Disparities in Health

Objectives:

- Identify Vulnerable populations and at-risk population for disease.
- Understand the influence of socio-economic status, sex, race, and other social determinants on health.
- Explain the need to use “indicators” to measure “health” status.
- State the characteristics of health indicators.
- List the uses of health indicators.
- List and describe the different indicators for measuring burden of disease
- State with examples the type of health indicators.

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1) Distinction between Health Inequalities and Health Inequity

Health Inequalities Vs. Health Inequities

Disparities = التباينات

- ***Health inequality*** generically refers to differences in the health of individuals or groups. Any measurable aspect of health that varies across individuals or according to socially relevant groupings can be called a health inequality. Absent from the definition of health inequality is any moral judgment on whether observed differences are fair or just.
- ***Health Inequity*** is a specific type of health inequality that denotes an unjust difference in health. By one common definition, when health differences are preventable and unnecessary, allowing them to persist is unjust.

Example

- Imagine individual A who dies at age 40 during a skydiving accident. His identical twin, B, who does not enjoy this hobby, lives to age 80. In this case, the unequal life spans of A and B (and for that matter, the unequal life expectancies of recreational sky divers and non-divers) **is an example of health inequality or health inequity.**
- A chose to engage in a high-risk activity (skydiving) which ultimately led to his death, preventing him from reaching his expected lifespan
- B chose not to engage in this activity and therefore lived to his full life expectancy
- A's death, resulting from his decision to go skydiving, could not have been prevented, making the outcome (his death) equitable as it was a result of his personal choice

2) Measuring and Assessing Health Inequalities (1)

Two Distinct Approaches

Disparities b/w groups	Disparities b/w individuals
Measuring social group differences in health	*Measuring the distribution of health status across individuals in a population* (W/o grouping)
Defining certain social groups a priori (based on health determinants #1st Lec.) (for example, geographic location, race, etc) and then examining the health differentials between them.	The value-free description of the distribution of health status across individuals, and bypassing the dilemmas of selecting the variables used to measure social groups

1. (I won't ask about it in detail, but it's important that you understand it as a concept)

3) Health Indicators: Definitions, Characteristics, Uses and Types

- The car dashboard provides information (speed, fuel level, and temperature)
  => These indicators inform about the **status** of the car.
- Health indicators are used to measure the health **status** of a population.

What is an indicator?

- An indicator acts like a red flag that draws your attention to something that is going on and makes you ask questions such as:
  - What does this number mean? Numbers alone are meaningless so, u have to put them in the context of comparison
  - Why did we get this result?
  - Are we getting better or worse over time?
  - Are we providing the right care?
  - How are we doing in comparison to other countries, institutions, groups, etc?
- An indicator is an indication of a given situation and a measurable variable

Health Indicators: Definition

- Variables that measure indirectly a health status which can not be measured directly
- They are an indication of a given situation;
- They are used to compare between areas or population group at a certain time
- They are used to measure changes over a period of time

HEALTH INDICATORS QUANTIFY THE HEALTH OF THE POPULATION

Health Indicators: Characteristics of an IDEAL Indicator

The ideal indicator doesn't exist! But we try to get the best

Specific

reflects changes only in that situation.

Valid

measures what it is supposed to measure.

Relevant

relevant to the community needs & problems.

Reliable

provides same information under different observations & conditions

Feasible

the ability to obtain data when needed.

Sensitive

sensitive to changes in the situation

- **Ideal indicators are RARE cause health is Multidimensional**

3) Health Indicators: Definitions, Characteristics, Uses and Types

Health Indicators: Uses (Why we need indicators?)

