Chapter 6

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WATER STORAGE IN RURAL HOUSEHOLDS: INTERVENTION STRATEGIES TO PREVENT WATERBORNE DISEASES

HOUSEHOLD NUMBER:…………………………
NAME:…………………………………………
VILLAGE:………………………………………. 

This study will investigate the quality of stored drinking water from various containers in 60 randomly chosen households in the village. Every household will be given a sodium hypochlorite solution (household bleach) which will either be 3.5%, 1.0% or 0% in order to determine the effectiveness of a chlorine based intervention. The other intervention that will be running together with the sodium hypochlorite solution intervention will be the addition of the CDC safe storage container to 30 of the households. This part of the study will determine the effectiveness of the storage container in improving the microbiological quality of the stored drinking water. The household members agree to participate in this study and will at the end of the study each receive 2 CDC safe storage containers for their participation. A group meeting will also be held at the end of the study to inform all the households taking part in the study, the chief of the village, the clinic staff and other relevant stakeholders like the Department of Water Affairs and the Department of Health, of the outcome of the interventions and to find a common goal to improve water quality in rural households. Each household is free to withdraw from the study at any time. Any personal information on the households and the household members will also be kept anonymous. The results of the study will strictly be used for scientific purposes only.

I……………………………………………… agree to be part of the study.

Sign:……………………………………….... Witness:……………………………………...
MADI O VHEWAHOMIDINI: DZI TSHANDUKO DZI NO THUSA U THIVHELA U PHADALALA HA MALWADZE A NO PHADALADZWA NGA MADI O TSHIKAFHADZEAHO

MUDI:..............................
DZINA:........................................
KUSI:...........................................

Dzingudo dzikhou ita thoduluso kha madi a unwa a ne a vha a zwigubuni mahayani. Ri do nanga midi ya 60 nga mamvate. Mudi munwe na munwe u do wana sodium hypochloride (bleach) (ine yavha 3.5%, 1.0% kana 0%zwi vha zwo sedzana na u sedza kushumele kwayo kha u kunakasi madi). Dzinwe ngudo dzine ra khou ita ndi dza zwigubu zwa CDC zwine ra khou fha madi a 30. Heyi ivha I tshi khou sedza vhudi ha zwigubu zwa CDC ri tshi zwi vhandedza na zve vha vha vha tshi khou zwi shumisa u vhe a khazwo madi. Na zwauri vhudi ha madi a hone (u vha na zwitshili) vhu a fana nna.

Midi yo tenda u dzhenelela kha idzi ngudo ido fhiwa zwigubu zwvhili zwa CDC magumoni a iyi ngudo. Hudo farwa mutangano magumoni a ngudo u ita muvhigo kha vhathu vho dzhenelelaho kha idzi ngudu, Vha-Musanda, manese, vha muhasho wa mutakalo na vhulonda vhathu. Uri vhathu vha hadzimane mihumbulo kha u kunakisa madi a unwa. Munwe na munwe o tendelwa udi bvisa kha dzingudo tshifhinga tshinwe na tshinwe.

Nne:.............................................., ndi khou tenda uvha tshipida tsha idzi ngudo.

Tsiano:.............................................. Thanzi:..............................................
APPENDIX B

PAMPHLETS DISTRIBUTED BY THE DEPARTMENT OF HEALTH AND THE DEPARTMENT OF WATER AFFAIRS ON THE USE OF JIK IN SOUTH AFRICA
PREVENT AND TREAT CHOLERA

DRINK COOL BOILED WATER OR TREATED WATER

Boil for 1 Minute

Add 1 teaspoon of bleach (Jik) to 25 litres of water. Leave stand for 30 minutes, but it is best to wash it over night before drinking.

COVER FOOD

WASH HANDS WITH SOAP AND COOL BOILED OR TREATED WATER

BUILD SAFE TOILETS

TREAT CHOLERA

Mix 1 litre of water, 8 teaspoons of sugar, half teaspoon of salt, and drink mixture as often as possible.

