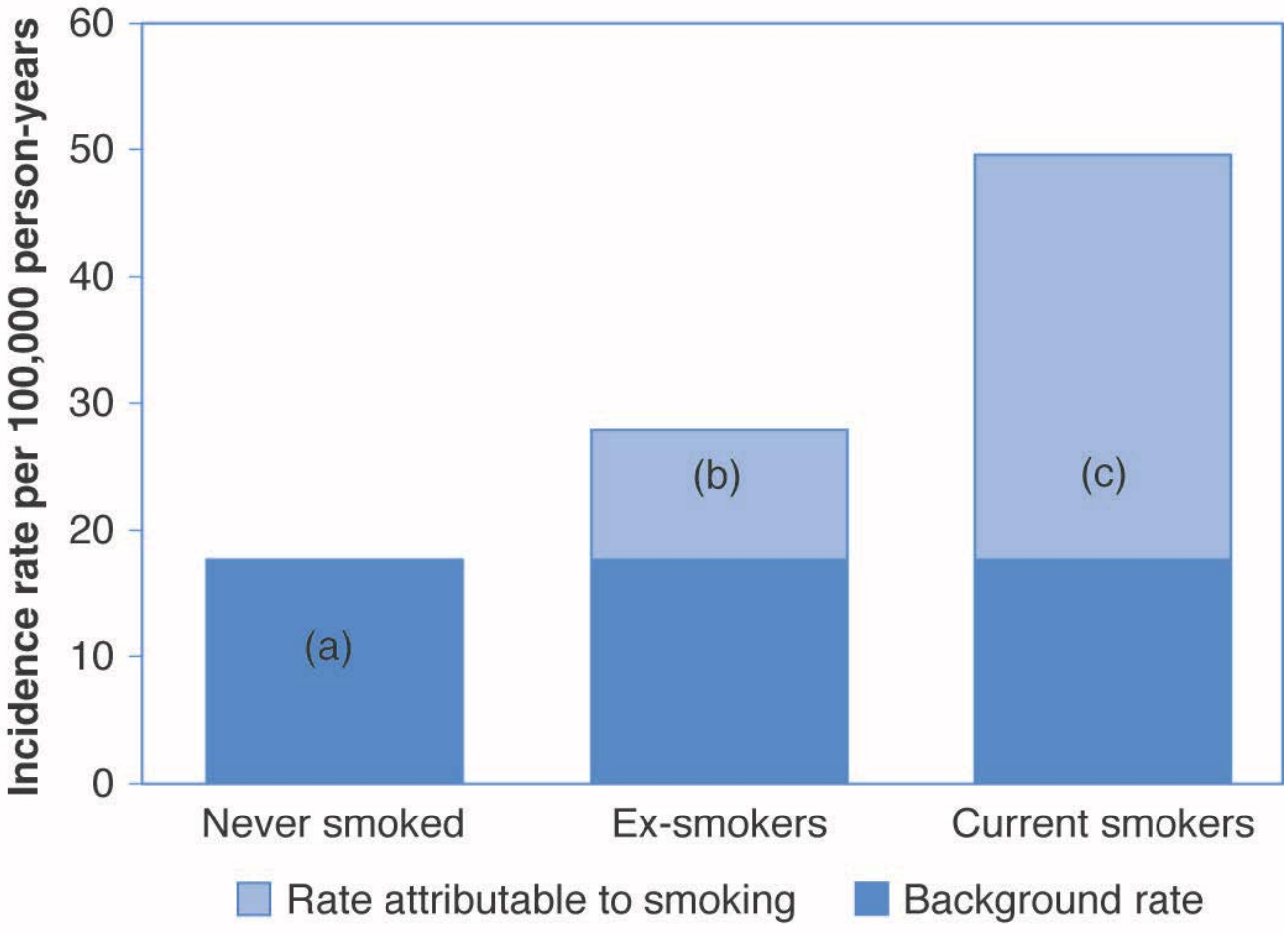


Fig 5.1

Attributable risks: the results of a study of smoking and stroke (Drawn from: Colditz et al., 1988)

1. Attributable Risk

(the incident “difference” between the exposed and unexposed)

Calculation 1

Incidence rate in exposed ^{e} – Incidence rate in unexposed ^{o} = $IR_e - IR_o$