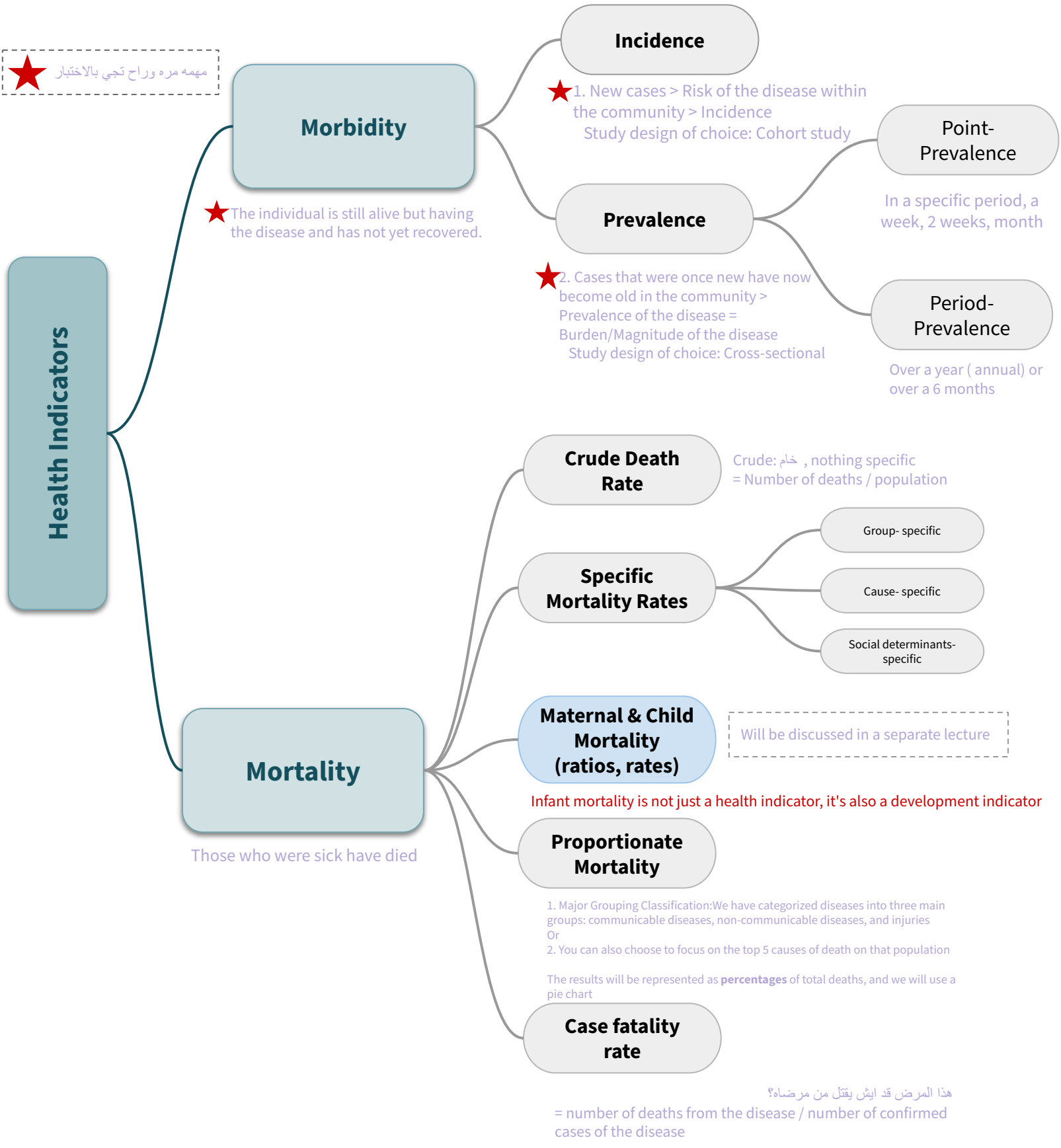
- Measure health status in a community.
- Compare health status between countries or over time.
- Assessment of health care needs.
- Allocation of resources according to needs.
- Monitoring and evaluation of health services.

Types of Health Indicators

Mortality indicators	Social and mental health indicators
Morbidity indicators	Environmental indicators
Disability indicators	Socioeconomic indicators
Nutritional status indicators	Health policy indicators
Health care delivery indicators	Indicators of quality of life
Utilization rates	Other indicator

- There are many health indicators to consider, but for your level focus on mortality and morbidity

3) Health Indicators: Definitions, Characteristics, Uses and Types



Indicators are Measurements

3.1) Health Indicators Concepts: Tools of Measurements

- Indicators are measurements of disease magnitude.

- Indicators are expressed in terms of:
  - Ratio
  - Proportion
  - Rate
- Clear understanding of the above terms is a MUST for interpretation of indicators.

"We had 400 deaths from Road Traffic Injuries in Riyadh in 2010" So What?!

Tool of Measurement	Ratio (simple ratio)	Proportion	★ Rate
Definition	the relationship in size of one measure/variable to another	**A specific type of ratio!** that relates a part to a whole	**A special type of proportion!** that measures the occurrence of an event in a population during a given time.
Use	size of two different variables or quantities	magnitude of the part of a whole	to allow comparisons
Differentiating element	The numerator is **NOT** a component of the denominator.	The numerator is **ALWAYS** a component of / INCLUDED in the denominator.	There must be a **time dimension** and a **multiplier** (per 1000, per 100,000)
Example	Out of the 400 death, 300 were males and 100 were female. The male to female ratio is 300/100 or 300:100 or 3:1 i.e. there are 3 male deaths for every female death	Out of the 400 deaths, 300 were males. i.e the proportion of males who died from RTI is (300/400 X100) = 75%.	In 2010 population of Riyadh 1,000,000. The mortality rate from RTI in 2010 is (400/1,000,000 X100,000)= 40 deaths per 100,000 population in 2010.

