Unit 1: TB Today – A Global Emergency
Activity 1: Graph Activity

Description:
Students are asked to explore prevalence rates of TB in various countries and compare results over time. They are asked to construct a double-bar graph to visually represent the data and then analyze the results.

Time:
Graph construction/analysis: 45 minutes
Discussion: 10-15 minutes

Objectives:
- To establish a basic understanding of the global prevalence of TB and how it varies across nations and continents;
- To find links between our situation and that of other countries;
- To understand that TB is still an epidemic illness but that rates of infection are slowly improving across the globe.

Curriculum Links:
This activity is meant to allow students to be introduced to key concepts in data collection and management, visual representation, and basic comparison analysis.

Mathematics – Data Management and Probability	Collection and Organization of Data	Collect and organize discrete or continuous primary data and secondary data and display the data in charts, tables, and graphs that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools
	Data Relationships	Read, interpret, and draw conclusions from primary data and from secondary data presented in charts, tables and graphics
		Compare similarities and differences between two related sets of data, using a variety of strategies (e.g., by representing the data using tally charts, stem-and-leaf plots, double bar graphs, or broken-line graphs; by determining

		measures of central tendency; by describing the shape of a data set across its range of values)
Science and Technology – Understanding Life Systems	2. Developing Investigation and Communication Skills	2.5 use a variety of forms to communicate with different audiences and for a variety of purposes

Materials:

- Coloured pencils
- Ruler
- Pencil
- Paper (chart/graph paper preferably)
- Eraser
- Calculator (optional)

Procedure:

1. Ask students to use the provided chart to construct a double-bar graph using appropriate titles, labels and scales to accurately represent the information.
   Optional: Put your students into groups to construct a graph together on large chart paper.
   Students should be able to demonstrate an understanding of the data provided in the table and demonstrate knowledge on how to visually represent it in chart form.
2. Briefly discuss the trends observed in the data between countries and compare results

Background Information;
TB Today: A Global Emergency

Tuberculosis is an illness many people might associate with the past. It is commonly perceived as a disease that reached its peak in the nineteenth and early twentieth centuries but declined with the discovery of antibiotic medications in the 1950s. Although for many parts of the world this is true, tuberculosis has not been eradicated; in fact, much of the world is experiencing epidemic rates of tuberculosis. In this era of globalization this trend should concern us all.

TB is often called a 'social disease', one that occurs most frequently among groups of people from defined socio-economic positions. Primarily a disease spread by air-borne droplets of bacteria, TB is transmitted most easily between people in frequent contact with each other in relatively confined spaces; over-crowded and poorly-ventilated living spaces, frequently associated with the economically marginalized, exacerbate TB transmission. Likewise, poor diet decreases overall health and increases the chance that the immune system will be unable to fight off a TB infection. Lack of access to health-care can lead to delayed diagnosis and inconsistent treatment, which enable the disease to continue to spread.

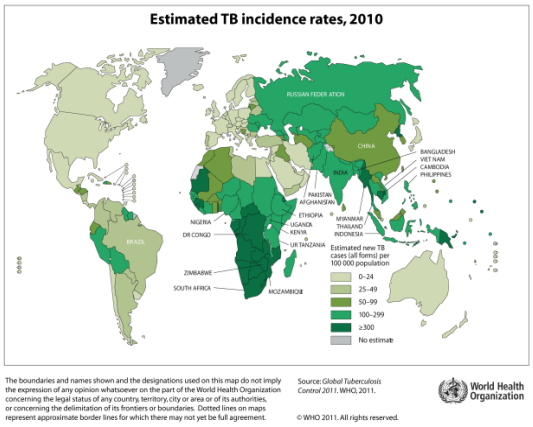
Such conditions exist not only in the so-called ‘developing world’. TB is both a global and a national concern.

