

# The Use and Performance of the BioSand Filter\* in the Artibonite Valley of Haiti: A Field Study of 107 Households

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\*an intermittent slow sand filter designed for affordable household water treatment



# Characterization of Households and Water Sources

- **107 households studied**
  - Average 5.4 people per house
  - 71 children, aged 5 and under
- **Long term users of the Biosand Filter**
  - 1 to 5 years; average 2.5 years
  - 91% use water for drinking only
- **Water Sources:**
  - 61% shallow dug wells
  - 26% springs and deep wells
  - 13% combination of above
- **Source Water Quality:**
  - Average fecal contamination= **202** (E. coli, cfu/100 mL)
  - Average turbidity= **6.2** NTU



# Is the BioSand Filter Effective?

## ➤ Bacterial Removal Efficiency:

**98.5%**

- Using membrane filtration, with *E. coli* as index bacteria
- Sample points: Water from Filter Spout versus Water from Source
- $\frac{\# \text{ in source} - \# \text{ in filtered}}{\# \text{ in source}}$

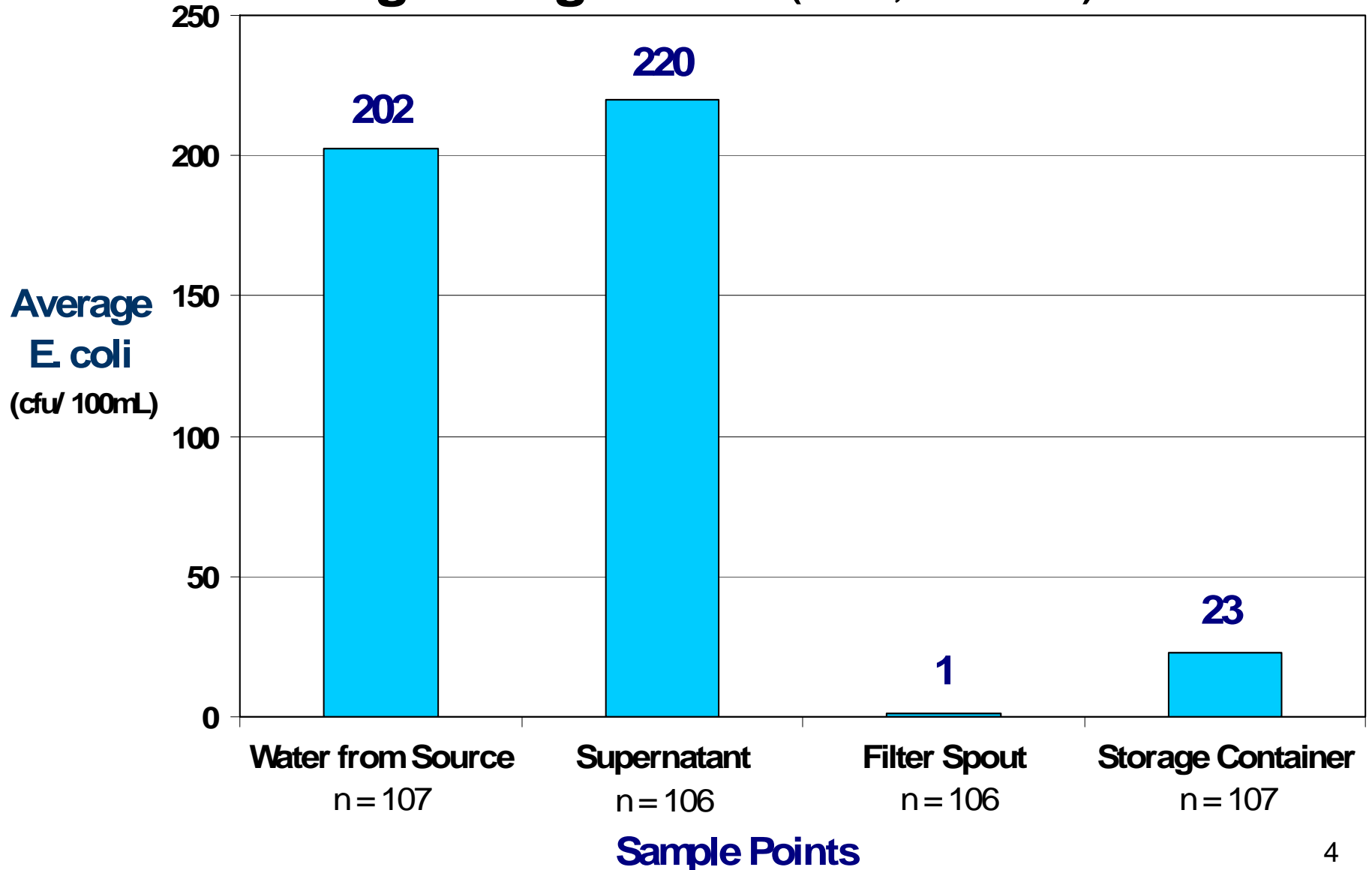
## ➤ Turbidity Removal Efficiency:

Source water: average **6.2** NTU

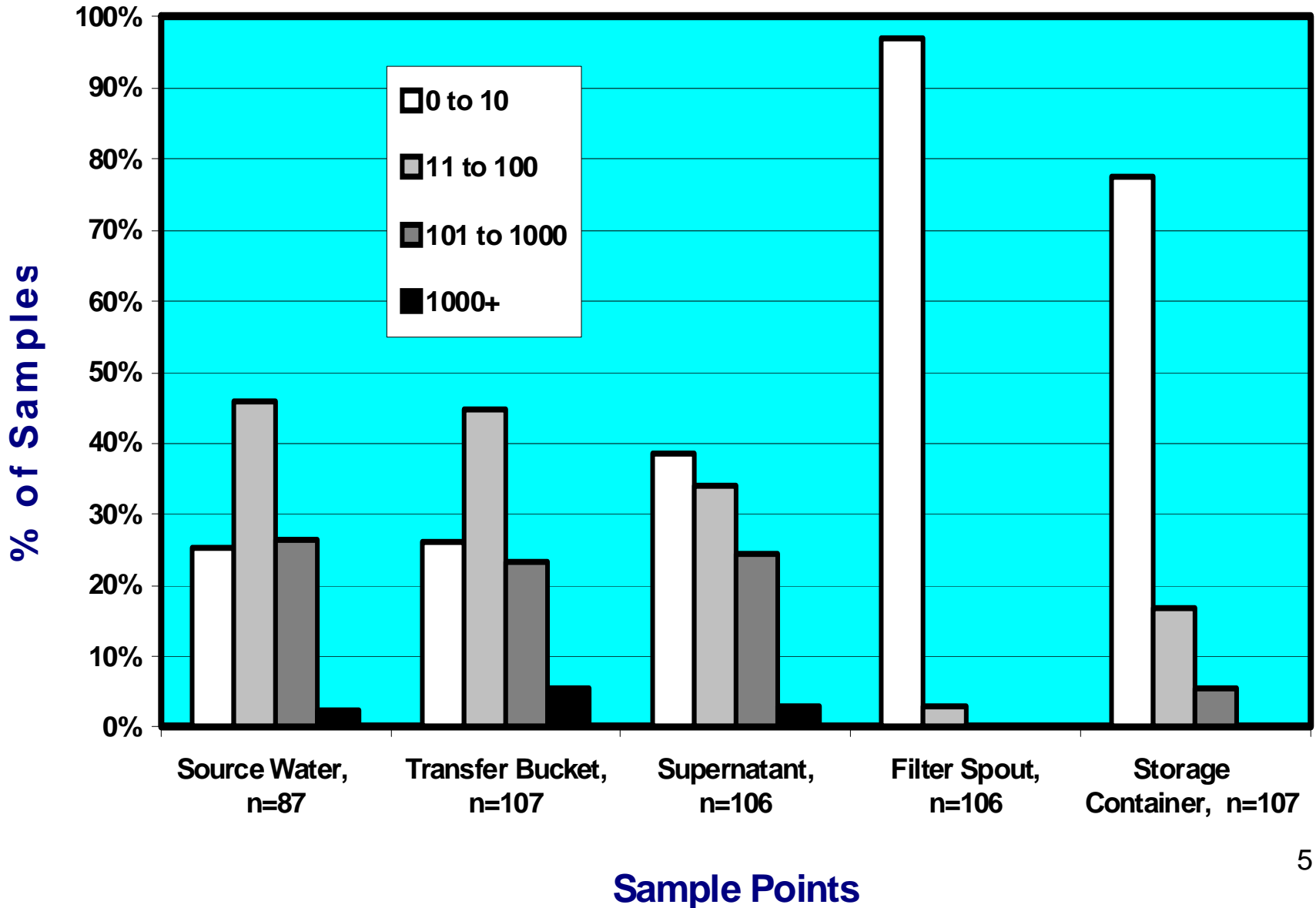
Filtered water: average **0.9** NTU



# Removal Effectiveness and Recontamination using Average values (E. coli, cfu/100 mL)



# Removal Effectiveness and Recontamination using Percent Ranges (E. coli, cfu/100 mL)



# Does the BioSand Filter meet the “Criteria of the Poor”?

- **Basic criteria:**
  - Cost / affordability
  - Local materials & labor skills
  - Input energy required
  - Effectiveness
- **Perceptions (critical to sustained use):**
  - Taste, smell, appearance
  - Ease of use, maintenance req.
  - Durability, longevity of filter
  - Health benefits
  - Problems encountered
- **Overall Perceptions:**
  - Do they like it?
  - Would they recommend it?