Rate is the most important tool => Allow comparison and time

3.2)Health Indicators Concepts: Numerator and Denominator

Numerator	Denominator
Number of times an event (e.g. death, sickness, births, etc) has occurred in a population during a specified time period. The numerator is ALWAYS a components of (included in) the denominator of proportions and rates The numerator is NOT a component of (included in the denominator of ratios.	Denominators are especially important for RATES. It might be related to: The population such as mid-year population in a given year OR Total events where it's more relevant than than total population. For example, case fatality rate from car injuries, it's more meaningful to have the denominator of 'number of vehicles'. Why?

3.3) Health Indicators Concepts: Multipliers (10n / per 100, 1000, 100,000)

- Majority of formulae include a multiplier of 100 and most often a multiplier of 1000, 10,000 or even 100,000.

- A multiplier is used to:
  - Indicate **how often something occurred** per 1000 population or per 100,000 population
  - **Decrease the use of minute decimal fractions.** e.g a mortality rate of 0.000071, huh?
  - **Increase data comprehension** (how well we understand the presented data)

- In certain rates, rather than specifying a multiplier such as 1000 or 100,000, **you can use 10^n** so the most appropriate multiplier can be selected to facilitate the data interpretation.

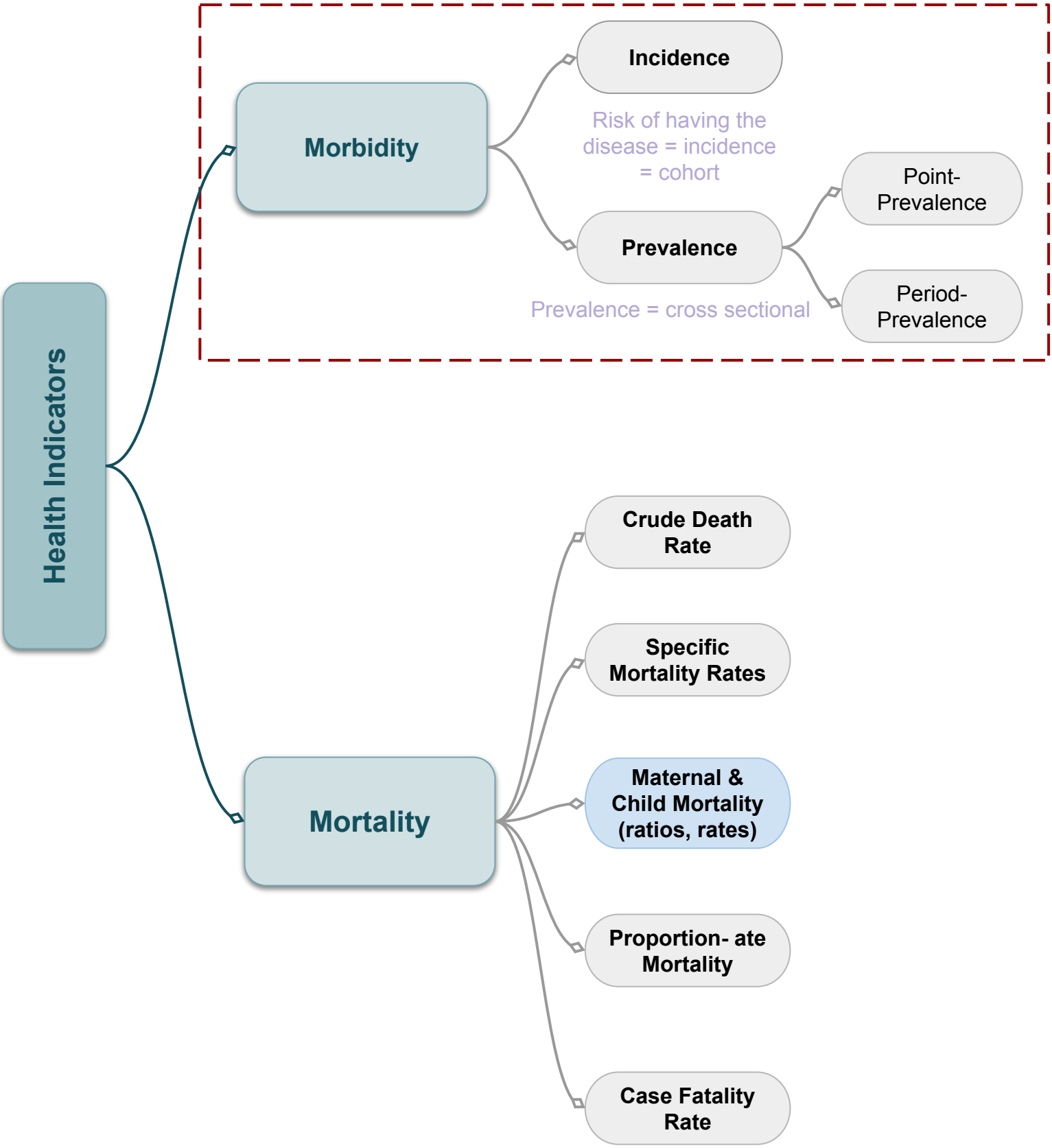
Example: A rate with a numerator of 190,000 and a denominator of 23,000,000 results in a value of 0.00826.

