

# *Determinants of Waterborne Illness in Rural Haiti*

A Participatory Community  
Assessment



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Abstract #163139

# Water in Haiti: The Numbers

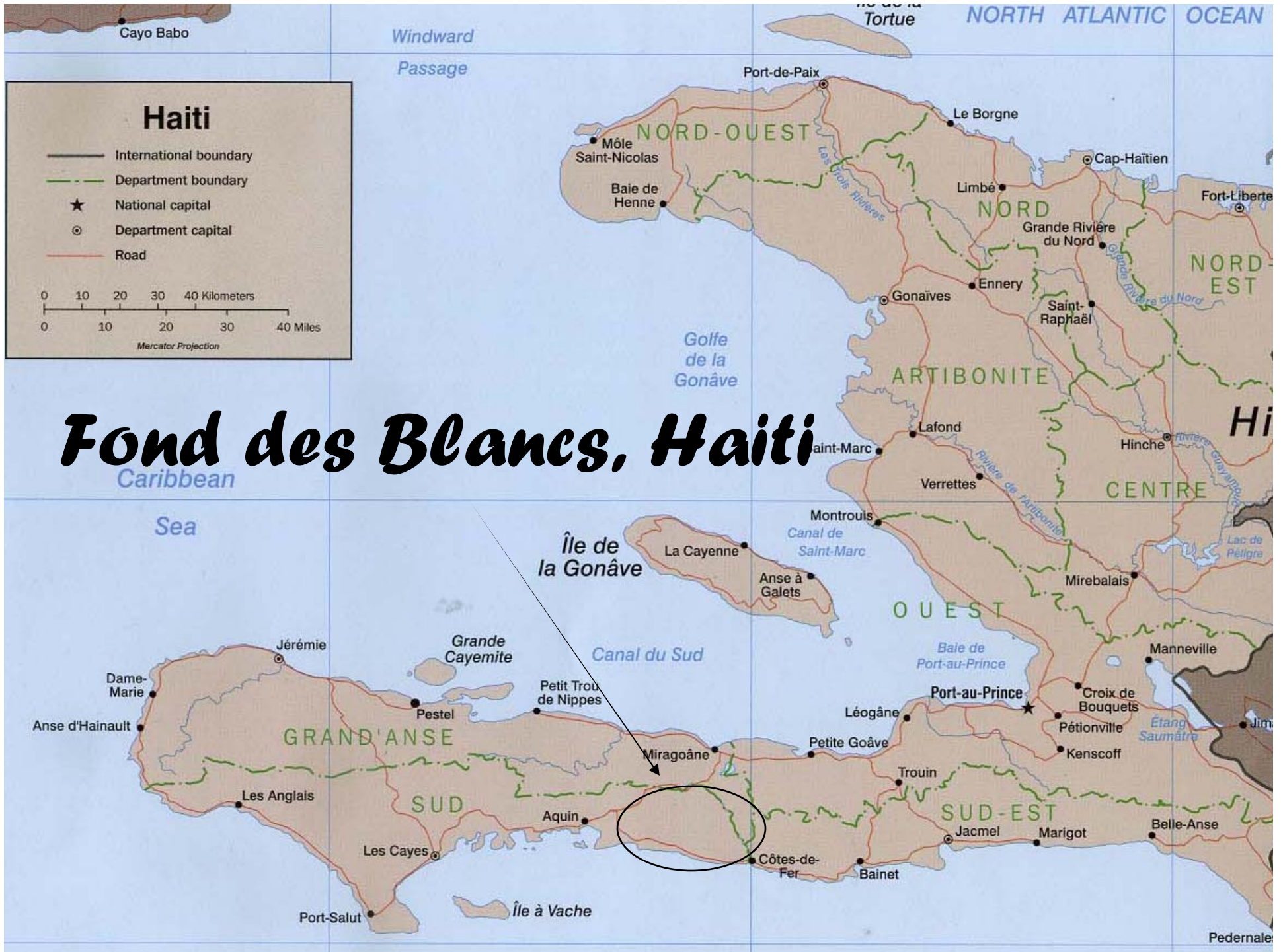
- 46% lack access to an improved water source (*UNICEF, 2007*)
- Last of 147 countries ranked according to Water Resources (*Water Poverty Index, Keele University*)
- Haiti Water Consumption: 3 liters/Per Capita/day



