Global Health & Economic Data

This presentation contains a ✔ *CheckPoint* **test**.

- You need to clear your desks except for one sheet of paper & a pencil.
- Throughout the presentation there will "*checkpoint* questions" on slides to test what you just learned.
- You will write the answers on your papers.
- You may not take notes during the presentation as this is an exercise in *active listening*.
- You may not confer with their classmates during the presentation.

Continue ➔

- A red dot (•) following CheckPoint questions indicates that a short answer is needed.

- A green arrow (↓) following questions indicates that the questions are multiple choice.

- At the end of the multiple choice selections, there will be a red punctuation point (•) indicating there are no other answer choices.

Health Data

- collection of organized information that gives a picture of the health of a population

Health data typically includes:

- population of a country
- ages of people in that country
- sex of their population
- their ethnic origin
- their urbanization
- Vital statistics
  - Number of live births
  - Number of deaths by sex, age, & cause

When health data became important:

- By end of 19ᵗʰ century --general acceptance of "germ theory"
    -theory that microscopic "animals" cause disease

- Microscopy was used to research & track diseases

- Because of this collecting health data was clearly important by beginning of 20ᵗʰ century

- By that time, transmission route & causative agents of almost every important infectious disease were established
  - This improved understanding of disease & how to control it

- As a result, 1st government health agencies were established

The World Health Organization (WHO)

www.census.gov

- Established by United Nations after WWII
- Headquarters in Geneva, Switzerland
- Mission: "attainment by all peoples of highest possible level of health"

- WHO provides important health information & data to governments including:
  - reports of disease outbreaks & health problems
  - steps countries are taking to improve health
  - international standardization of vaccines

- Countries which are members of WHO must provide regular reports about health of their population

Other responsibilities of WHO

- Maintain tumor registries, which compile epidemiological data regarding cancer cases

- Track health services, including number & type of health care facilities

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1. Name two types of information that are usually included in health data.

1. Briefly define the "germ theory"? .

3.   Where is the World Health Organization (WHO) headquarters located? ↓

    a. Washington D.C.

    b. London, England

    c. Geneva, Switzerland

    d. Paris, France.

4.   Name one important function of WHO.

Scientists who collect health data:

- **Epidemiologists**

    ("Sherlock Holmes" of germ world)

    – track diseases all over world

    – find causes of disease (& health) in **groups** (populations) of people

    – conduct outbreak investigations

Father of Epidemiology
John Snow - 1854

- British physician
- Practiced anesthesiology
- Traced source of cholera outbreak in Soho, England (1854)

- Snow was skeptic of then-dominant **miasma** (mI-az-mah) **theory**:
  - belief that diseases were caused by noxious form of "bad air"

londonparticulars.wordpress.com/.../19/snow-ho

- 1854, cholera outbreak in Soho, England
- Snow carefully plotted cases of cholera on area map.
- Identified water pump as source of disease
- Had city officials remove pump handle, which eliminated spread of disease
- This study was one of 1st epidemiologic analyses ever done.

Site of notorious wellhead pump that supplied cholera-infected water that took the lives of 600 Londoners in September 1854.

Meet modern-day epidemiology sleuth, Lorna Thorpe, who tracks infectious diseases around globe.

Lorna Thorpe tells what a team of epidemiologists do when they first arrive in an infected area:

http://archives.cnn.com/2002/fyi/news/03/04/disease.detective/first.arrive.wav

5.   What is the "miasma theory"? **.**

5.   How did Snow track cholera in Soho, England? **.**

How do societies use health data?

- As early warning to identify emerging health problems

  For example:

  Epidemiological data helped establish a connection between:

    1. a morning sickness drug, *thalidomide*, & birth defects

In 1959, cases of rare, severe birth defects of extremities started to appear in high numbers.

The connection

- Sudden spike in # of deformities made investigators suspect that a new drug might be culprit

- Soon, defects were traced to thalidomide

- Drug was taken off the market

www.medicineworld.org

Another example of data providing an early warning: Kaposi's sarcoma

- In 1981, two diseases usually seen in older, immuno-compromised people, showed up in young healthy homosexual men
  - Kaposi's sarcoma
  - Pneumocystis carinni pneumonia
- CDC launched investigation & later identified AIDS

Certain epidemic-prone diseases are considered to be reportable

- meaning they have to be reported to health agencies
- allows for monitoring of potential outbreaks & prevents spread of epidemics

