

Water Classroom 1-5 (version 2)

Water and Disease

Teaching plan for learning on water for middle school students

Under a project initiated by the Living Waters Museum, Centre for Water Research, IISER Pune and

Research and supported by Transforming Education for Sustainable Futures, IIHS, Bangalore

1-5-1 Proposed plan

Lesson Plan number	WC-1-5
Topic	Water and Disease - Basic Data Handling Using Waterborne Diseases Data
Discipline	Mathematics, History, Biology
Time	60 minutes (can be divided into multiple sessions)
Prior learning	Basic understanding of what is a graph and what are waterborne diseases.
Learning objectives	<ul style="list-style-type: none">● Students will be able to <i>associate</i> water-related diseases with both biological and historical perspectives.● Students will <i>outline</i> the basics of data and analysis using graphical and tabular data on waterborne diseases in India
Success criteria	<ul style="list-style-type: none">● Students will be able to <i>correlate</i> waterborne diseases with historical events that bring out the social dimension of how diseases spread● Students will be able to <i>explain</i> what data is● Students will be able to <i>illustrate</i> how data can be <i>represented</i> and <i>analyzed</i> using tables and bar graphs, with information on

	waterborne diseases in India
Resources/materials	Data set for waterborne diseases in India, whiteboard/blackboard, powerpoint presentation, projector, internet connectivity
Key vocabulary	data, graph, interpretation, waterborne diseases, public health timeline, Bombay
Use of teaching time	<p>3-5 mins</p> <p>Facilitator may open with the following questions –</p> <p>What are some diseases that are caused by contaminated (dirty) water? Let's make a list.</p> <p>Are any of these diseases fatal (kill people)?</p> <p>10-15 mins</p> <p>Facilitator/educator will use Bombay as a case study and walk them through the timeline of public health and its relationship with water heritage and history of the city using the link</p> <p>https://confluence.livingwatersmuseum.org/water-public-health/exhibit01.php</p> <p><i>Refer to – Background content for facilitator/educator- section 1-5-2a.</i></p> <p>10-15 mins</p> <p>Educator/facilitator will discuss what tabular data looks like and what it means.</p> <p>They will discuss how this can be adapted to different forms of data visualisation such as the bar graph.</p> <p>They may use the observations/ inferences/ questions tabulated in section 1-5-2b.</p>

	<p>They will discuss the X and Y axes and ways in which these visualisations can be used in data interpretation.</p> <p><i>Refer to – Background content for facilitator/educator- section 1-5-2b.</i></p> <p>10-15 mins</p> <p>Conduct activity - WC-1-5-Activity-I.</p> <p>This activity is designed to help students carry out comparative data analysis using visualisations and also answersimple questions about data and visualisations.</p> <p>7-10 mins</p> <p>Facilitator/educator can discuss answers to each question in WC-1-5-Activity-I by randomly selecting students.</p> <p>This discussion may lead to further discussion about access to and availability of potable freshwater that is related to Module-2 on Shared Waters.</p>
Differentiation	The level of discussion can be moderated according to the level of the students.
Additional activities	Worksheet is additional and may be given as homework
Anticipated challenges and solutions	<p>Students may not have been exposed to the techniques for interpreting bar graphs.</p> <p>Scaffolding may be needed based on the level of understanding of students. Scaffolding could use a step- by- step approach, with leading questions at each step to guide students through the process of analysing data.</p>

Keywords	Waterborne disease, data, data range, data set, bar graph, X and Y axes of a graph, maximum value, minimum value, tap water, contaminated water, treatment, healthcare services, patient, doctor
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1-5-2 Background content for facilitator/educator

1-5-2a Relationship between disease and water heritage and history: A case study

2020 was a drastic year when poor access to water, especially for vulnerable communities was further compounded by the Covid-19 pandemic. Bombay has seen several plagues and epidemics in the past, but what is often overlooked in the discourse on public health is that many such diseases are waterborne. Furthermore, they are exacerbated by the lack of holistic infrastructure planning sensitive to the needs and priorities of the different communities that make the city of Bombay.

The timeline at the link below looks at the fatal course of history, charted by waterborne or water-related diseases, culminating in the crisis of 2020 and its implications for the future of our planetary health and wellbeing as a global community.

(by Basia Irland, Ipshita Karmakar, Sara Ahmed, Mridula Ramanna)

<https://confluence.livingwatersmuseum.org/water-public-health/exhibit01.php>

1-5-2b Data and Bar Graph Analysis

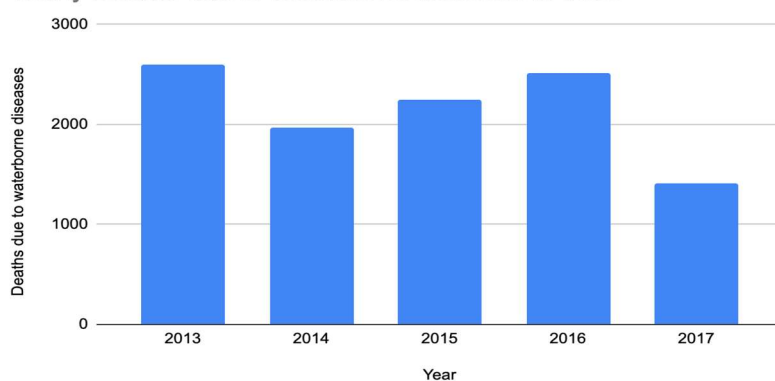
Data has become an omnipresent concept in our daily lives, ranging from the domain of machine learning and engineering, to economics and medicine. Over the last few decades, there has been growing use of massive quantities of data, called 'Big Data', in transforming personal care, clinical care and public health. However, understanding of complex computation begins with understanding basic data representations like the bar graph.