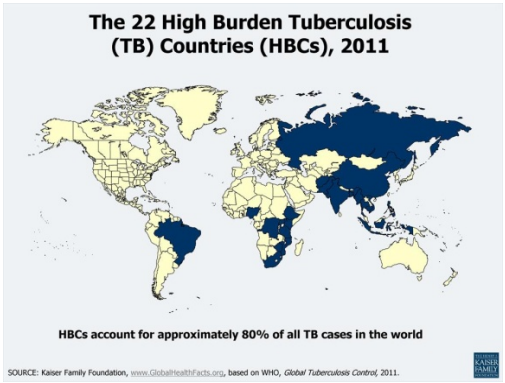
- A Global Perspective

It is estimated that one third of the world’s population has been infected with tuberculosis. In 2010, 8.8 million people were diagnosed with tuberculosis. Even though 95% of drug-susceptible TB cases can be cured with appropriate therapy, approximately 3,800 people die from TB each day - a total of 1.4 million people in 2010. The mortality rate of TB has declined since the 1990s, but it remains too high to tolerate. The health care infrastructure and drug supply mechanisms in place around the world are not meeting the needs of the sick.

While tuberculosis cases can be found in most every country of the world, it does not affect them equally. Twenty-two high burden countries carry 80% of the cases of TB. The list of high burden countries includes Brazil, India, Cambodia, Kenya, Russia, and South Africa, to name but a few (see image below). The high incidence rates in such countries might be linked to high population and high population densities, poverty rates, and/or a lack of health care infrastructure.

Although the global incidence and mortality rates of TB are now declining, after having peaked in the 1990s, the correlation between tuberculosis and HIV/AIDS and the growing number of drug-resistant cases is of growing concern.





TEACHER KEY

Estimated burden of TB by Selected Countries

North America	Incidence Rate	South America	Incidence Rate	Middle East	Incidence Rate
Canada	5	Argentina	28	Afghanistan	189
Mexico	17	Chile	19	Iraq	64
United States	4	Costa Rica	14	Israel	5
		Dominican Republic	70	Lebanon	15
Australia	**Incidence Rate**	Ecuador	68		
Australia	6	Haiti	238		
		Peru	113		
Africa	**Incidence Rate**	**Europe**	**Incidence Rate**	**Asia**	**Incidence Rate**
Congo	382	Bosnia & Herzegovina	50	Cambodia	442
Ethiopia	266	Czech Republic	8	China	80
Kenya	314	France	10	India	190
Mozambique	539	Germany	5	Indonesia	189
Namibia	693	Greece	5	Japan	22
Nigeria	136	Hungary	15	Malaysia	83
Sierra Leone	645	Norway	6	Pakistan	231
South Africa	971	Russian Federation	106	Phillipines	280
Swaziland	1257	Switzerland	7	Thailand	137
Zimbabwe	672	United Kingdom	13	Vietnam	200

*Incidence Rate derived from average rate over 2008, 2009 and 2010.
Source: Public Health Agency of Canada, <http://www.phac-aspc.gc.ca/tbpc-latb/itir-eng.php>