# Perceptions; Taste, Smell, Appearance

**Question:** *Tell us about the taste of the water – is it better, worse or about the same?*

**99%** Better  
**1%** Worse

**Question:** *What about its smell?*

**99%** Better  
**1%** Worse

**Question:** *What about its appearance?*

**99%** Better  
**1%** Worse



# Ease of Use, Quantity of Water Produced

**Question:** *Is it easy to use the filter?*

Yes 100%

No 0%

**Question:** *Do the children know how to use the filter?*

Yes 100%\*

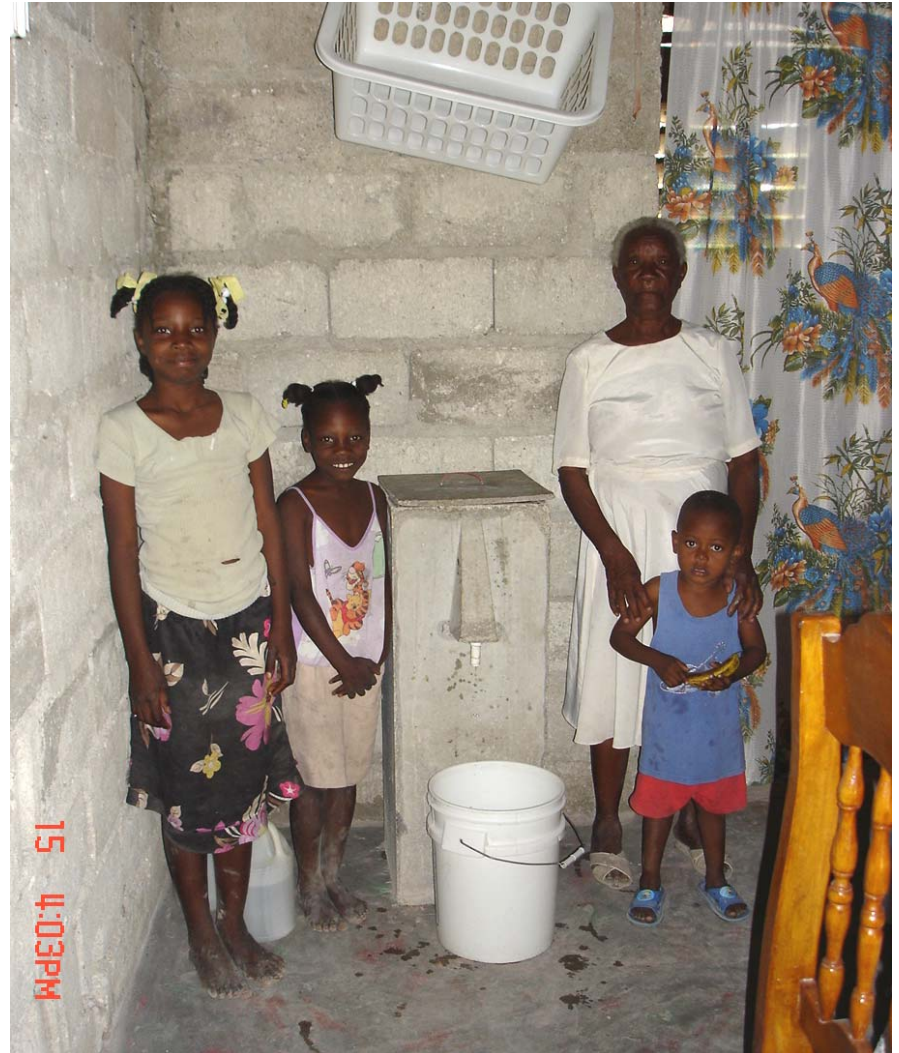
No 0%

\*except those too young

**Question:** *Does the filter produce enough clean water for the entire household?*

Yes 99%

No 1%



# Problems Encountered, Durability, Longevity

**Question:** *Have you had any problems with the filter?*

## Problems Encountered

Yes 13% → 14 / 107 flow rate slow

No 87%

**Question:** *Do you ever require help to fix the filter?*

## How often & what?

Yes 6% → 6 Users required help restoring flow rate

No 94%

## **Observations by Enumerators:**

*Write down any problems with the quality of construction.*

0% Leaking      3% Concrete body\*

3% Lid / Diffuser    0% Other issues

94% No problems

\*1 filter had a crack, 2 were chipped



# Health Perception and Results

## Health Perception

**Question:** *Since you started using the filter, do you think your family's health has improved, stayed the same, or become worse?*

**95%** Better

**0%** Worse

**5%** Stayed the same

## Health Results

For the 71 children, under 6:

10 - diarrhea in prior 2 weeks

7 - took medicine for diarrhea

2 - saw a physician



# Overall Perceptions

**Question:** *Do you like the filter?*

Yes: 100% → Yes, because:

No: 0%

- 22% protects health
- 49% better water
- 7% it serves well
- 22% other, or no reason given

**Question:** *Would you recommend the filter to others?*

Yes: 95%

No: 5%



# Conclusions

In the context of this field study;

➤ Perceptions:

- High level of overall satisfaction
  - Quality of water
  - Ease of Use
  - Quantity of water

➤ Observations:

- Overall; filters were durable, well-maintained, functioning properly, and used regularly
- The major user problem: plugging of the filter due to clay / silt in the source water
- Lack of knowledge regarding:
  - Maintaining the filter to remove clay / silt and restore flow rate
  - Disinfecting the water post-filtering
  - Safe water storage practices and containers
  - Transmission of water-borne disease

➤ Water Analyses:

- Good turbidity removal
- Significant bacterial removal
- Substantial recontamination occurred post-treatment.