FOR MORE INFORMATION CONTACT YOUR LOCAL CLINIC

DEPARTMENTS:
WATER AFFAIRS AND FORESTRY + HEALTH + LOCAL AND PROVINCIAL GOVERNMENT + GOVERNMENT COMMUNICATION AND INFORMATION SYSTEM
KHA VHA THIVHELE KHOLOREA VHA DOVHE VHA I ALAFHE

KHA VHA NWE MADI O VHILISWAHO KANA O SHELWAHO MUSHONGA

VHA TAMBE ZWANDA NGA TSHISIBE NA MADI O VHILISWAHO O PHOLAKHO KANA O SHELWAHO MUSHONGA

KHA VHA FHALE MABUNGA O TSIRELEDZEAHO

KHA VHA ALAFHE KHOLOREA

ARALI VHA TSHI TODA MAFUNGGO NGA VHUDALO, KHA VHA KWAME KILINIKI YA HAVHO

MINASHO

ZWA MADI NA ZWA MADAKA. ZWA MUTAKALO. ZWA MUVHUSO WAPO NA WA PHUROVINTSI. SISTEME YA ZWA MAFUNGGO NA VHUDAYIDZANI YA MUVHUSO
Fhelisani kholera

Ni shele teaspoon ya jik kha litha dza 25 dz a madi. Ni ime awaru dzine dzu swiku mbeli phandu hauri ni a nke kana ni bke ngao.

Arali ni tshi vhoma unga no tshwa- nga kholera, ni mbo di shele teaspoon dza 8 dz zvignon na hatu ya teaspoon ya muno kha litha ya madi o kungakhweka. Ni mbo rwa nga zvituku nga zvituku, ni tshi thadza ni mbo di ya kilinki i re tshini na hanu.
**CHOLERA**

**WHAT IS CHOLERA?**
Cholera is an acute bowel infection caused by a bacterium called *Vibrio cholerae*. The bacteria cause a severe watery diarrhoea that can be fatal. You can be infected by drinking contaminated water.

**SYMPTOMS**
- Vomiting
- Severe watery diarrhoea (rice water stool)
- Exhaustion and dehydration

**PREVENTION**
- Water must be disinfected by boiling it for at least 2 minutes or bleaching it. Add a teaspoon of bleach (such as 
  'sodium hypochlorite') for every 20-25 litres of water and leave it to stand for two hours, preferably overnight.
- Always cover food from flies.
- Toiletts should be far away from the river or stream which is used for cooking and washing.
- Do not swim in cholera-contaminated rivers.
- Fruit, vegetables, utensils, clothing and bedding must be washed in treated water (boil water or use bleach) before use.
- Wash hands before handling food, eating and after using the toilet.
- If you are in a cholera risk area, do not eat uncooked oysters and shellfish.

**HOW DOES CHOLERA AFFECT THE BODY?**
- People sometimes drink contaminated water containing cholera bacteria.
- These bacteria travel to the small intestine (gut) where they multiply.
- The bacteria destroy the salt balance of the body and dehydration occurs.
- Water is no longer transported across the intestine and is flushed straight out of the body and as a result the person becomes dehydrated.
- If rehydration does not occur immediately it can result in the failure of organs, coma and death.

**Children and elderly people are at greatest risk.**

_NORTHERN PROVINCE_  
DEPARTMENT OF HEALTH AND WELFARE
HELPING SOMEONE WHO IS SICK WITH CHOLERA:

- A person can die quickly from loss of body water and salt.
- Quickly give them lots more to drink.
- Make the secret drink with sugar and salt (below).
- OR you can use a watery rice or maize porridge. Mix 1/2 cup rice or maize meal with 1 litre water and boil for 6-7 minutes.
- Children and adults should drink as much as they want but at least one to two cups after each watery stool.
- Continue to feed babies with breast milk and porridge or rice. Also give half a cup of the special drink, slowly by spoon, after each watery stool.

TAKE PEOPLE SICK WITH DIARRHOEA TO YOUR CLINIC OR DOCTOR:

If a person loses lots of water and feels or looks weak, take her to the clinic or doctor immediately. Give more of the special drink or water on the way. This will help to keep the person alive.

A SPECIAL DRINK FOR TREATING DIARRHOEA AT HOME

Take:
- One litre clean water
- 8 level teaspoons sugar
- Half level teaspoon of salt

AND

MIX ALL THREE TOGETHER AND GIVE THE PERSON TO DRINK

WHAT IS CHOLERA?