Calculation 2

Cumulative incidence in exposed – Cumulative incidence in unexposed = $CI_e - CI_o$

Example 1

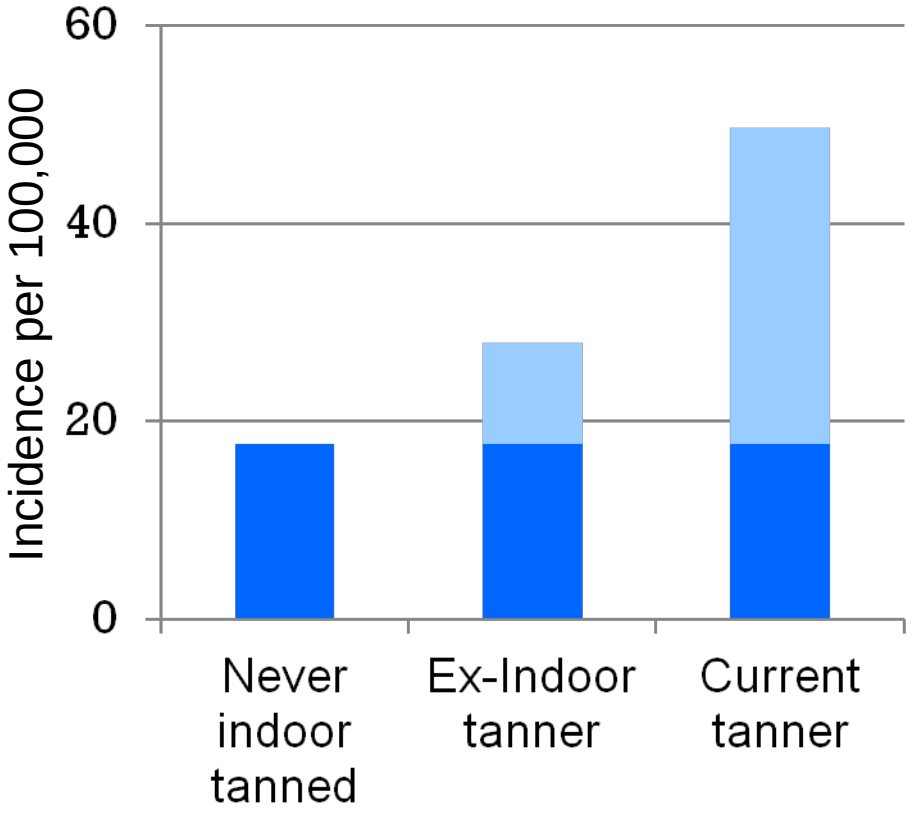
- Melanoma incidence among indoor vs. non indoor tanners in 2012:
  - Indoor tanners: 49.6 cases per 100,000
  - Non-tanners:17.7 cases per 100,000

AR = 49.6 – 17.7 = 31.0

There is a 31.9 difference in melanoma cases between the exposed and unexposed.

Interpretation

- There were an **extra 31.9 cases of melanoma** per 100,000 among current indoor tanners in 2012.
- Tells us **extra amount** of disease due to exposure