WHO maintains a world-wide list of reportable diseases

- In the US:
  - the Center for Disease Control & Prevention (CDC) manages mandatory reporting of diseases to WHO
  - In US, reportable diseases are referred to as **notifiable diseases**

Nationally notifiable diseases:

- 2010 list of US nationally notifiable diseases includes these infectious diseases:

- Anthrax
- HIV
- Mumps
- Pertussis

- Plague
- Rubella
- Smallpox
- Tuberculosis
- Typhoid fever

To see full updated/revised national lists:
http://www.cdc.gov/ncphi/disss/nndss/phs/infdis.htm

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7. What made epidemiologists suspect that a new drug might be the cause of rare, severe birth defects? ↓

    a. It had caused congenital defects in mice

    b. There was a sudden spike in birth defects

    c. The drug hadn't been clinically tested.

7. Name three of the reportable diseases? .

Health Statistics

- Health data also includes health statistics, which give information about:
  - frequency of disease by type
  - severity of disease outbreak
  - outcome of an outbreak

Collecting international statistics is very problematic

- Data statistic collection & analysis takes time to compile
- Developing countries data not as comprehensive as developed countries
  - lack resources to collect data extensively
- Comparative data not always available
- Rarely find "real time" data for estimates
- Most statistics out of date by time published

But-- even incomplete stats help us understand health throughout world

- Data must be measured in quantitative manner (example on next slide)
- These data allow *estimates* of magnitude of health problem

Quantitative health measures:

- **Incidence rate** - refers to number of ***new*** cases of a disease in a population ***over a given period of time***

- It's a measure of risk of developing a new disease/condition within specified period

To calculate:

Annual Incidence Rate = $\dfrac{\text{\# new cases of a defined condition in a defined population in 1 yr.}}{\text{\# in that population at mid-year at that same yr.}}$

Another quantitative health measure:

- **Prevalence** – indicates total number of *existing* cases of disease in given population *at specific time*

  (rather than rate of occurrence of new cases)

  To calculate:

Point Prevalence = $\dfrac{\text{\# cases of defined condition in a defined population at a point in time}}{\text{\# in that population at same point in time}}$

Making the distinction between *incidence* & *prevalence*

Consider a disease with relatively short duration (e.g. flu)

- annual *incidence rate* for flu is much higher than *point prevalence*

- While many people contract flu each year, *at any given time* throughout year they are not all sick

…in contrast

Consider disease with relatively long duration—a chronic progressive disease (e.g. HIV/AIDS)

– point prevalence can be much higher than annual incidence rate

9. Why are health statistics rarely "real time" data? .

9. A quantitative measure that indicates the number of existing cases of a disease in given population at specific time describes: ↓

    a. incidence

    b. prevalence .

EXAMPLE 1: Incidence Rate

Using data obtained by the World Health Organization below, calculate the annual incidence rate of Pertussis (whooping cough) in New Zealand in 2002 and compare it to the annual incidence rate in 2001.

New Zealand – Population Data in Thousands		
	2002	2001
Live Births	54	54
Female 15-49 years	968	965
Pop. Less than 15 years	869	869
Pop. Less than 5 years	273	275
Surviving Rates	54	54
Total Population	3846	3815

New Zealand – Number of Reported Cases		
	2002	2001
Diptheria	1	0
Measles	21	65
Pertussis	1068	4143
Polio	0	0

Calculate annual incidence rate of *Pertussis*

For annual incidence rate of Pertussis

Solution

For 2002:

Incidence = 1068 / 3846000
= 2.8×10^{-4} or
= 0.00028
= or about 3 in 10,000 people

For 2001:

Incidence = 4143 / 3815000
= 1.1×10^{-3}
= or 0.0011
= or 11 in 10,000 people (over 3 fold higher)

Mortality rates

- Mortality rate quantifies how many people have *died* in a population

Calculate as:

$$\text{Mortality Rate} = \frac{\text{\# of deaths in a defined population in 1 yr.}}{\text{\# in that population at mid-year at that same yr.}}$$

Infant mortality rates

- Refers to # deaths of persons *under one year of age*

- **Calculate as**:

Infant Mortality Rate = $\dfrac{\text{\# of deaths under 1 yr of age in defined population in 1 yr.}}{\text{\# of live births in that population in same year}}$

Morbidity rate

- Morbidity rate –

  an incidence rate that refers to degree of *severity of a disease* in given population over a given time