- Using a multiplier of 1000: 8.3 per 1000 population

- Using a multiplier of 10,000: 82.6 per 10,000 population

This sheet contains important previous exam questions for the OSCE **click here**

4) Health Indicators: Morbidity Indicators



4.1) Health Indicators - Morbidity: Incidence

Incidence

It's the number of **NEW** cases occurring in a DEFINED POPULATION during a SPECIFIC PERIOD OF TIME.

Tool of Measurement	Rate
Numerator	Number of NEW cases of specific disease during a given time period
Denominator	Population at risk (1) during that given time period.
10n	Per 1000
Time Frame	Per year (usually a year unless otherwise specified).
Uses	1. Taking action (Outbreak). 2. Control disease (Outbreak). 3. Research for etiology and pathogenesis. 4. Efficacy of therapeutic and preventive measures.
Formula ★	$\text{Incidence} = \frac{\text{Number of new cases of specific disease during a given time period}}{\text{Population at-risk during that period}} \times 1000$
Special Types of Incidence Rates	1. Attack Rates (limited time less than year during outbreak). 2. Secondary Attack Rates. 3. Hospital Admission Rates. • N.B: They will be discussed in their respective upcoming lectures

1. Why the population of incidence are population at risk? Because each outcome (disease, such as prostate cancer) has a specific population (male)

4.1) Health Indicators - Morbidity: Incidence cont..

Example

In 2010, the number of new cases of influenza in Riyadh region was 5000. The midyear population of Riyadh region during the same year was 3 million.

- **Calculate:**

$$\text{Incidence} = \frac{\text{Number of new cases of specific disease during a given time period}}{\text{Population at-risk during that period}} \times 1000$$

  - **(5000/3000000)*1000**
    - 1.67 per 1000 per year

4.2) Health Indicators - Morbidity: Prevalence

Disease Prevalence

It refers to all cases **(NEW & OLD)** existing at a given **POINT** in time **OR** over a **PERIOD** of time in a given POPULATION.

Point Prevalence:

Definition	Number of all current cases NEW & OLD occurring in a DEFINED POPULATION at **ONE POINT OF TIME (a day, days, or few weeks**)
Tool of Measurement	Proportion (Be careful it is proportion even when it's called rate).
Numerator	Number of all current cases NEW & OLD at a given POINT OF TIME.
Denominator	Estimated population at the same given Point of TIME.
10n	Per 100 (always expressed as percentage)
Time Frame	Given point of time.
Uses	1. Estimate the magnitude of health, disease, and high risk populations. 2. Administrative and planning, e.g: hospital beds.
Formula ★	$= \frac{\text{Number of all current cases (old and new) of a specified disease existing at a given point in time}}{\text{Estimated population at the same point in time}} \times 100$

4.2) Health Indicators - Morbidity: Prevalence cont..

Period- Prevalence (less common):

Definition	Number of all current cases NEW & OLD occurring in a DEFINED POPULATION at **DEFINED PERIOD OF TIME (over months or annual**)
Tool of Measurement	Proportion (Be careful it is proportion even when it's called rate).
Numerator	Number of all current cases NEW & OLD at a DEFINED PERIOD oF TIME.
Denominator	Estimated population at the same DEFINED PERIOD of TIME.
10n	Per 100 (always expressed as percentage)
Time Frame	Given point of time.
Uses	1. Estimate the magnitude of health, disease, and high risk populations.
Formula ★	$= \frac{\text{Number of existing cases (old and new) of a specified disease during a given period of time interval}}{\text{Estimated mid-interval population at-risk}} \times 100$

4.2) Health Indicators - Morbidity: Prevalence cont..

Example

In survey of 1,150 medical students in Riyadh in 2018, a total of 468 reported symptoms of seasonal allergies during the first week of September. Calculate the prevalence of seasonal allergies in this group.