Example 2

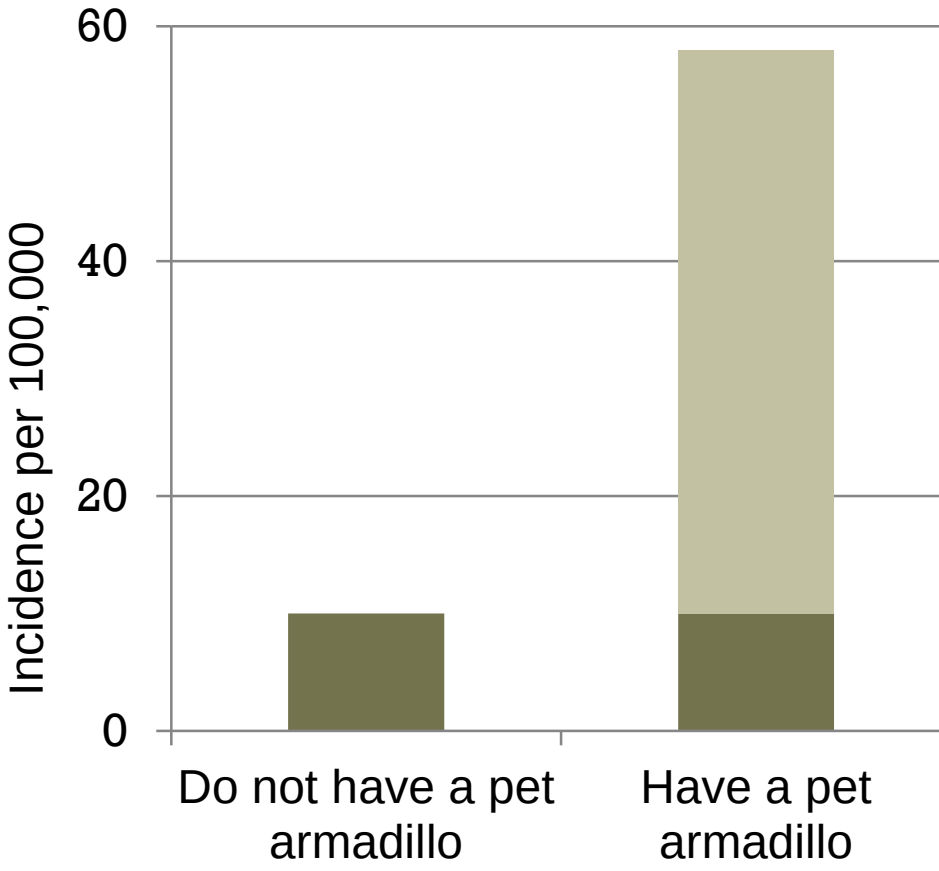
- Leprosy incidence among armadillo vs. non armadillo owners in Alberta (2012):
  - Incidence, armadillo owners:

    58 cases per 100,000
  - Incidence, non-armadillo owners: 10 cases per 100,000

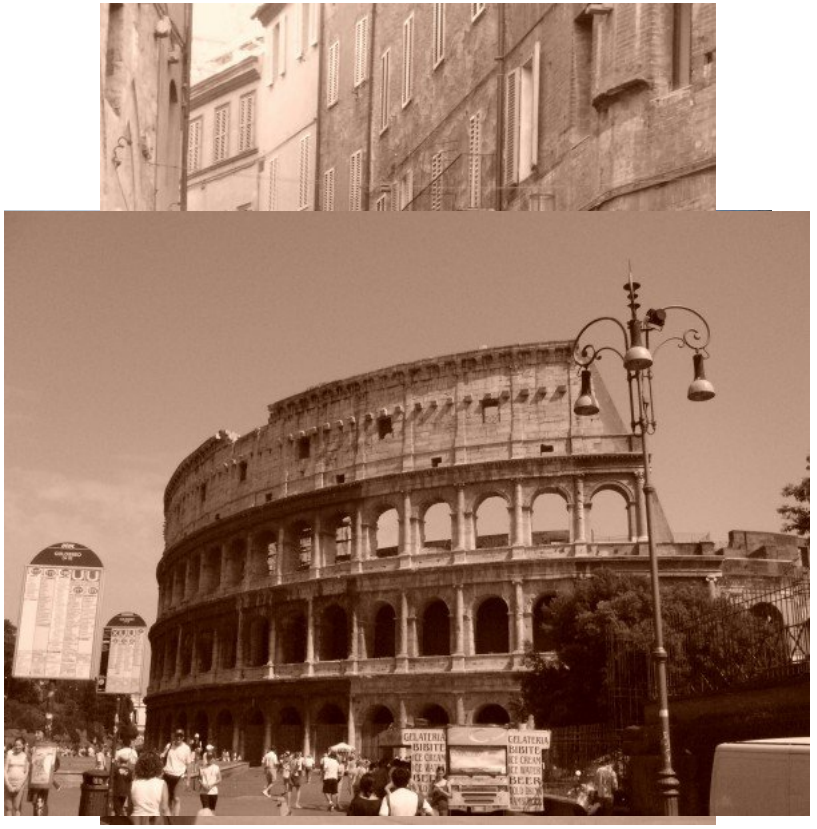
  Difference = 48 cases

Interpretation

- In 2012, there were an **extra 48 cases of leprosy** per 100,000 that were ***attributable*** to owning an armadillo in Alberta.



UK or Italy?