- Commonly calculated as percentage of deaths associated with a disease

Burden of Disease Measure

- A measure that combines effects of both morbidity & mortality

searo.who.int
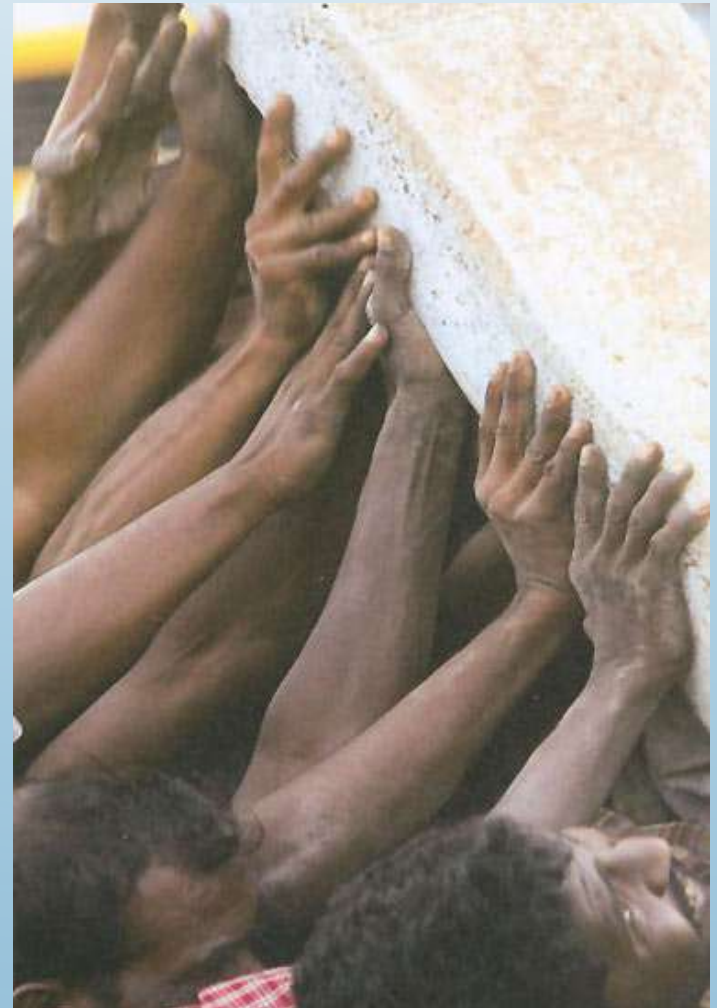
Measuring the *burden of disease*

- Measure was developed by the WHO
- Referred to as *Disability-Adjusted Life Years* (DALYs)
- DALY is a health gap measure, which combines information on:
  - "years of life lost" & "years lived with disability"
- DALY estimates # of healthy years of life lost due to premature death and disability

Think of a DALY as:

- average # of years of disability free life that an individual who at some point, after contracting a disease/condition, would lose.
- One DALY represents loss of one year of "healthy life"
- DALYs permit comparisons across a wide range of health problems.

For example, with such an index in place, one could say that:

- number of DALYs due to premature death of one girl aged 5,

  equals number of DALYs caused by 3 girls of same age suffering a below-knee amputation.

(certain amount of controversy surrounding calculation of DALYs)

DALYs can be used in 3 interrelated areas:

- For epidemiological surveillance of total disease burden

- To calculate cost-effectiveness of interventions (cost per avoided DALY)

- To decide what should be included in a country's "core services" (package of essential health care services)

DALYs associated with some common diseases and conditions

Disease/Condition	Impact DALYs
Stroke	6
Car accidents	9
Self inflicted injuries	17
Violence	9
Lower respiratory infections	1
HIV	28

Leading Causes of Mortality and Disease Burden from Infectious Diseases (2002)	Deaths (millions)	DALY's (millions)
Respiratory Infections	3.9	94.6
HIV/AIDS	2.8	84.5
Diarrheal Diseases	1.8	62.0
Tuberculosis	1.6	34.7
Malaria	1.3	46.5

11. What does morbidity mean? .

11. What is the age cut-off used when calculating infant mortality rates? ↓

    a. 3 months

    b. 6 months

    c. 12 months

    d. 18 months .

13. The *burden of disease* is a measure of what two things? (select two answers, please) ↓

      a. incidence

      b. point of prevalence

      c. mortality

      d. DALYs

      e. morbidity .

14. DALYs measure: ↓

    a. sum of years of life lost due to disability or premature death

    b. morbidity of cross-cultural cohort groups

    c. value of life after recovering from a disease.

