



RESEARCH, RHYTHM + RHYME FOR HEALTHY COMMUNITIES

# RESEARCH ACTIVITY 1: WATER-BORNE DISEASE



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# GET RESEARCH READY!

Welcome to Hip Hop Health. Did you know that Hip Hop artists and scientists do the same thing? They all observe the world around them. When artists and scientists see problems – they try to do something about it. But before a problem can be solved we have to find out more about it, or the solutions won't work. That's called research. In this project we'll be doing research to better understand the problems in water and health, so that we can help fix them.

But how do we do research? No problem – it is just like making music! Let us break it down: a research project is about finding an answer to a new question or a new solution to a problem. The research question is the project's basic beat, simple né?

Next the beat needs some rhythm. This means choosing what kind of information you need to answer your research question and how you are going to collect it. The information you collect is called raw data. Data is like a single sound in a song – put it all together and you get an answer! Having only one data point is just noise, but lots of data points means music!

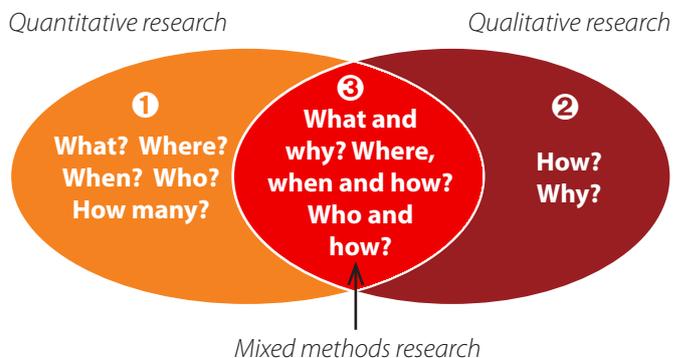
## The research cycle

Research is done in steps, called the **research cycle**. Research usually leads to more research.



There are three kinds of data you can collect. They are:

- 1 Numbers – called quantitative research.
- 2 Words, ideas or pictures – called qualitative research.
- 3 Both numbers and words – called mixed methods.



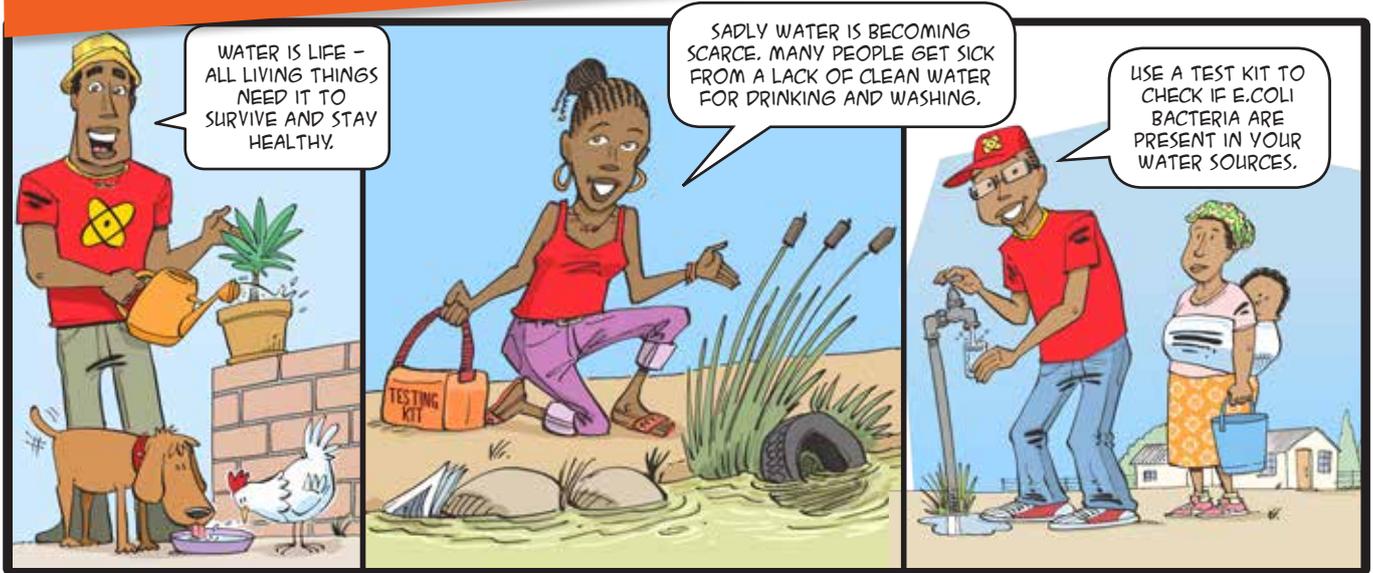
The method you choose depends on the questions you ask. When you put all your data together, they tell you a story about the topic you are researching.