Attributable Risk

- the 5-year cumulative incidence of injury or death in Italy is **0.8** per 100,000 Canadians who visit.
- In comparison, the 5-year cumulative incidence of injury or death in the UK is **0.3** per 100,000.

What is the “exposure”?

Calculate the **relative risk:**

Calculate the **attributable risk** to fully inform your decision:

Decision Time – Italy or the UK?

Attributable risk is 0.8 – 0.3 = 0.5 per 100,000

(or 5 per 1,000,000)

An additional 5 Canadians per 1 million who visit Italy each year are injured or killed compared to those who visit the UK. This suggests ***the public health impact*** of this exposure (Italy) is very low and of little concern. So feel free to go to Italy!

2. Attributable Fraction (AF)

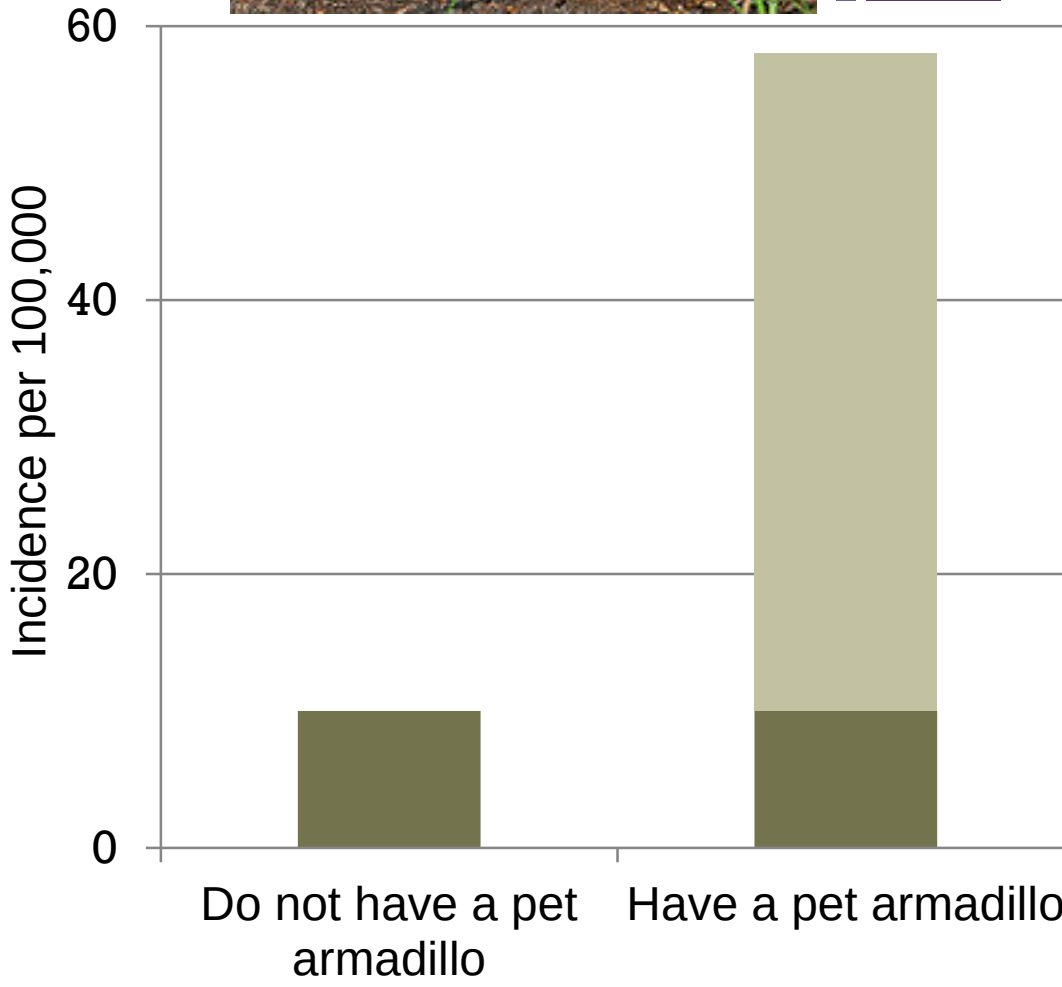
- Tells us the **% of disease** in the exposed group **that would not have occurred** in the absence of the exposure.