# Waterborne Diseases in Haiti

- Diarrhea, Gastroenteritis
  - Leading cause of under 5 deaths
  - 2<sup>nd</sup> leading cause of adult death after AIDS (*PAHO*)
- Quantity– distance to source
- Quality– source, point of use





# *Economy in Fond des Blancs*

- Limited dirt roads
- Subsistence  
Farming, raising animals, charcoal production, vending
- Difficult to assess differences in household economic status



# Methods

## 4 Neighborhoods

- 129 households
- Child under 5 yrs
- Female head of household
- 850 individuals

## Fecal Coliform Levels

- Household Water
- Source water

## GPS location

- House
- Water source
- Distance to water

## 8 Focus Group Discussions



# Study Population

Mean Age 20 yrs (14 days–98 yrs)

6.7 per house (3–16)

House Roof type

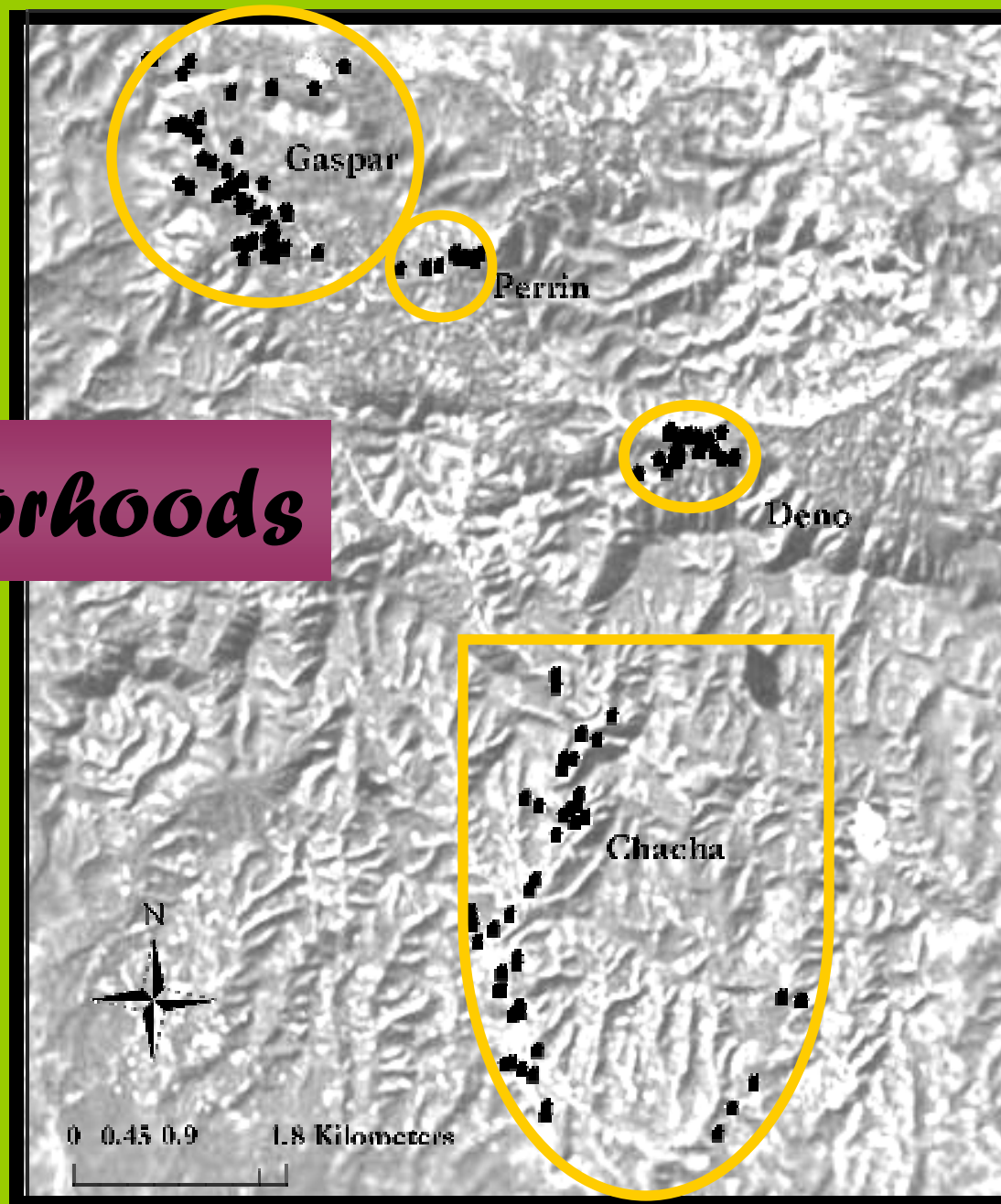
- 33% thatch
- 66% tin

40% of households did not have soap