- **Calculate:**

$$= \frac{\text{Number of existing cases (old and new) of a specified disease during a given period of time interval}}{\text{Estimated mid-interval population at-risk}} \times 100$$

Prevalence is a snapshot of the population

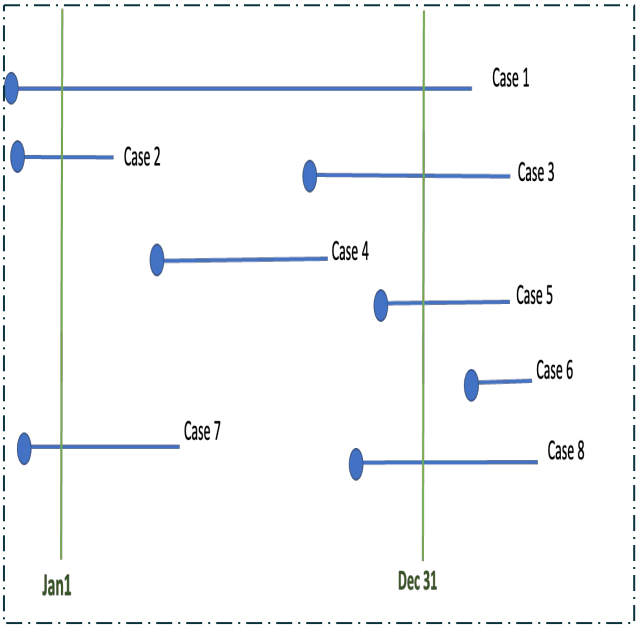
  - **(468/1150)*100**
    - 40.7%

- **What cases will be included in the incidence?**

  A: 3, 4, 5, & 8.

- **What cases will be included in the point prevalence and period prevalence during the given period of time?**

  - **Point prevalence Jan1:** 1,2, & 7.
  - **Point prevalence Dec 31:** 1,3,5,& 8.
  - **Period prevalence:** 1,2,3,4,5,7,& 8.

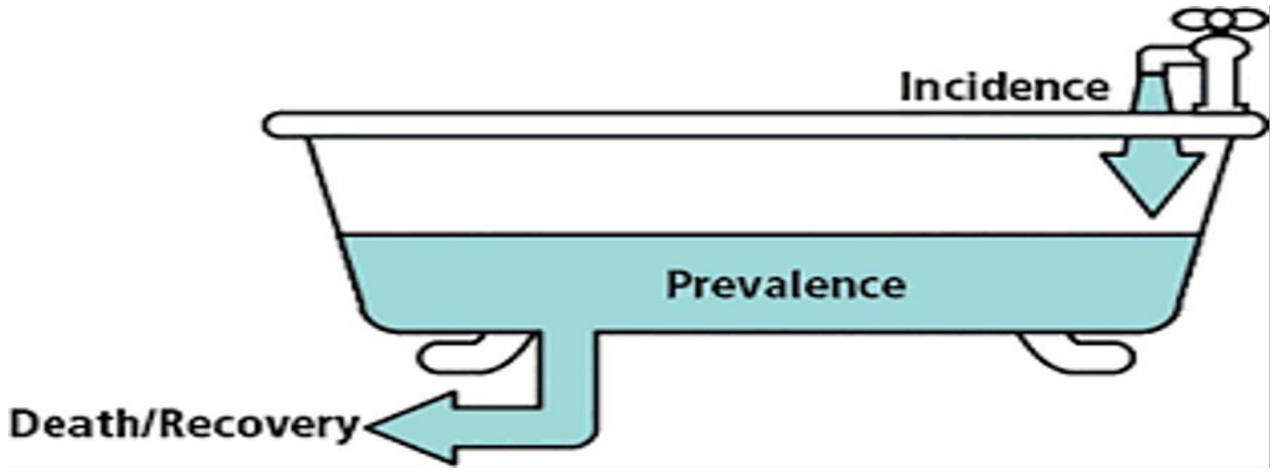


4.2) Health Indicators - Morbidity: Prevalence cont..

What is the relationship between the morbidity indicators: Incidence and Prevalence?

The Epidemiologist Bathtub!