- To calculate, divide the attributable risk by the incidence in the exposed group x 100.

$$\text{Attributable Fraction (AF)} = \frac{\text{Attributable Risk}}{\text{Incidence in exposed}} \text{ X } 100$$

2. Attributable Fraction

- In 2012, there were an **extra 48 cases of leprosy** per 100,000 that were attributable to owning an armadillo in Alberta.
- Leprosy incidence among armadillo pet owners was 58 cases per 100,000
- 0.00048 / 0.00058 = **82.8%** of leprosy cases in Alberta are attributed to people owning armadillos as pets.



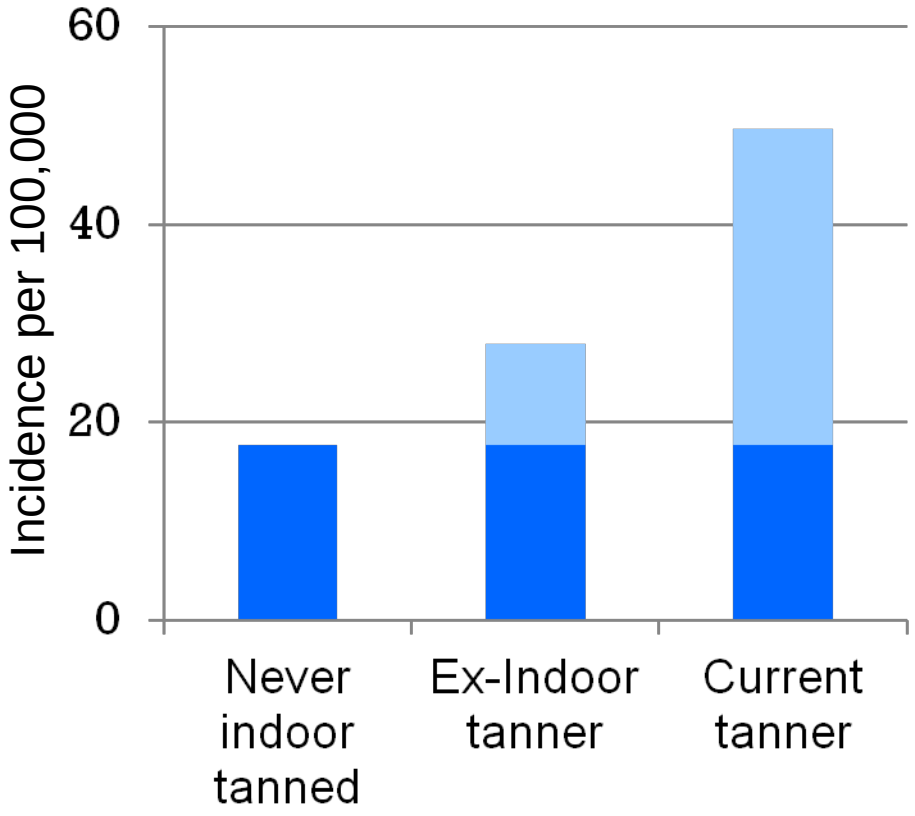
2. Attributable Fraction

- Attributable risk = **31.9 cases of melanoma** per 100,000 in Alberta *due to indoor tanning.*
- Melanoma incidence among indoor tanners was 49.6 cases per 100,000
- Calculate the attributable fraction

_____

- Interpret the attributable fraction

_____



3. Population Attributable Risk

- Compare **amount of disease in whole population** with the **amount of disease in unexposed group** (the amount of disease we would expect if no one was exposed to high salt).

- PAR = **Incidence in whole popul** – **Incidence in unexposed**

- The best way to remember AR, AF and PAR and to learn how to interpret them is through practice. We will do an in-class exercise today. There are also practice questions at the end of Ch 5.

What would a Population Attributable Fraction be?

$$\text{Popluation Attributable Fraction (PAF)} = \frac{\text{Population Attributable Risk}}{\text{Incidence in total population}}$$

Difference Measure Example

[Canada's Salt Problem]

(Last statement in this video is a measure of population attributable risk)

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Health

Salt levels in fast foods higher in Canada

Canadian salads saltiest, international report finds

CBC News Posted: Apr 16, 2012 12:01 PM ET | Last Updated: Apr 16, 2012 10:41 PM ET 211

The salt in fast food burgers in an international study ranged from an average of 1.1 g in the U.K. to 1.4 grams in New Zealand. (Paul Sakuma/Associated Press)

Dr. Karl Kabasele

Salt levels in meals sold at major fast food chains vary substantially across developed countries, according to a new study that challenges the industry and governments to get tougher to protect public health.