Cholera germs in the stomach cause diarrhoea. This may lead to rapid loss of body fluids.

HOW DO WE KNOW SOMEONE HAS THE DISEASE?

- The first sign is watery diarrhoea, sometimes with vomiting.
- The person loses a lot of water very quickly.
- They feel weak and can have cramps in the arms and legs.
- The skin can become cold and wrinkled.
- The person may collapse and die.

WHERE DO THE GERMS COME FROM?

- Cholera germs live in the intestines of some people.
- Sometimes the germs make people sick and sometimes not.
- Those that do not get sick can carry the germs for a few weeks before the body’s natural defences gets rid of them.

HOW DO THE GERMS SPREAD FROM ONE PERSON TO ANOTHER?

- When infected people empty their bowels, the germs come out in the stool (faeces).
- Some stool gets onto a person’s hands or into drinking water or food.
- Water or food can look OK but contain the germs. Cholera germs spread to other people who consume this dirty water or food.
- Once inside the body, it can make this person sick.

WHAT WATER IS CLEAN AND SAFE?

Tap or borehole water is usually safe. Water from rivers or dams is NOT safe.

To make water safe to drink:
- Boil the water, OR
- Add bleach (Lit or Javel) to the water as shown below. Use clear water or filter it through a cloth first.

DANGER: Do not drink pure bleach!

Wash hands

Wash fruit and vegetables

Add 1 teaspoon bleach

Add 5 drops of bleach to one litre and leave for half an hour before using it.
APPENDIX C

QUESTIONNAIRE
THE IMPACT OF WATERBORNE DISEASES IN RURAL COMMUNITIES OF THE VHEMBE REGION IN THE LIMPOPO PROVINCE

PARTICIPANT IN THIS STUDY:

I am aware that the information obtained through this questionnaire will be treated as anonymous and will be used strictly for scientific purposes. I am free to withdraw from the study at any time.

I ................................................................... agree to be part of this study.

Sign:.................................................. Witness:..........................................

INSTRUCTIONS TO THE INTERVIEWER:
1. Ask questions and match the answer to the choices. Do not give the choices.
2. Write an X in the appropriate box.
3. If there is no match, choose other and ask the respondent to describe.

A. DEMOGRAPHIC DATA:
1. General household information:
1.1. Name of village

__________________________________________________________________________

1.2. House number for future visit (any type of identification)

__________________________________________________________________________

__________________________________________________________________________
2. How many people live in your household?
   2.1. adult females
   2.2. adult males
   2.3. female children <5
   2.4. female children 6 - 10
   2.5. female children 11 - 18
   2.6. male children < 5
   2.7. male children 6 - 10
   2.8. male children 11 - 18

3. What is the highest educational standard of the female adult head of the family?
   3.1. degree
   3.2. diploma
   3.3. std. 8 - 10
   3.4. std 4 - 7
   3.5. std 1 - 3
   3.6. grade 1 - 2
   3.7. not educated

4. How many rooms does your house have?
B. WATER SOURCE

5. Does the village have a water committee?  
   yes  no

6. What is your main source of domestic water in your village?
   6.1. rain
   6.2. dam
   6.3. river
   6.4. private borehole
   6.5. outdoor tap at home
   6.6. indoor tap
   6.7. communal tap for < 100 people
   6.8. communal tap for > 100 people
   6.9. communal borehole (windmill)
   6.10. other (please specify)

7. Is water readily available from the source?  
   yes  no

8. If your answer to the above question is NO, state alternative source
   8.1. buy water
   8.2. private source
   8.3. pond
   8.4. river/ stream

9. Do you pay for water?  
   yes  no
10. How much do you pay for water per month?
   10.1. R5.00
   10.2. R10.00
   10.3. R20-00 or more

11. If the water source is a private communal, how many households use the source?
   11.1. 1 - 10
   11.2. 11 - 20
   11.3. 20 - 50

12. How far is the water source from your house (in meters)?
   12.1. 0 (at home)
   12.2. 50 - 100
   12.3. 100 - 500
   12.4. 500 - 1000
   12.5. > 1000