54% of households did not have a working latrine



# *Neighborhoods*





# *Four Different Types of Sources*



*Capped Spring*

# *Deep Well*



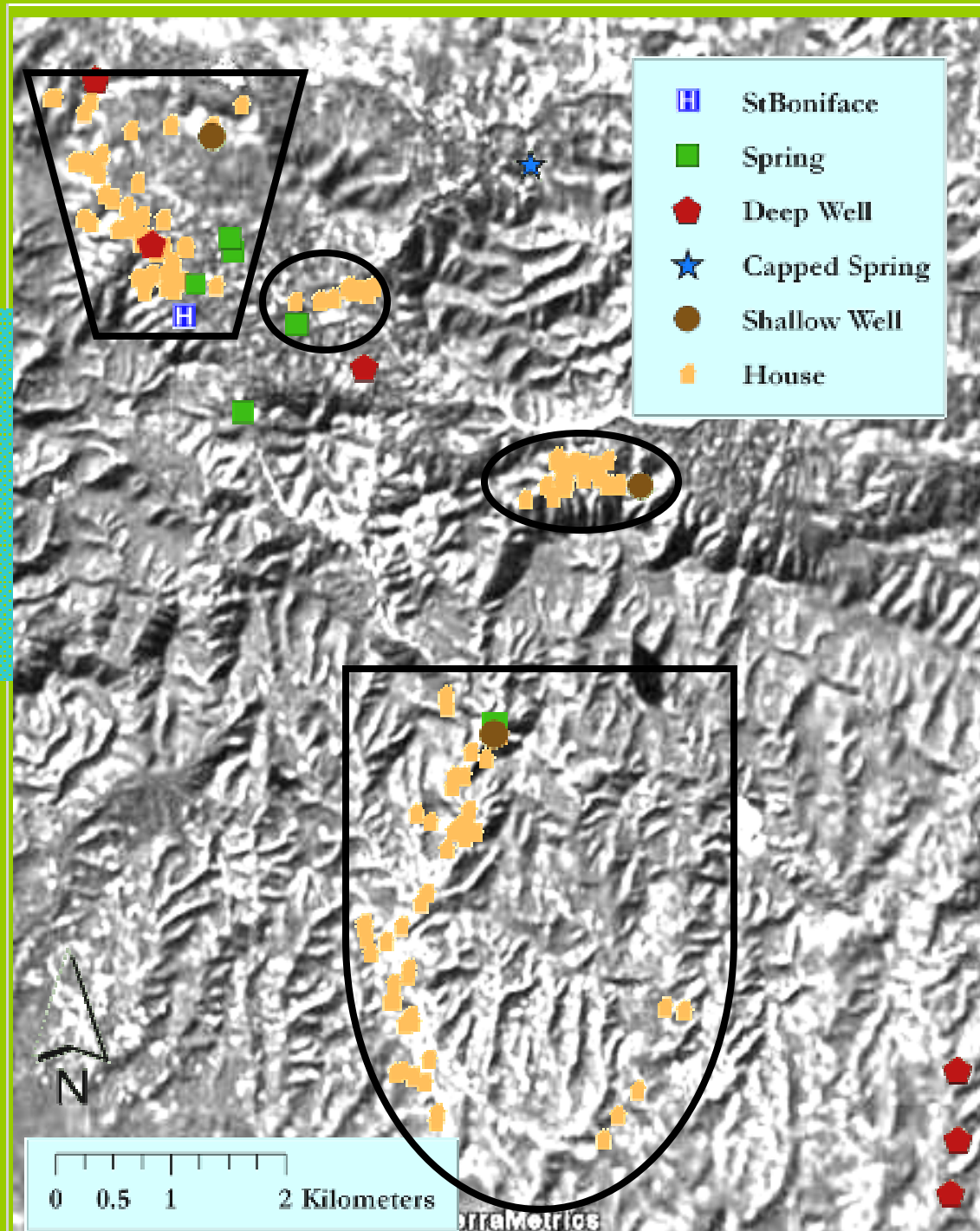


## *Shallow Well*

# Spring

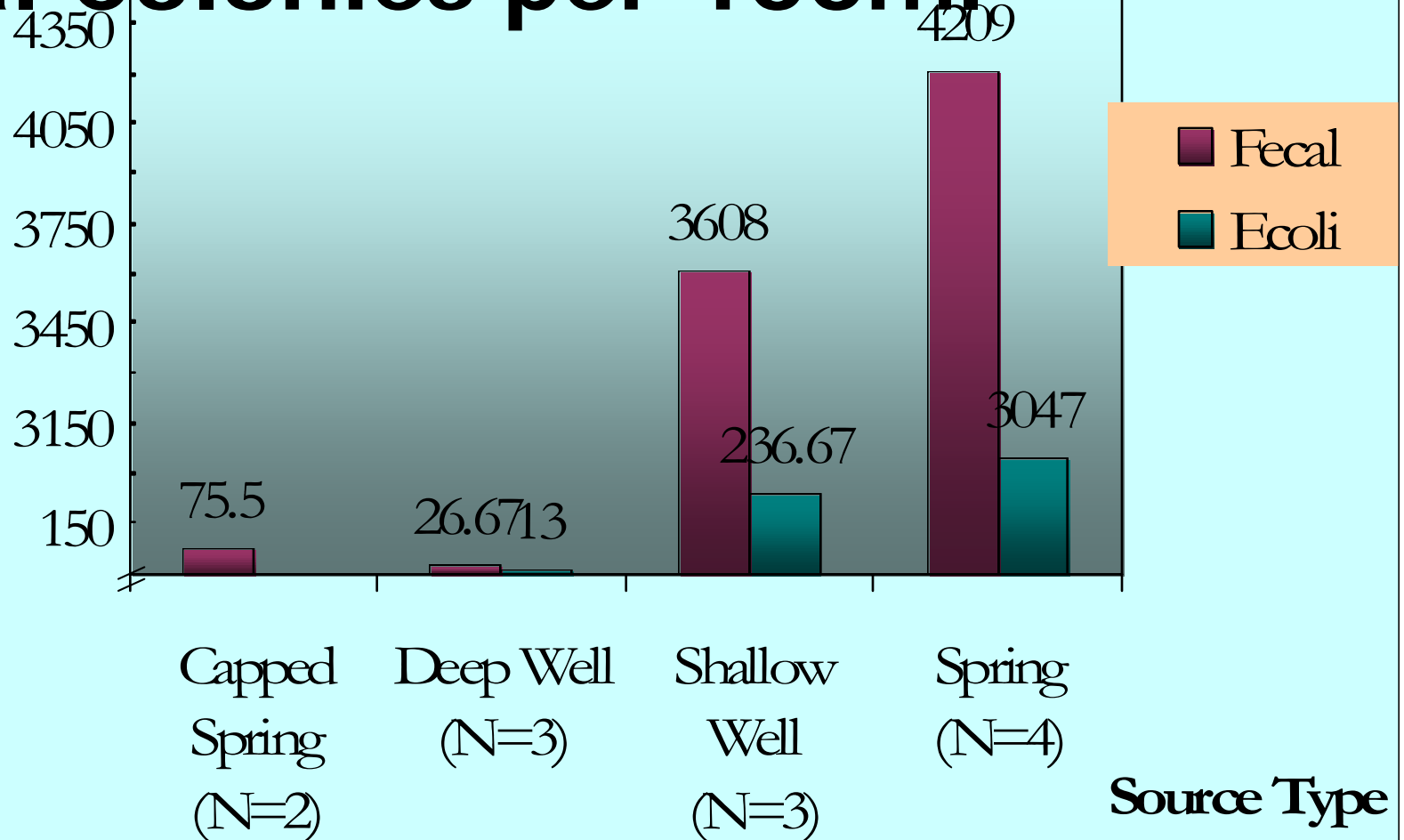


# Water Sources Available in Each Neighborhood



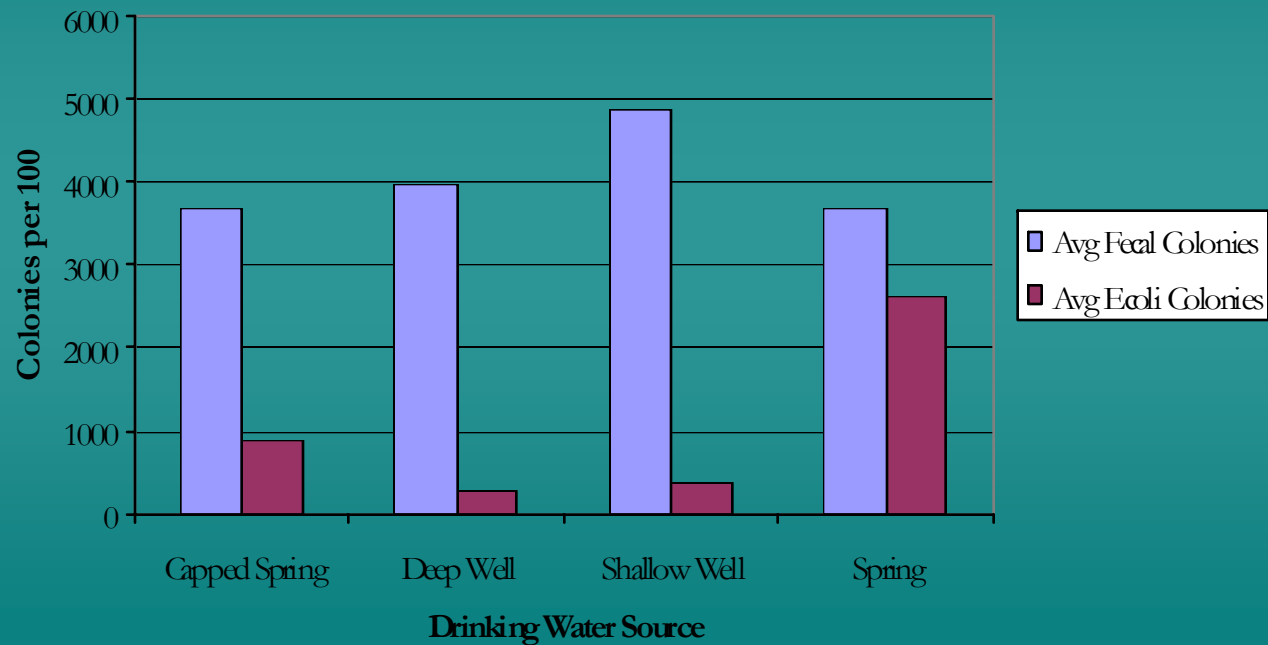
# Bacterial Quality of Water Sources

## Fecal Colonies per 100ml



# Bacterial Quality of Household Drinking Water

Quality of Household Drinking Water by Source Type



E. coli Colony counts varied by Source Type ( $p=0.0125$ )

# *Disease, Distance and Water Source*

- IF the closest water source is a **SPRING** or **SHALLOW WELL**
  - 2.4 times more likely to have diarrhea (adult and child) ( $p=0.02$ )
- For every 1 km away from **ANY** water source (up to 6km)
  - 1.6 times more likely to have GI symptoms ( $p=0.0006$ )\*\*