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CMAJ RESEARCH

The variability of reported salt levels in fast foods across six countries: opportunities for salt reduction

Elizabeth Dunford MPH, Jacqueline Webster PhD, Mark Woodward PhD, Sebastien Czernichow PhD, Wen Lun Yuan MPH, Katharine Jenner MPH, Cliona Ni Mhurchu PhD, Michael Jacobson PhD, Norm Campbell MD, Bruce Neal PhD

Abstract

Background: Several fast food companies have made commitments to reduce the levels of salt in the foods they serve, but technical issues are often cited as a barrier to achieving substantial reductions. Our objective was to examine the reported salt levels for products offered by leading multinational fast food chains.

Methods: Data on salt content for products served by six fast food chains operating in Australia, Canada, France, New Zealand, the United Kingdom and the United States were collected by survey in April 2010. Mean salt contents (and their ranges) were calculated and compared within and between countries and companies.

Results: We saw substantial variation in the mean salt content for different categories of contained 1.6 g. We also saw variability between countries: chicken products from the UK contained 1.1 g of salt per 100 g, whereas chicken products from the US contained 1.8 g. Furthermore, the mean salt content of food categories varied between companies and between the same products in different countries (e.g., McDonald's Chicken McNuggets contain 0.6 g of salt per 100 g in the UK, but 1.6 g of salt per 100 g in the US).

Interpretation: The salt content of fast foods varies substantially, not only by type of food, but by company and country in which the food is produced. Although the reasons for this variation are not clear, the marked differences in salt content of very similar products suggest that technical reasons are not a primary explanation. In the right regulatory environment, it

Competing interests: See end of article.

This article has been peer reviewed.

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Processed meat can cause colon cancer, World Health Organization says

Diets high in red meat also linked to increased cancer risk, report says

CBC News Posted: Oct 26, 2015 7:20 AM ET | Last Updated: Oct 26, 2015 7:52 PM ET

Processed meat can cause bowel cancer: WHO 1:09

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Eating processed meat such as sausage and bacon can cause cancer in humans, the World Health Organization's cancer agency says.

Monday's official designation from the France-based International

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"Our expert working group estimated that the consumption of processed meat increases the risk of colorectal cancer about 18 per cent per 50 gram portion eaten daily,"

LINK

According to the most recent estimates by the Global Burden of Disease Project, an independent academic research organization, about 34,000 cancer deaths per year worldwide are attributable to diets high in processed meat; red meat could be responsible for 50,000 cancer deaths per year worldwide.

In contrast, about 1 million cancer deaths per year globally are due to tobacco smoking, 600,000 per year are due to alcohol consumption, and more than 200,000 per year are due to air pollution, the WHO points out.

> "IARC classifications describe the strength of the scientific evidence...rather than assessing the level of risk."

The WHO also repeated the estimates presented by the IACR in its report, saying that every 50-g portion of processed meat eaten daily increases the risk for colorectal cancer by about 18%, and that 100 g of red meat could increase the risk for colorectal cancer by 18%.

It did not, however, emphasize that these are relative risks. That was left to others.

Cancer Research UK (CRUK), in a scienceblog, used UK population data to give some absolute numbers.

LINK – UICC, Global Cancer Control

LINK – Cancer Research UK

Difference Measures

1. **AR** = amt of excess disease in exposed group

2. **AF** = **%** of disease in exposed group that would not occur if they weren't exposed.

3. **PAR** = amt of disease in the whole population that would not occur if there was no exposure.

   - Example - How many deaths in Canada as a whole can be attributed to high salt intake?
   - PAR is an important and frequently used measure!

iClicker Question

Which difference measure is reported as a percentage?

A. Attributable risk

B. Attributable fraction

C. Population attributable risk

D. Risk ratio

Calculating Difference Measures

1. **AR** = Incidence in exposed – Incidence in unexposed
2. **AF** = (**AR** / incidence in exposed) x 100
3. **PAR** = Incidence in whole popul – Incidence in unexposed
4. **PAF** = Incidence in the whole population – incidence in the unexposed (**PAR**)/ incidence in the whole population

Do you know how each one is interpreted?

In Class Exercise