## Keep it fair and safe

All research must be done in a way that does not harm people, animals or the environment. It must also be done in a way that means we can trust the results. This is called research **ethics** – here are a few principles:

- **Informed Consent:** when you talk to people, always ask permission first and explain exactly what the research is about. It is a person's right to say no!
- **Community Engagement:** involve or talk to the people affected by the research problem.
- **Privacy and confidentiality:** you must always protect the people you talk to by keeping their names and any personal information private.
- **Risk-benefit:** all research must do more good than bad.
- **Social Value:** research must also be useful to the community.
- **Research Justice:** all community members must have an equal chance to benefit from the research.

# WATER-BORNE DISEASES



## STEP 1 Problem Statement



WHAT IS THE PROBLEM?

Many water sources are polluted with litter, illegal waste from homes and businesses (including hazardous and toxic chemicals), and faecal matter. Faecal matter contains harmful micro-organisms that cause different illnesses. When people use and drink this water, they can become dangerously ill, and some even die. There are also serious social and economic consequences.

## STEP 2 Knowledge Review



WHAT DO WE KNOW ABOUT WATER-BORNE DISEASES?

Any illness that is spread through drinking contaminated water is called a water-borne disease. In South Africa many of our water sources are polluted by human and animal waste which contains harmful organisms (pathogens). If people use and drink water that has these pathogens in it, they can become very ill. Cholera, diarrhoea, typhoid, dysentery and bilharzia are some examples of dangerous water-borne diseases.

There are various ways to test water to find out if it contains harmful bacteria and other micro-organisms. One of these is the **H<sub>2</sub>S strip test** which was developed by researchers in the Faculty of Pharmacy at Rhodes University. This is a test to find out if E coli bacteria are present in a water sample.

There are different kinds of E coli bacteria. Not all E coli cause disease – in fact, we all have harmless E coli in our bodies – but when E coli are found in water, they always indicate that there is faecal contamination. One kind of E coli causes diarrhoea.

**What else do you know about diarrhoea? Use the Internet or look up information in your local library. Write it down here:**

- 
- 
- 

**Reference  
(Where did you find the information?)**

- 
- 
-

### STEP 3 Research Aim



WHAT DO YOU WANT TO FIND OUT BY DOING THIS RESEARCH?

We want to find out if local water sources are contaminated by faecal waste (by seeing whether E coli is present in local water sources.)

### STEP 4 Research Question



THIS IS THE SPECIFIC QUESTION THAT YOU WILL TRY TO ANSWER THROUGH YOUR RESEARCH.

Do the local water sources contain E coli?

## ACTIVITY

### FINDING OUT WHETHER OUR LOCAL WATER SOURCES ARE CONTAMINATED BY FAECAL WASTE

#### YOU WILL NEED:

- SIX H<sub>2</sub>S WATER TESTING KITS (EACH KIT IS A SMALL BOTTLE CONTAINING A PAPER TEST STRIP)  
(YOU WILL HAVE TO WRITE TO [INFO@SCIENCESPAZA.ORG](mailto:INFO@SCIENCESPAZA.ORG) OR CONTACT +27 (0)76 173 7130 TO GET SOME OF THESE!)
- SOAP AND WATER (OR HAND SANITISER)
- THREE DIFFERENT WATER SOURCES
- AN ADULT FOR SUPPORT AND TO ENSURE SAFETY (SEE DETAILS IN THE PROJECT MANUAL)
- SCISSORS AND GLUE
- PERMANENT MARKER TO LABEL THE BOTTLES.



### STEP 5 Research Method



WHAT RESEARCH METHOD WILL YOU USE TO COLLECT DATA? WHY DO YOU CHOOSE THIS METHOD?

You will be using a quantitative research method because the information you collect from the H<sub>2</sub>S testing kits will be recorded as numbers.

### STEP 6 Consent



GET APPROVAL AND TALK TO THOSE AFFECTED (SEE **KEEP IT FAIR AND SAFE** ON PAGE 2).