13. What time is the water source the busiest?
   13.1. morning
   13.2. afternoon
   13.3. no busy time

C. WATER COLLECTION AND STORAGE

14. What type of container do you use to fetch or store water?
   14.1. plastic
   14.2. unpainted metal
   14.3. painted metal
   14.4. fibreglass
14.5. stainless steel
14.6. other (please specify)

15. How big is the container (litres) you use to collect the water with?
  15.1. 5 - 10 litre
  15.2. 10 - 25 litre
  15.3. 25 - 50 litre

16. Indicate the shape of the container
  16.1. drum
  16.2. bucket
  16.3. bottle
  16.4. other (please specify)

17. How do you remove the water from the water source?
  17.1. dipping into it with a container (cup/jar)
  17.2. hand pump
  17.3. tap
  17.4. diesel pump
  17.5. electric pump
  17.6. use piece of hosepipe
  17.7. other (please specify)
18. How do you take the water home? (Transportation)
   18.1. hand carried container
   18.2. vehicle
   18.3. rolling the container
   18.4. wheelbarrow
   18.5. use donkey cart

19. How many times do you fetch water each day?
   19.1. once
   19.2. twice
   19.3. thrice

20. Who fetches water?
   20.1. adults
   20.2. children
   20.3. both

21. Do you store water at home?
    yes  no

22. What is the size of your storage tank?
   22.1. 20 - 50 litres
   22.2. 50 - 100 litres
   22.3. 100 - 200 litres
   22.4. 200 litres and more
23. What type of storage container do you use?
   23.1. plastic
   23.2. unpainted metal
   23.3. painted metal
   23.4. fibre glass
   23.5. stainless steel
   23.6. glass

24. Is the storage container kept.................?
   24.1. open
   24.2. closed
   24.3. outdoors
   24.4. indoors

25. How is the water obtained from the storage container?
   25.1. tap
   25.2. mug
   25.3. other (please specify)

26. How often is the storage container emptied or nearly emptied?
   26.1. daily
   26.2. weekly
   26.3. monthly
   26.4. rarely or not at all
27. How often is the storage container cleaned?
   27.1. daily
   27.2. weekly
   27.3. monthly
   27.4. rarely or not at all

28. What do you use to clean the storage container?
   28.1. water only
   28.2. soap and water
   28.3. bleach
   28.4. sand and water

29. Do you treat water used for drinking by ........
   29.1. boiling
   29.2. straining
   29.3. adding chemicals e.g. chlorine tablets
   29.4. other (please specify) _____________

D. WATER QUALITY OF STORED WATER

30. Is the water clear
   yes  no

31. Does the water have a smell?
   yes  no

32. Does the water have any taste?
   yes  no
33. Does your household use water for each of the following?
   33.1. drinking
   33.2. cooking
   33.3. bathing
   33.4. laundry
   33.5. watering the garden
   33.6. watering animals
   33.7. home industry/business

E. ATTITUDES/KNOWLEDGE TOWARDS WATERBORNE DISEASES

34. Do you know any diseases caused by contaminated water? yes no

35. Which of the following waterborne diseases have you suffered from?
   35.1. Cholera
   35.2. Dysentery
   35.3. Typhoid fever
   35.4. Diarrhoea

36. Have any of your children had diarrhoea (loose tummy) at any time in the past six months? (loose tummy = more than 3 stools/day for at least 2 days). yes no
   List their ages:.........................................................................................

37. What do you think caused the diarrhoea?
  
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

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38. For the most severe cases of stomach problems, which symptoms applied in your case?
   38.1. Stomach ache
   38.2. Passing blood
   38.3. Vomiting
   38.4. Fever
   38.5. More than 4 loose stools in 24 hours
   38.6. Other (please specify)

39. Did you report your health problems to the clinic nurse? yes no

40. Were you given medication for your health problems? yes no

41. For how many days did this bout of diarrhoea last?
   41.1. 1 - 3 days
   41.2. 4 - 6 days
   41.3. More than 7 days

42. How do you think diarrhoea may be prevented?

43. Have your family suffered from stomach ache in the last six months? yes no
F. SANITATION

44. What type of toilet does the household have?
   44.1. In-house flush
   44.2. Outdoor flush
   44.3. Bucket system
   44.4. Pit latrine
   44.5. Other (please specify)