Organizing & interpreting health data

- WHO collects health statistics data yearly
- Organize these data to create overall picture of world health which identify:
  - diseases that are most prevalent
  - diseases that should cause great concern
  - where outbreaks are occurring

- Data showing the leading causes of mortality throughout world help prioritize which diseases constitute greatest threat
- Allows resources to be targeted effectively

What economic data reveals about health

Three economic measures which influence health status:

1.Average annual per capita income – ave. annual income / person in a population

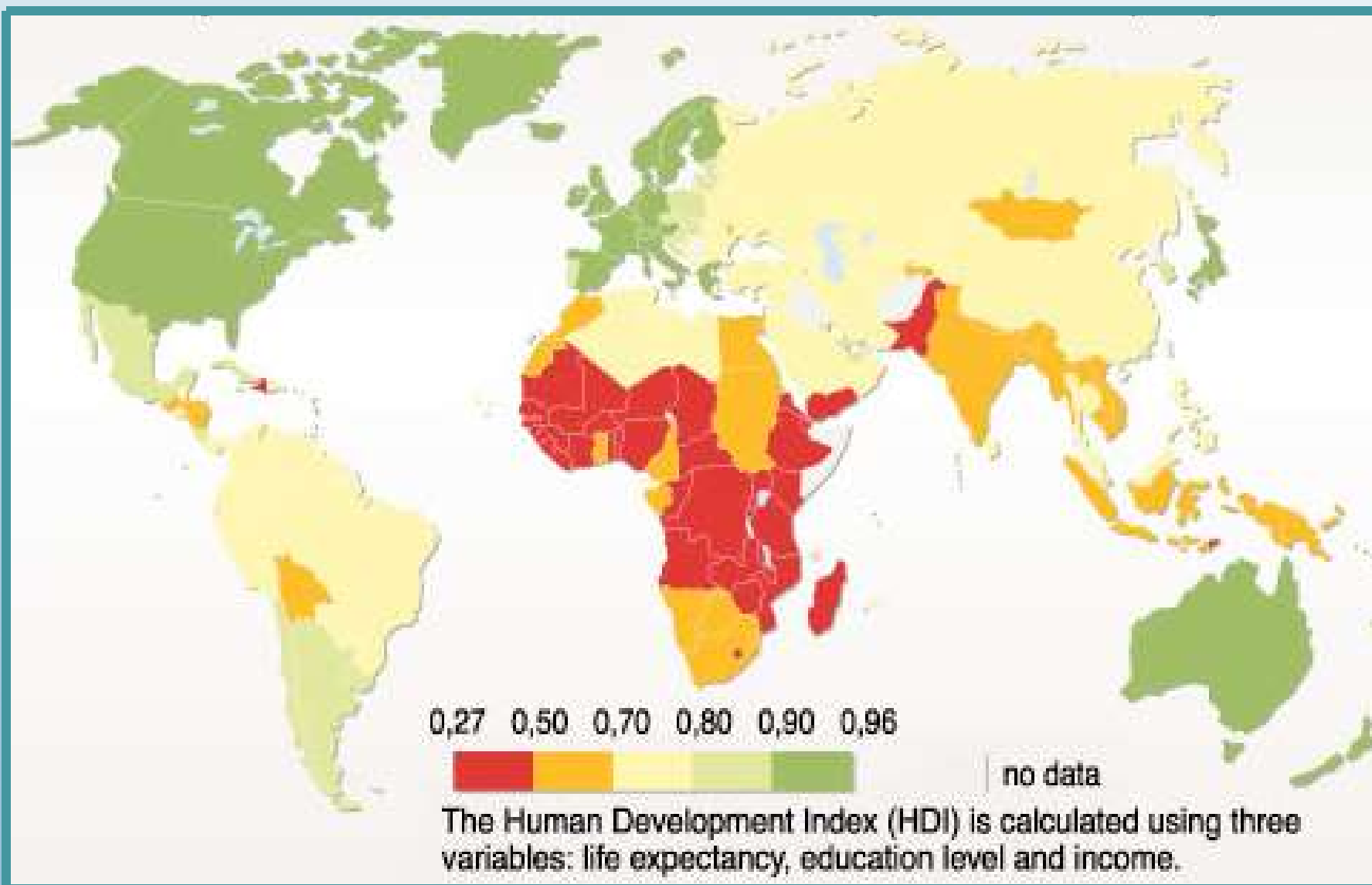2. **Average annual per capita health expenditure** –

   ave. amount spent on health care each yr / person in a population

3. Human Development Index (HDI) – measures achievements in a country in 3 basic areas:

  health, education, & income
  (HDI is average of these 3 indices)

HDI World Map

0,27   0,50   0,70   0,80   0,90   0,96

no data

The Human Development Index (HDI) is calculated using three variables: life expectancy, education level and income.