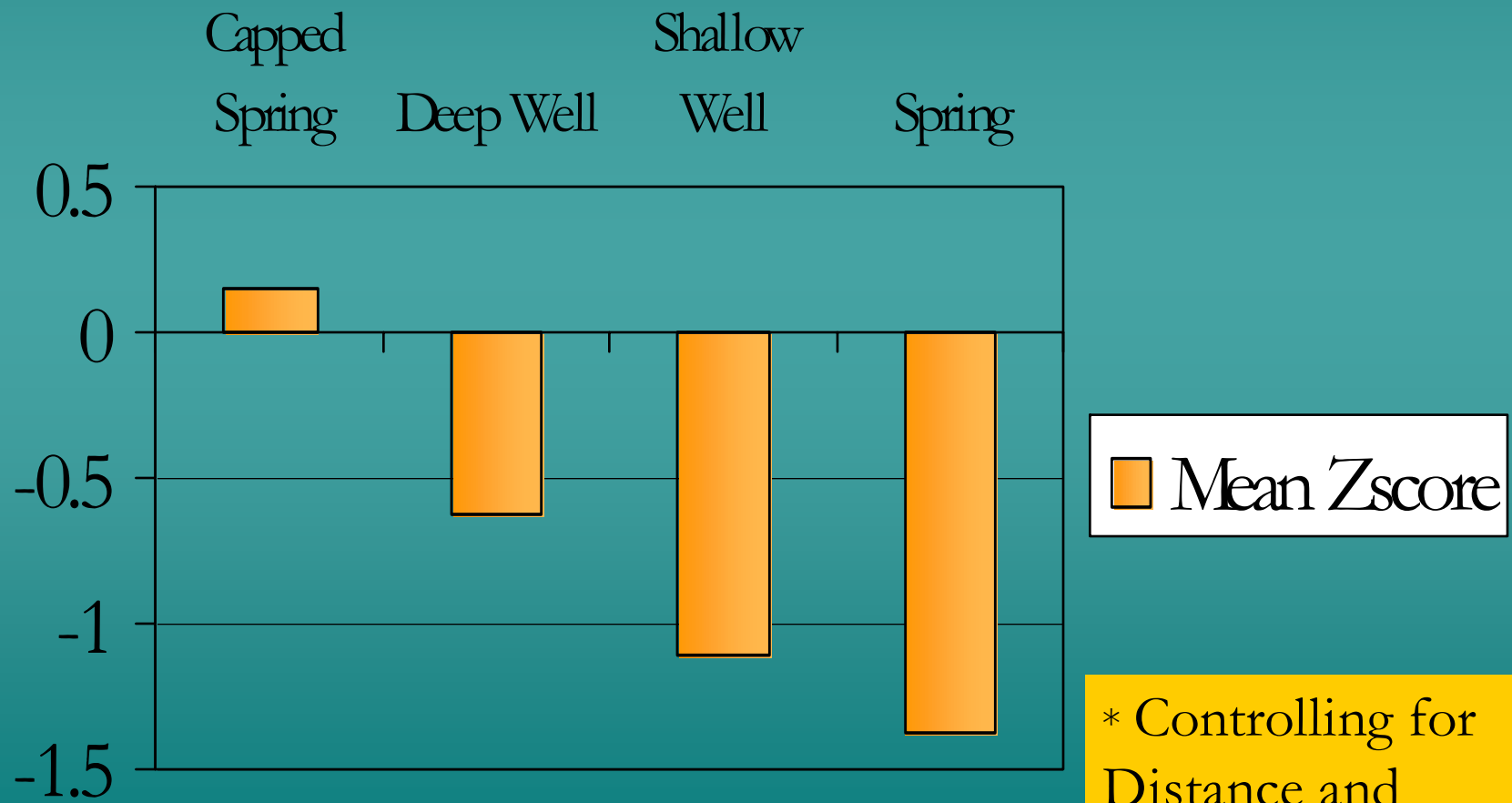


\*\*Controlled for

- source type,
- Neighborhood
- Chemical Treatment

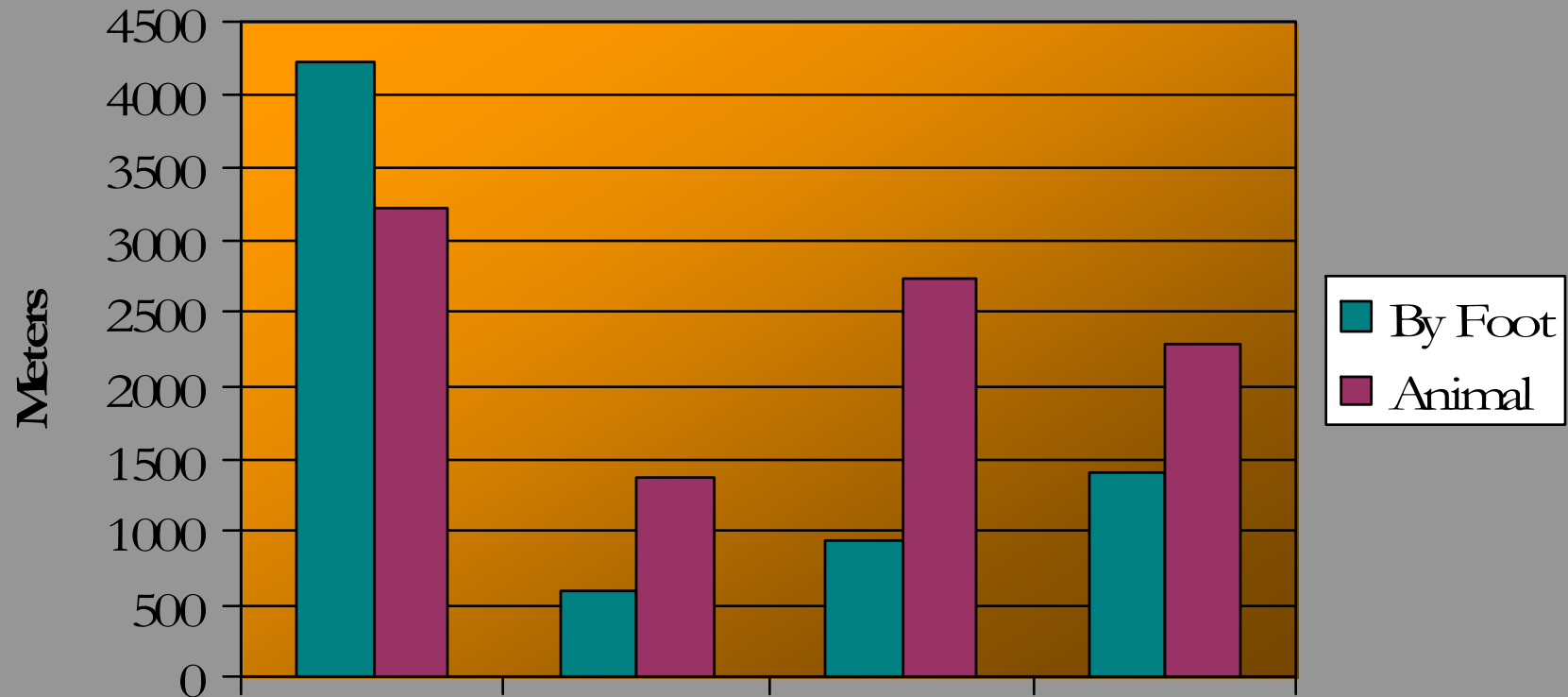


# Mean Height for Age Z-score and Type of Closest Water Source (p=0.0032)\*



\* Controlling for Distance and Neighborhood.

# Distance Traveled to Each Type of Water Source\* ( $p < 0.0001$ )



Capped  
Spring

Deep  
Protected  
Well

Shallow Well

Spring

Source Type

\*controlling for:

- Neighborhood
- Transportation
- Transportation x Source

# *Why don't people use Deep Wells?*

- Believe most water contamination is from the source
- Suspicious of well water quality
- Aesthetics—taste and color
- Run dry; long lines



# *Water Treatment*

- Spring water
- most contaminated
- least treated ( $p < 0.05$ ).

- 20% (N=26 of 128) of households reported treating their sample water
- 21 used a chemical treatment
  - Bleach (13) or tablet (8)
- 5 used non-chemical
  - Citrus
  - Filter
  - Sun
  - Boil (3)

# *Who Uses a Chemical Treatment?*

## Not Associated with

- Economic Indicators
  - Roof type, cistern, radio
- Beliefs about Illness and Water Quality
  - Diarrhea is preventable
  - Water is contaminated
  - Contaminated water causes illness