FOLLOW THE STEP-BY-STEP METHOD BELOW TO COMPLETE YOUR H<sub>2</sub>S TESTING.



### STEP 7 Do the Research

The H<sub>2</sub>S water testing kit includes a small bottle with a paper test strip in it. The strip contains nutrients which enable E coli bacteria to grow. If there are E coli bacteria in water they will start to grow and multiply as soon as the water touches the paper. The E coli produce a chemical called hydrogen sulphide (H<sub>2</sub>S) and this causes the water to become black/very dark in colour (a positive result).

If E coli are not present in the water, there will be no production of H<sub>2</sub>S, and the water will not turn black (a negative result).

**Note:** The kit also contains hand sanitiser. Make sure your hands and the bottle are clean so you do not contaminate your sample or infect yourself.

A NEGATIVE RESULT DOESN'T MEAN THE WATER IS SAFE TO DRINK! IT MEANS THERE ARE NO E COLI, BUT THERE MAY BE OTHER HARMFUL MICRO-ORGANISMS OR CHEMICALS IN THE WATER THAT ARE NOT INDICATED BY THE STRIP TEST.



## STEP BY STEP:

- 1 Work as a group. Identify 3 different water sources where people collect water to use for drinking and preparing food, (e.g. tap, rainwater tank, water truck, borehole, river, stream, well).



- 2 You will need 6 test kits to collect 2 samples from each of the 3 water sources. At each water source, first let the water run for 30 seconds.
- 3 Use the hand sanitiser (or soap and clean water) to clean your hands, the outside of the test kit bottles and the end of the tap or pipe where the water comes out.
- 4 At each water source, carefully collect water in the two bottles. Make them about three quarters full. Do not touch the insides of the bottles while you are filling them.
- 5 Close the lid of each bottle firmly and shake it. Use the hand sanitiser or soap and water to clean your hands and the outsides of the test kit bottles.
- 6 Label each bottle to identify the water source, the date and the time that you collected the water.
- 7 Place the 6 bottles (3 from each source) in a warm, dry place, such as a box or cupboard, away from sunlight.
- 8 For the next 3 days (72 hours), check the bottles every 24 hours. You are looking to see if the colour of the water changes. Use the pictures of the different colour samples to describe the colours of your samples, e.g. "dark yellow". Record your results for each sample in Table 1.
- 9 After three days, flush the contents of the bottles down the toilet or empty them into the sewer. Throw the bottles away with the refuse, and remember to wash your hands with soap and water.



## RESULTS:

Use the following pictures to compare your samples and describe the colour of each sample.

WHAT RESULTS DID YOU GET?



Use the table on the following page to record your observations. You are presenting your data in a table: this is part of quantitative research. Remember to give your table a heading, for example: *Table 1: H<sub>2</sub>S strip test results for Ingwavuma, KZN.*

Table 1:

Water source	Source 1:		Source 2:		Source 3:		Example: Community tap on Mandela Street	
	Test 1	Test 2	Test 1	Test 2	Test 1	Test 2	Test 1	Test 2
<b>Start</b> Date and time: (e.g. 12/09/15, 8:45 am)							clear	clear
<b>24 hours</b> Date and time: _____							pale yellow	pale yellow
<b>48 hours</b> Date and time: _____							dark yellow	pale yellow
<b>72 hours</b> Date and time: _____							black	dark yellow

**Note:** If the water looks very pale yellow or slightly cloudy, you can record this as 'clear'. If there is a definite **change of colour** to very dark or black then this will be a positive result for H<sub>2</sub>S.

### Keep it fair and safe

Think about the ethical and safety issues that are important for this project. Write them down. For example, if you find that a water source is contaminated, is it ethical just to prove contamination, or should you tell other people?

**Note:** On page 2 of this worksheet there is a list of ethical and safety issues. Go through this list again before you start writing your answers.

**Ethical issues:**

\_\_\_\_\_  
\_\_\_\_\_

**Safety issues:**

\_\_\_\_\_  
\_\_\_\_\_



WHAT DOES IT MEAN IF ONE TEST IS NEGATIVE AND THE OTHER TEST IS POSITIVE? WHY DO YOU THINK YOU TESTED TWO SAMPLES FROM EACH SOURCE?

### STEP 8 Analyse your Data



ORGANISE  
YOUR  
RESULTS.

Analysing data means looking carefully at all the data to find links that will help you to answer your research question. There are many different ways to analyse data. Choosing the right one depends on your research question.