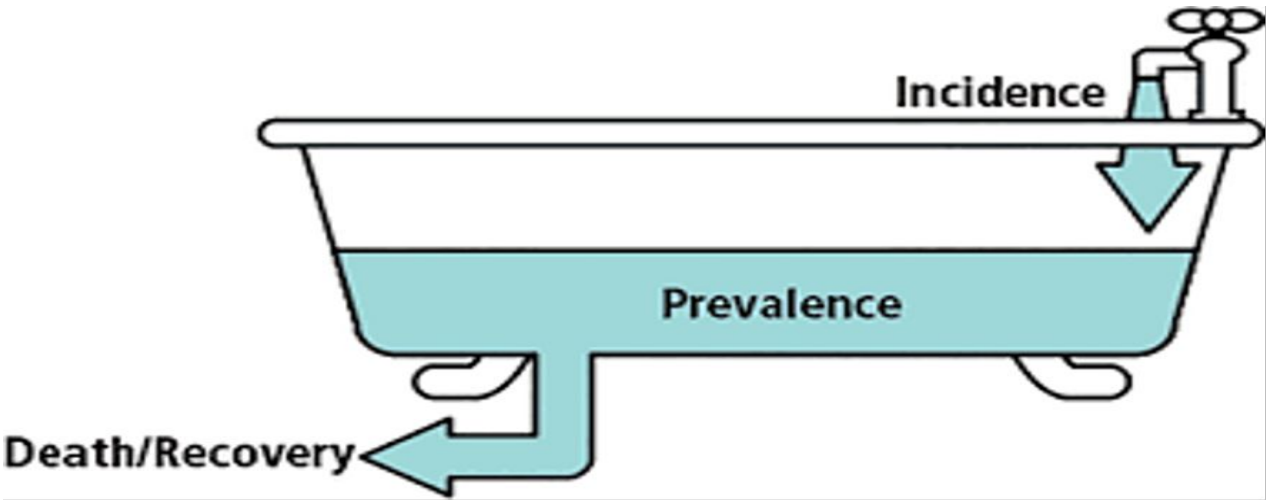
• The **bathtub** represents **community.**	
• **Water in the tub** represents the **prevalence of disease** so:	
◆ The more water that is in the tub the more disease prevalence is there.	◆ The less water is in the tub the less disease prevalence there.
• The **prevalence represents burden of disease = how many people have the disease.**	



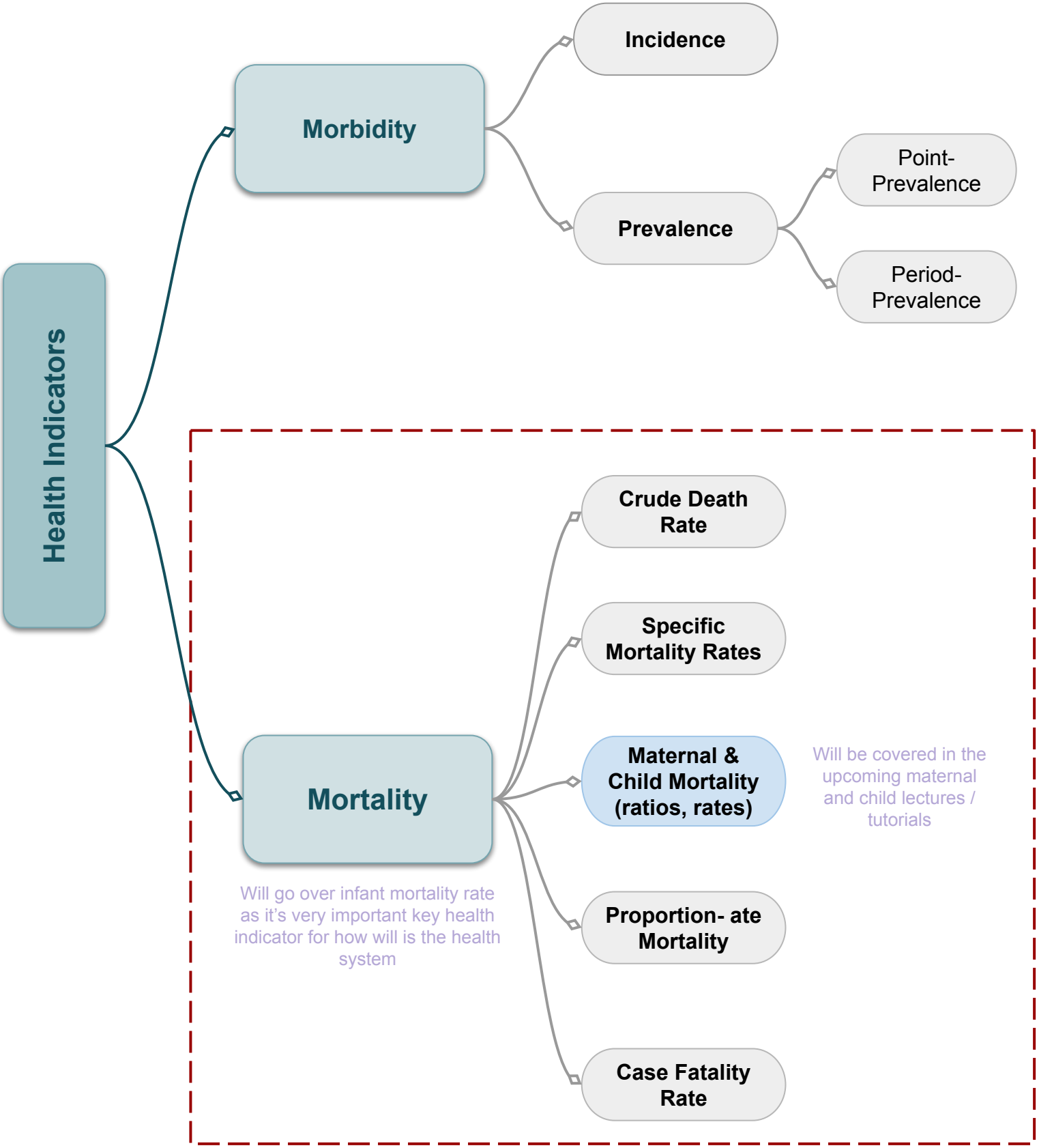
4.2) Health Indicators - Morbidity: Prevalence cont..

