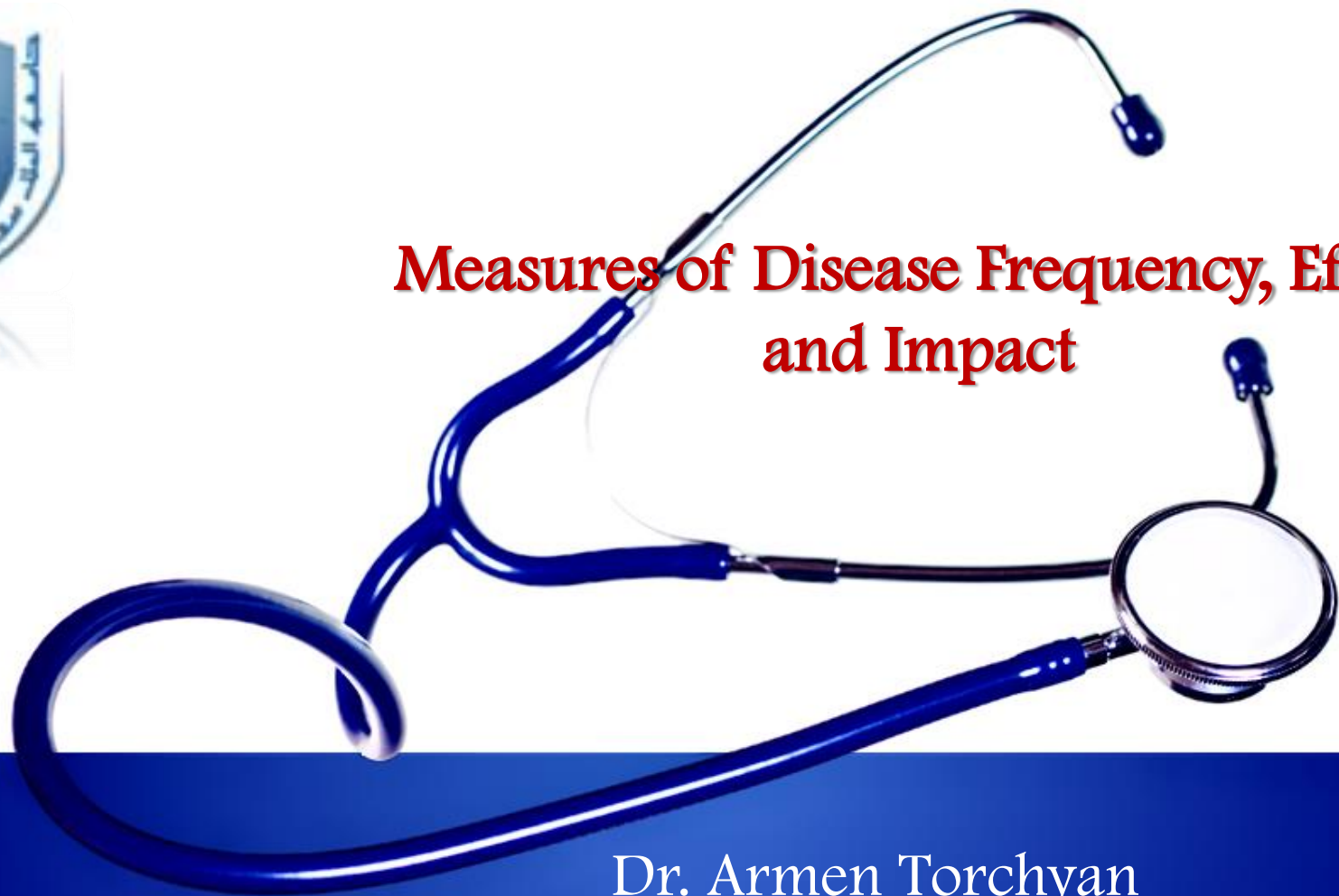




Measures of Disease Frequency, Effect and Impact



Dr. Armen Torchyan
Dr. Amna Rehana Siddique
Tutorial CMED 305
September, 2014

OBJECTIVES



- Incidence Rate
- Prevalence Rate
- Attack Rate
- Risk Difference
- Measures of Association



Important Terms



- **Exposure (E)** \equiv an explanatory factor; any potential health determinant; the independent variable
- **Disease (D) (Outcome)** = the response; any health-related outcome; the dependent variable
- **Measures of disease frequency** = Incidence & Prevalence
- **Measure of association (syn. measure of effect)** \equiv a statistic that quantifies the relationship between an exposure and a disease
- **Measure of potential impact** \equiv a statistic that quantifies the potential impact of removing a hazardous exposure

Incidence Rate



Population of the city in Atlantis on March 30, 2003 = 183,000

No. of new active TB occurring between January 1 and June 30, 2003 = 26

No. of active TB cases according to the city register on June 30, 2003 = 264

The incidence rate of active cases of TB for the 6 month period was:

- a. 7 per 100,000 population
- b. 14 per 100,000 population
- c. 26 per 100,000 population
- d. 28 per 100,000 population
- e. 130 per 100,000 population

Absolute risk

Prevalence Rate



Population of the city in Atlantis on March 30, 2003 = 183,000

No. of new active TB occurring between January 1 and June 30, 2003 = 26

No. of active TB cases according to the city register on June 30, 2003 = 264

The prevalence rate of active cases of TB for the 6 month period was:

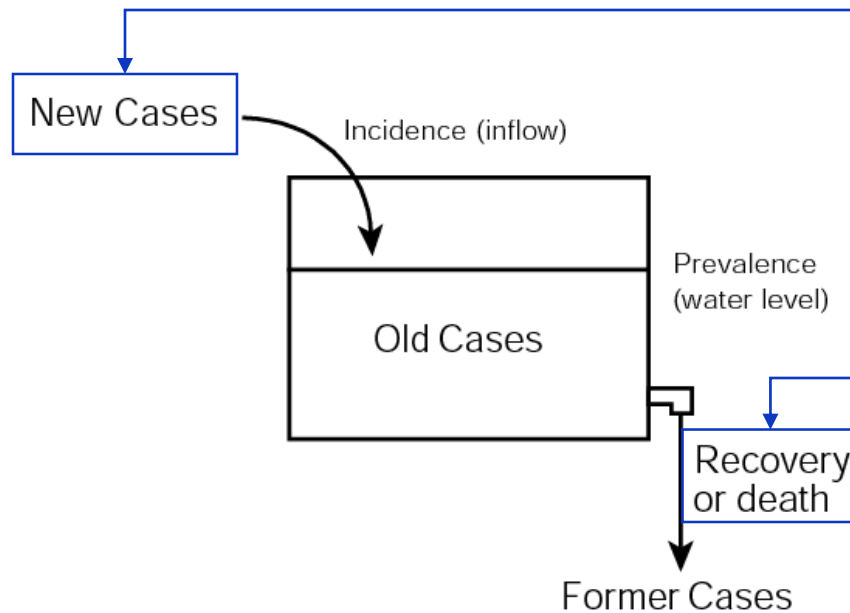
- a. 14 per 100,000 population
- b. 130 per 100,000 population
- c. 144 per 100,000 population
- d. 264 per 100,000 population
- e. None of the above

Dynamics of Prevalence

Cistern Analogy



Ways to increase prevalence



Increase incidence → increase inflow

Increase average duration of disease → decreased outflow

Risks



- Suppose, I am exposed to a risk factor and have a 2% risk of disease.
- You are not exposed and you have a 1% risk of the disease.
- Of course we are assuming we are the same in every way except for this risk factor.
- In **absolute terms**, I have $2\% - 1\% = 1\%$ greater risk of the disease
- This is the **risk difference**

Risks



- In **relative terms** we divide
- I have $2\% \div 1\% = 2$, or twice the risk
- This is the **relative risk** associated with the exposure

Risk Difference



Risk Difference (RD) \equiv absolute effect associated with exposure

$$RD = R_1 - R_0$$

where

R_1 \equiv risk in the exposed group

R_0 \equiv risk in the non-exposed group

Interpretation: *Excess* risk in absolute terms

Measures of Effect / Measure of Association



Men and women between 30-35 years of age in a city were followed up in program to determine the occurrence of Migraine headaches. The migraine headaches were found in 10 of 1000 women aged 30 to 35 years and in 5 of 1000 men aged 30 to 35 years.

Can you name and interpret a measure of effect?

Relative risk in women is higher than men in this age group

$$\text{Incidence in Women} / \text{Incidence in men} \sim \frac{10/1000}{5/1000} = 2$$

Women have a two times greater risk of developing migraine headache than do men in this age group.

Inference



A survey was conducted among the non-hospitalized adult population of United States during 1988 . The results are shown below:

Age group	Persons with hypertension (%)
18-29	4
30-39	10
40-49	22
50-59	43
60-69	54
70 and older	64

What is the prevalence of hypertension in the age group of ≥ 70 yrs of age?

64% of persons of 70 and more years had hypertension in 1988.

Attack Rate



TOTAL	Ate Tuna	Did Not Eat Tuna
Ate Egg Salad	75	100
Did not eat Egg Sla	200	50

With Acute Sore Throat	Ate Tuna	Did Not Eat Tuna
Ate Egg Salad	60	75
Did not eat Egg Sla	70	15

What is the sore throat attack rate in persons who ate both egg salad and tuna:

- a. 60/75
- b. 70/200
- c. 60/135
- d. 60/275

Attack Rate



TOTAL	Ate Tuna	Did Not Eat Tuna
Ate Egg Salad	75	100
Did not eat Egg Sla	200	50

With Acute Sore Throat	Ate Tuna	Did Not Eat Tuna
Ate Egg Salad	60	75
Did not eat Egg Sla	70	15

What is the sore throat attack rate in persons who ate only egg salad:

- a. $60/75$
- b. $70/200$
- c. $75/100$
- d. $75/275$

Inference from attack rates



What is the inference?

Persons who ate both egg salad and tuna have greater risk of developing sore throat than do persons who ate only egg salad.

Measures of Effect and Impact



Following table describes the data from a study when two groups based on meat consumption were followed up in time for occurrence of Coronary heart disease (CHD) over one year.

	Cases of CHD	Non Cases of CHD	Total
Eat Red Meat Daily	182	1449	1631
Eat Red Meat once/week	23	779	802
Total	105	2328	2433

1. What is an exposure here?
2. What is an outcome here?
3. What is the incidence in exposed?
4. What is the incidence in unexposed ?
5. Calculate Relative Risk and Attributable Risk (optional)



Thank you

Questions?