### Let's analyse!

The colour of the water after the H<sub>2</sub>S strip test will tell you if the water contains E coli bacteria from faeces or not.

If the water turns black in the 72 hours after you filled the bottle then the water contains E coli. We call this a **positive result for E coli, even though it is a bad thing**. If the colour remains pale or yellow, it means that the sample does NOT contain E coli, and we call this a **negative result**, so in this case negative is good and positive is bad!

Remember that any colour changes that happen **after** 72 hours are **not** a positive result.

OVER TO YOU...

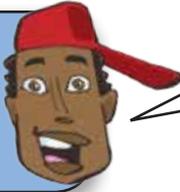
Complete the following sentences:

**Source 1.** The water we tested from \_\_\_\_\_ (add name of water source) turned \_\_\_\_\_ (add colour of water). This means that E coli from faeces **are / are not** present. (Circle the correct answer).

**Source 2.** The water we tested from \_\_\_\_\_ (add name of water source) turned \_\_\_\_\_ (add colour of water). This means that E coli from faeces **are / are not** present. (Circle the correct answer).

**Source 3.** The water we tested from \_\_\_\_\_ (add name of water source) turned \_\_\_\_\_ (add colour of water). This means that E coli from faeces **are / are not** present. (Circle the correct answer).

## STEP 9 Conclusions



WHAT ARE YOUR FINDINGS?

Once you have analysed your data, you will be able to draw conclusions, based on what you have discovered in your research. Refer back to the problem and the research question. Do your data help you to answer the research question?

OVER TO YOU...

Use the space below to write down any conclusions you and your group have come up with.

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## STEP 10 Recommendations



WHAT DO YOU THINK SHOULD BE DONE ABOUT THE PROBLEM?

Recommendations are suggestions about what you think should be done next. This is a very important part of any research project because this is a chance for you to put your research into action and make a difference to your community.

## What kind of action?

There are various ways that research can make a difference.

**Future research.** Research often leads to more questions and the need to find out further answers.

Do you have questions about this research that you still need to find answers to?

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**Innovate.** This means to come up with a new idea! Do you have ideas for innovations that will help to solve the problem? Write them here.

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**Advocacy.** 'Advocacy' means to speak up! You can make people aware of the problem and tell them what needs to be done. How will you get people to take notice of the problem?

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A GOOD EXAMPLE OF ADVOCACY IS TEACHING PEOPLE THE IMPORTANCE OF BOILING WATER FOR AT LEAST 1 FULL MINUTE BEFORE USE, OR SANITISING WATER STORED IN A TANK, TO KILL HARMFUL MICRO-ORGANISMS. FOR A FULL 5 000-LITRE RAINWATER TANK, ADD HALF A GLASS OF JIK BLEACH (150CM<sup>3</sup>) EVERY MONTH.

**Telling people about what you learned in your research is called dissemination. Why not write a song to spread the word!**

## How to write a good hip hop song



**LYRICS** – The first thing you need is content. Choose some facts from your Hip Hop Health activity and write some lyrics to share a key message with people. Rhyming and clever use of words can be a good way to do this. Get your teacher or an expert to check that your science facts are correct, and write some rhymes!

**Remember:** using swear words and words that put other people down (e.g. women) are not cool!

**BEAT** – Next is the beat. Remember, rapping is all about rhythm. In the same way that singing adds a melodic layer to a song, rapping adds a rhythmic layer. Use rhyming words to try to give your lyrics some flow, and add a beat! You can create your own beat with beatboxing, download a beat, or even get a friend to make you a beat.

**EMOTION** – Finally, you need emotion. You want the audience to sense how you feel about your message, and you want them to feel it too. This is a chance for you to truly express yourself. Let your emotions come through in your song and everyone will want to listen!

*A few more tips:*

- You don't want to confuse the audience or make it too hard for yourself, so keep it simple.
- If you're enjoying it, the audience will enjoy it; so enjoy it!
- This is your own creation, so don't try to mimic someone else. No one can do YOU better than YOU.

***Keep it simple, have fun, and be yourself!***

Why not get some friends together and put on a show! You can even enter your songs in our annual **Hip Hop Science Spaza competition**. Find out more at [www.sciencespaza.org](http://www.sciencespaza.org).



Hip Hop Health and Hip Hop Science Spaza are an initiative of Jive Media Africa. For more information, visit [www.jivemedia.co.za](http://www.jivemedia.co.za).

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