The Epidemiologist Bathtub!

• So, we can get rid of the water from the tube by **draining it**, so we can **lower the prevalence.**	
• How can we drain the tube? **TWO WAYS** to get rid of people who have the disease:	
◆ They can be **CURED.**	◆ They can **DIE.**
• How can we get water in the tube? Obviously through the faucet!	
◆ Open the faucet all the way **(first running water): HIGH INCIDENCE.**	◆ Almost closed **(low running water): LOW INCIDENCE**
Prevalence = Incidence X Duration of Disease. Used for stable diseases, and when there's only a one given number. (incidence) نستخدمها لما نبي نطلع ال	



5) Health Indicators: Mortality Indicators



5.1) Crude Death Rate

Definition	Number of deaths from ALL CAUSES occurring in ESTIMATED MID-YEAR POPULATION during ONE YEAR in a GIVEN PLACE.
Tool of Measurement	Rate
Numerator	Number of deaths from ALL CAUSES during the YEAR
Denominator	Mid-year population
10n	per 1000
Time frame	One year
Uses	Gives an impression of mortality in a single figure!
Formula	$\frac{\text{Number of deaths during the year}}{\text{Mid-year population}} \times 1000$

The differences between crude death rate and PMR (Rate Vs Ratio, Denominator!)

Example: In Saudi Arabia in 2017, a total of 119,157 deaths occurred. The estimated population was 33,099,147.

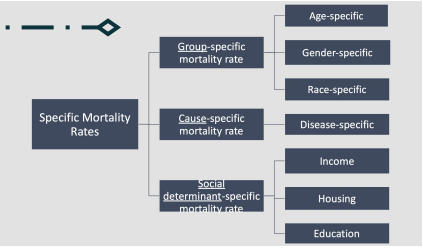
Calculate crude death for Saudi Arabia in 2017.

= 119,157 / 33,099,147 x 1000

= 3.6 per 1000 people

5.2) Specific Mortality Rates

(BE CAREFUL, except cause specific, the denominator is the mid-year population for the same SPECIFIC thing!)
Ex. ovarian cancer; mid year population of females



Definition	Number of deaths from/in SPECIFIC (CAUSE, GROUP, SOCIAL DETERMINANT) occurring in ESTIMATED MID-YEAR POPULATION during a ONE YEAR in a GIVEN PLACE.
Tool of Measurement	Rate
Numerator	Number of deaths from SPECIFIC (CAUSE, GROUP, SOCIAL DETERMINANT) during the YEAR
Denominator	Cause-specifc: MID-YEAR POPULATION / Group, Social determinant: MID-YEAR POPULATION of SPECIFIC GROUP, SOCIAL DETERMINANT
10n	per 1000 or per 100,000
Time frame	One year
Uses	1) Identify at risk groups for preventive action, 2) They allow comparison between different causes within the same population
Formula	1. Specific death rate due to tuberculosis = Number of deaths from tuberculosis during a calendar year / Mid-year population × 1,000 2. Specific death rate for males = Number of deaths among males during a calendar year / Mid-year population of males × 1,000 3. Specific death rate in age group 15-20 years = Number of deaths of persons aged 15–20 during a calendar year / Mid-year population of persons aged 15–20 × 1,000

Example: In 2001, a total of 15,555 deaths from Road Traffic Injuries occurred among males and 4,753 deaths occurred among females. The estimated 2001 midyear populations for males and females were 139,813,000 and 144,984,000, respectively.