45. How many people use your toilet?
   45.1. 1 - 5
   45.2. 6 - 10
   45.3. More than 10

46. If your household does not have a toilet, where does your family normally defecate?
   46.1. Neighbours
   46.2. Hole dug in the yard
   46.3. Other (please specify)

47. Are there times when the toilet is unavailable and household members relieve themselves in the vicinity of the house?
   yes  no

48. Did your household have any problems with the toilet in the last four weeks which made it necessary to use other toilet facilities?
   yes  no
49. How is water including waste from flush toilets disposed of?
   49.1. Pipeline to sewage works
   49.2. Septic tank
   49.3. Poured into yard in the vicinity of house
   49.4. Poured outside yard
   49.5. Other (please specify)

50. How do you dispose of your domestic rubbish?
   50.1. Rubbish is collected
   50.2. Dump in the yard
   50.3. Bury in the yard
   50.4. Dump outside the yard
   50.5. Bury outside the yard
   50.6. Burn
   50.7. Other (please specify)

51. For how long do you store solid waste in the house before taking it outside?
   51.1. Daily
   51.2. Weekly
   51.3. Monthly
   51.4. Rarely or not at all

52. How often is solid waste removed from the outside of your house?
   52.1. Daily
   52.2. Weekly
   52.3. Monthly

53. Is there a problem in your area of people dumping solid waste? yes no
54. Do you keep the following animals at home?
   54.1. Cat
   54.2. Dog
   54.3. Poultry
   54.4. Pigs
   54.5. Goats
   54.6. Cattle
   54.7. Other (please specify) _______________

55. What do you use to clean your baby’s anus/buttocks?
   55.1. Water and hand wash
   55.2. Cotton wool
   55.3. Toilet paper
   55.4. Washing rag
   55.5. Newspaper

56. List occasions when you usually wash your hands each day
   56.1. Before eating food
   56.2. Before preparing food
   56.3. After toilet use
   56.4. After waking up in the morning
   56.5. After cleaning baby’s buttocks

57. Do you have soap in your household? yes No
58. Where do you keep soap for washing your hands after using the toilet?
   58.1. In the toilet
   58.2. In the yard
   58.3. In the bathroom
   58.4. In the kitchen
   58.5. In the bedroom

G. ECONOMIC IMPACT

59. How often have children in your household been ill with diarrhoea the past 6 months?
   A. How often did you take these children for medical care?
   B. How far are medical services from your home?
   C. How do you get to the medical services?
   D. How much does it cost you to get to the medical services
   E. How much does the medical treatment cost you each time?
   F. How many days did you have to stay away from work to take children for medical care?

60. How often have adults in your household been ill with diarrhoea the past 6 months?
   A. How often did you take these ill adults for medical care?
   B. How much does the medical treatment cost you each time?
   C. How many days did ill adults stay away from work because of this illness?

61. What is the total monthly income of your household?
H. OBSERVATION

62. How are the water containers covered?
   62.1. No cover
   62.2. Tightly
   62.3. Loose
   62.4. No containers

63. What is the hygienic condition of the yard?
   63.1. Clean
   63.2. Dirty
   63.3. Very dirty

64. Fly count in yard
   64.1. Numerous
   64.2. Many
   64.3. Few
   64.4. None

65. What is the hygienic status of the kitchen?
   65.1. Clean
   65.2. Dirty
   65.3. Very dirty

66. Fly count in kitchen
   66.1. Numerous
   66.2. Many
   66.3. Few
   66.4. None
67. What is the general condition of the latrine?
   67.1. Faecal matter in the toilet
   67.2. Toilet paper available
   67.3. Toilet is ventilated
   67.4. Smell of urine
   67.5. Presence of flies

68. Is there a place for washing hands next to the toilet? [yes | no]

69. Cleanliness of children?
   69.1. Hands
   69.2. Face
   69.3. Clothes

70. Garbage container in house?
   70.1. None
   70.2. Closed
   70.3. Open

71. Are there a lot of flies in your kitchen during the day?
   71.1. No
   71.2. Usually/almost always
   71.3. Occasionally

72. Does your toilet attract flies during the day?
   72.1. Almost never
   72.2. Occasionally
   72.3. Usually