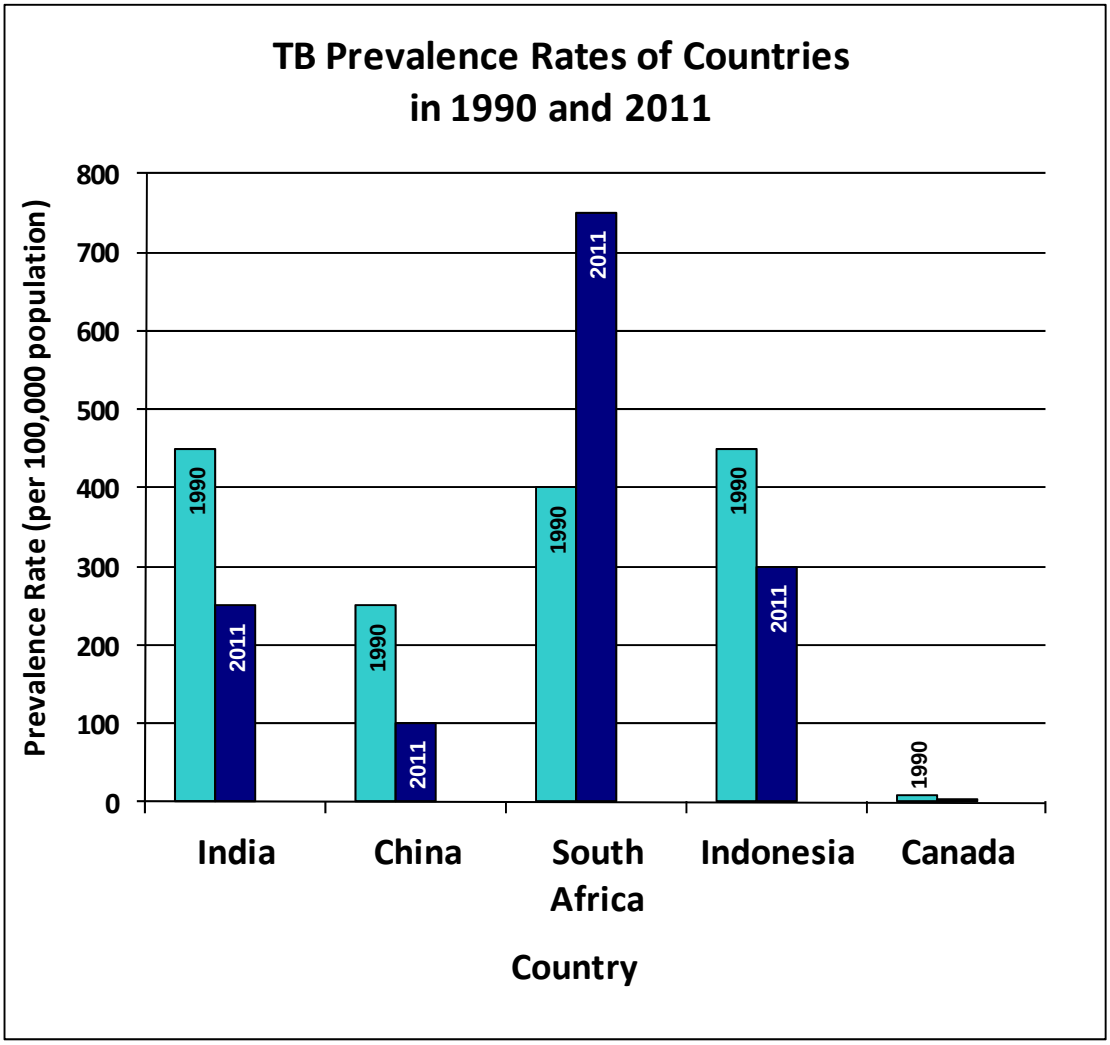
TB Unit 1: TB Today – A Global Emergency
ANSWER SHEET: Graph Activity

1. Construct a double bar graph using the following table, comparing the TB prevalence rates in 1990 and 2011.

Country	Prevalence Rate 1990 (per 100,000 pop)	Prevalence Rate 2011 (per 100,000 pop)
India	450	250
China	250	100
South Africa	400	750
Indonesia	450	300
Canada	10	5

Source: WHO Global Tuberculosis Report 2012
http://www.who.int/tb/publications/global_report/en/index.html

The chart should look something like this:



2. What is the rate of change between the years for each country?

   Students should be able to demonstrate a basic understanding of comparison analysis and display knowledge on how to compare simple values and establish a relationship between sets of data.

   Rates of change between years for each country:
   India: 200
   China: 150
   South Africa: 350
   Indonesia: 150
   Canada: 5

3. Based on the bar graph and rates of change, what country has the greatest change in TB? The smallest change?

   Students should be able to note the following:
   - *South Africa has the greatest change in TB prevalence*
   - *Canada has the smallest change in TB prevalence*

4. Is there an overall improvement in prevalence rate? What country showed no improvement in prevalence?

   Student should be able to note:
   - *Most countries are greatly improving their TB prevalence*
   - *South Africa is an anomaly and was the only country seemingly increasing in prevalence rate*