-Calculate Gender-specific mortality rates
-RTI mortality rate (males)
= (# RTI deaths among males／male population) × 100,000
= 15,555／139,813,000 × 100,000
= 11.1 RTI deaths per 100,000 population among males
-RTI mortality rate (females)
= (# RTI deaths among females／female population) × 100,000
= 4,753／144,984,000 × 100,000
= 3.3 RTI deaths per 100,000 population among females

5.3)Proportionate Mortality

Definition	Number of deaths due to a PARTICULAR CAUSE (OR IN A SPECIFIC AGE GROUP) per 100 TOTAL DEATHS
Tool of Measurement	Proportion
Numerator	Number of deaths from SPECIFIC CASUSE OR AGE GROUP during the YEAR
Denominator	TOTAL deaths from ALL CAUSES (**not the POPULATION in which the deaths occurred)**
10n	per 100 (percentage %)
Time frame	One year
Uses	1) Used in broad disease groups (e.g. communicable, non-communicable, injuries); 2) Specific diseases of public health importance (e.g Cancer)
Formula	$= \frac{\text{Number of deaths from the specific disease in a year}}{\text{Total deaths from all causes in that year}} \times 100$

The differences between crude death rate and PMR (Rate Vs Ratio, Denominator!)

Example: In 2003, a total of 128,294 deaths occurred among 24-44 years old. 16,283 deaths were due to heart disease and 7,367 were due to cancer.

-Calculate Proportionate mortality for heart disease and cancer among 25–44 years.

-Proportionate mortality for heart disease, 25–44 years

= (# deaths from heart disease⁄# deaths from all causes) × 100

= 16,283⁄128,294 × 100

= 12.6%

-Proportionate mortality for cancer, 25–44 years

= (# deaths from cancer⁄# deaths from all causes) × 100

= 7,367⁄128,924 × 100

= 5.7%

5.4)Case Fatality Rate

Definition	Number of deaths due to a PARTICULAR CAUSE (DISEASE) per 100 TOTAL CASES
Tool of Measurement	Proportion **(although it is called rate!, called also: Deaths to Cases Ratio)**
Numerator	Number of deaths due to a PARTICULAR CAUSE (DISEASE)
Denominator	TOTAL number of number of CASES (**not the POPULATION in which the cases occurred)**
10n	per 100 (percentage %)
Time frame	Not specified
Uses	Reflects THE KILLING POWER OF A DISEASE. Used mainly in ACUTE INFECTIOUS Diseases.
Formula	$= \frac{\text{Total number of deaths due to a particular disease}}{\text{Total number of cases due to the same disease}} \times 100$

The differences between crude death rate and PMR (Rate Vs Ratio, Denominator!)

Example: In an epidemic of hepatitis A traced to green onions from a restaurant, 555 cases were identified. Three of the cases died as a result of their infections.

-Calculate the case-fatality rate.

-Case fatality rate = (3/555) × 100 = 0.5%

Practice Questions

Q1:Which term specifically indicate an unjust difference in health?

A. Health Inequality	B.Health Variance	C. Health Equity	D. Health inequity

Q2: Which tool of measurement involves a time dimension and a multiplier to measure the occurrence of an event in a population during a given time?

A. Ratio	B. Proportion	C. Rate	D.magnitude

Q3: Which of the following is used to measure the number all new and old cases at a given point of time?

A. Period-prevalence	B. Point-prevalence	C. Case Fatality Rate	D. Incidence

Q4: Water at the tub represents _____,indicating _____, and can be rid (lowered) by _____?

A. Prevalence, Burden of Disease, Medication	B. Burden of Disease, Prevalence, Death.	C. Prevalence, Incidence, Death.	D. Prevalence, Burden of Disease, Death.

Q5: Severity of a disease is measured by:

A. crude death rate	B. infant mortality rate	C. case fatality rate	D. adult mortality rate

Q6: In an outbreak of cholera in a village of 2000 population 20 cases have occurred and 5 have died. Case fatality rate is:

A. 1%	B. 0.25%	C. 5%	D. 25%

Answer 1- D 2- C 3- B 4- D 5- C 6- D 5/20 *100

Thanks to all leaders and members from team 439 and team 441🤍🤍

Team Leaders:

Shahad Alaskar
Reema Alquraini
Lina Alyahya

Qusay Alsultan
Hassan Alabdullatif

The amazing Members:

Farah alhalafi
Sara almajed
Norah Alrashoud
Hoor aloraini
Mohammed Alzeer
Shahad Albukhari
Walaa AlMutawa
Meznah alshammari
deema alqahtani
Fatima halawi
raghad alkhodair
⭐Amani Alotaibi
⭐Nouf Aldhalaan
⭐Reema AlJabarin
Reema Alhussien

Sarah Alzahrani
Raid almadi
Rayan alahmari
Mayssar Alshobaki
Kadi aldossari
nora bin hammad
Mayssam Aljaloud
Rahaf Almotairi
Lana Alhumaidhi
Jana Alhazmi
Yazeed Alsanad
Safia Aldkhyyl
Haifa Almuddahi
Omar Kadhi
Saad Alsahli