Economic data & the world's countries

- **World's countries can be divided into 3 economic groups**:
  - Developed countries - diversified economies, which rely on technology; enjoy relatively high standards of living

  - Developing countries - low per capita income, underdeveloped infrastructure, low HDI

  - Least developed countries (LDCs) - lowest national incomes

Low income countries tend to have:

- much lower access to safe drinking water
- much shorter life expectancy

Disease in these countries destabilizes their economy & political system.

More than 10% of world's population lives in 49 least developed countries
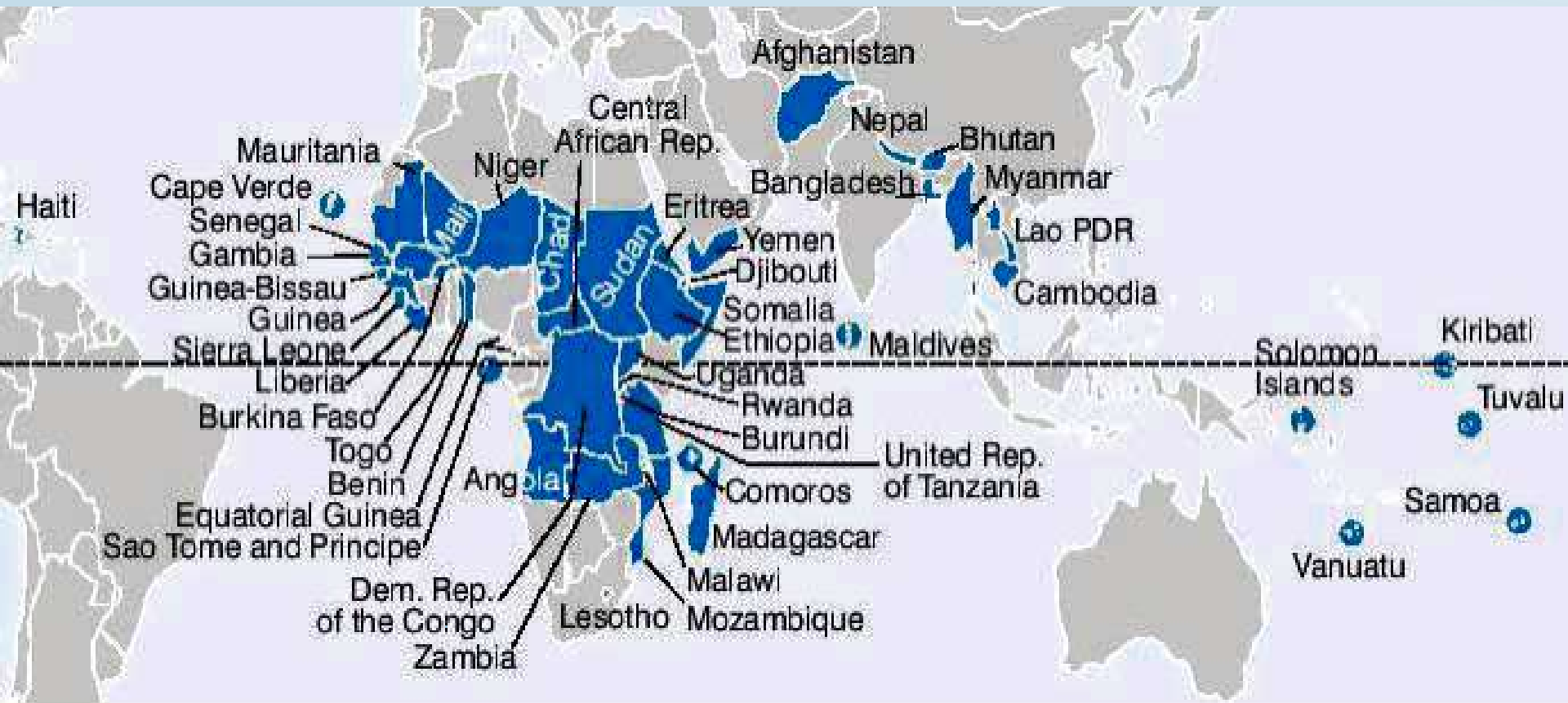
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15. What international organization collects annual health statistics? ↓

  a. CDC

  b. WHO

  c. NHI

  d. UN .

16. Name two of the basic areas that the Human Development Index uses as a measure? .

-The End-