# *Which Households chemically Treat the Water?*

Associated with current:

- Child with diarrhea
  - $P < 0.0001$
- GI symptoms
  - diarrhea, stomach cramps or vomiting
  - $P < 0.0001$
- Neighborhood
  - $P < 0.0012$



# *Qualitative: Reasons for Not Treating Water*

- Cost
- Chemical treatment
  - Stomachaches
  - Fear of Cancer
  - Unsafe for children
- Boiled water
  - bad taste, time consuming
- Children must build resistance to bacteria

# *Lessons Learned*

- Perceptions about clean water sources not consistent with bacterial quality
- Belief that majority of water contamination occurs at the source
- Willingness to invest in safe drinking water.



# *Give people the tools to make informed choices*

## **Chacha Vire: Dlo Sa Pa Pwop!**



**Tout sa ou we nan photo se mikwob.  
Mikwob sa a rele Fekal Kolifom. Sa vle di  
ke se pou pou nan dlo. TRETTE dlo avan ou  
bwe!! Sevi ak soley oubyen kloroks!**



# Play at the Cock Fight Ring



# *Limitations*

- Not longitudinal; limited pilot-study;
- Small Sample Size
- Misclassification Bias: bacterial colonies
- Recall Bias:
  - Relied on self-reported illness vs clinical diagnosis
  - Age
  - water source



# *Contact Information of US Researchers*

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