Data Table

Year	Deaths due to waterborne diseases in India
2013	2595
2014	1967
2015	2244
2016	2520
2017	1412

Bar Graph

Yearly Deaths due to waterborne diseases in India



Observations/**Inferences**/**Questions**

Observe the data table columns and X-Y axes

Which column is used for the X axis in the bar graph?

Which column is used for the Y axis in the bar graph?

Observe the minimum and maximum values of the Deaths due to waterborne diseases in the given time period

(the educator/facilitator can explain what is data range with this info)

In which year were the maximum number of deaths? What could be the possible reasons?

In which year were the minimum number of deaths? What could be the possible reasons?

The years in which the deaths are less than 2000

The years in which the deaths are more than 2000

What measures can be taken to avoid people becoming ill due to waterborne diseases?

Water Classrooms WC-1-5-ACTIVITY-I

Student Name:

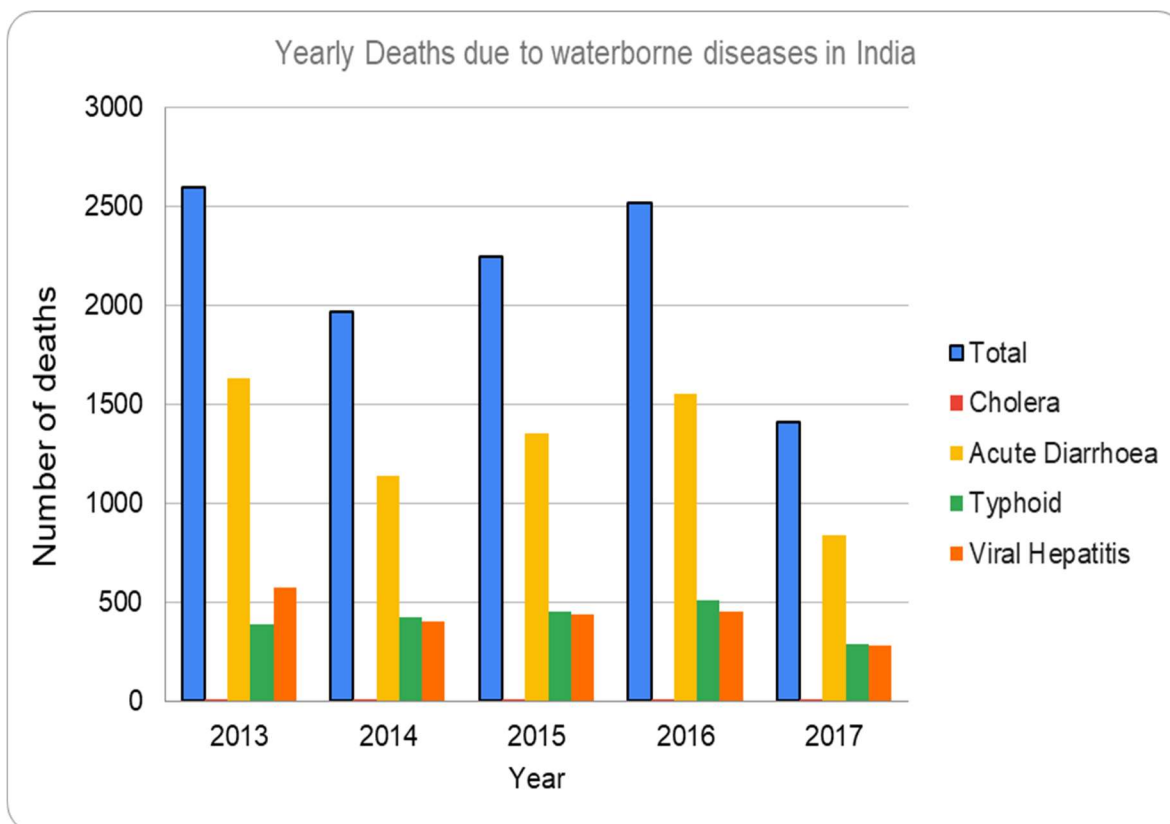
Class:

Date:

Data Table

Year/Disease	Total	Cholera	Acute Diarrhoea	Typhoid	Viral Hepatitis
2013	2595	5	1629	387	574
2014	1967	5	1137	425	400
2015	2244	4	1353	452	435
2016	2520	3	1555	511	451
2017	1412	3	840	286	283

Bar graph based on the data table above



Water Classrooms WC-1-5-ACTIVITY-I (contd)

Student Name:

Class:

Date:

Referring to the bar graph above, answer the following questions:

Q1. Maximum total deaths were seen in the year _____.

Q2. Deaths due to viral hepatitis were higher than deaths from typhoid in the year _____.

Q3. Which disease caused the maximum number of deaths every year?

Q4. Refer to the disease you mentioned in Q3. How can this disease condition be prevented?

Answer the following questions from what you learnt in the session – Water and Disease.

Q5. What is data? Write down two things you learned during this session about what data is.

Q6. How do visual representations of data help you make sense of information? Write down two things you learned during this session about this.

References

<https://ejalshakti.gov.in/jimreport/JJMIndia.aspx>

<https://www.cbhidghs.nic.in/showfile.php?lid=1160>

<https://data.gov.in/resource/stateut-wise-tap-water-connections-rural-households-13072021>

<https://visualize.data.gov.in/?inst=93e7b321-1afc-4647-97ab-3b493bf95101&vid=106709#>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6859509/>