

Multiple sustainability challenges in multi-use water systems: drinking water, sanitation, health and irrigation

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Sustainable Development Goals: A Water Perspective
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Drinking Water Sources and Handling matters



Quality matters: Example from Bangladesh

BRAC Intervention

Non Intervention



Whole Community Environment matters

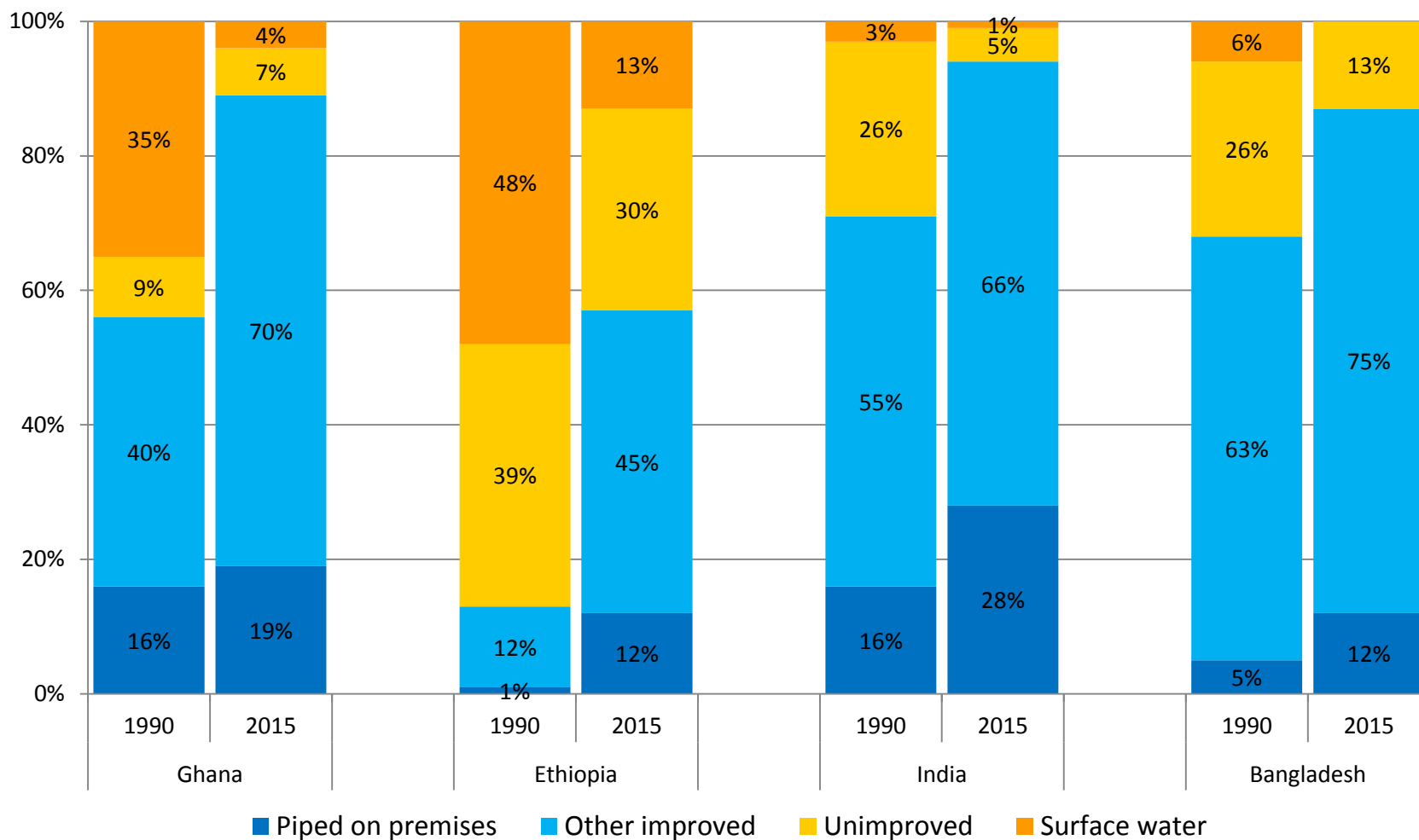


The whole Water – Land Use Context matters



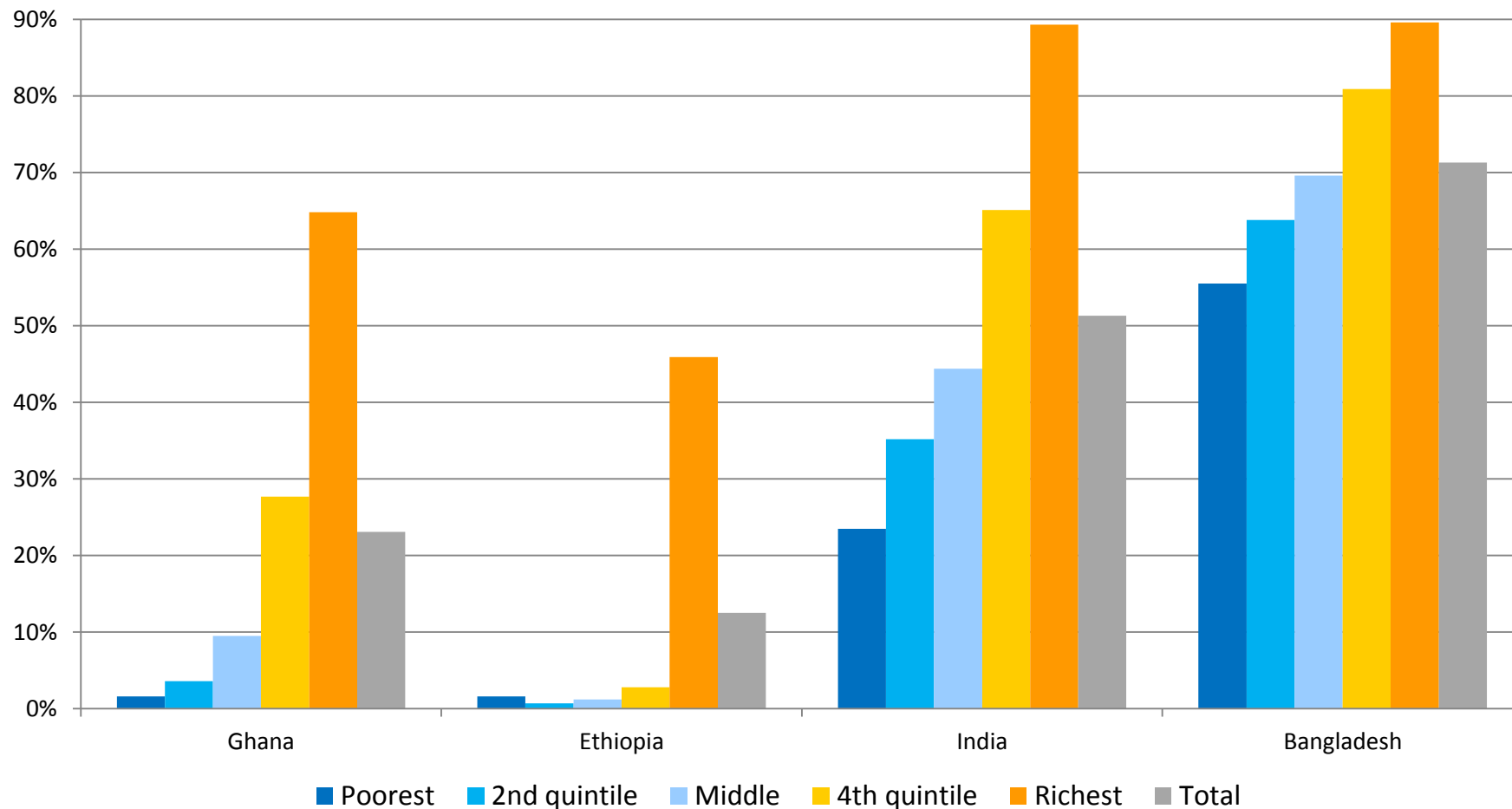
Current WATER situation

Trends in drinking water coverage (%), by country JMP reporting



Current WATER situation

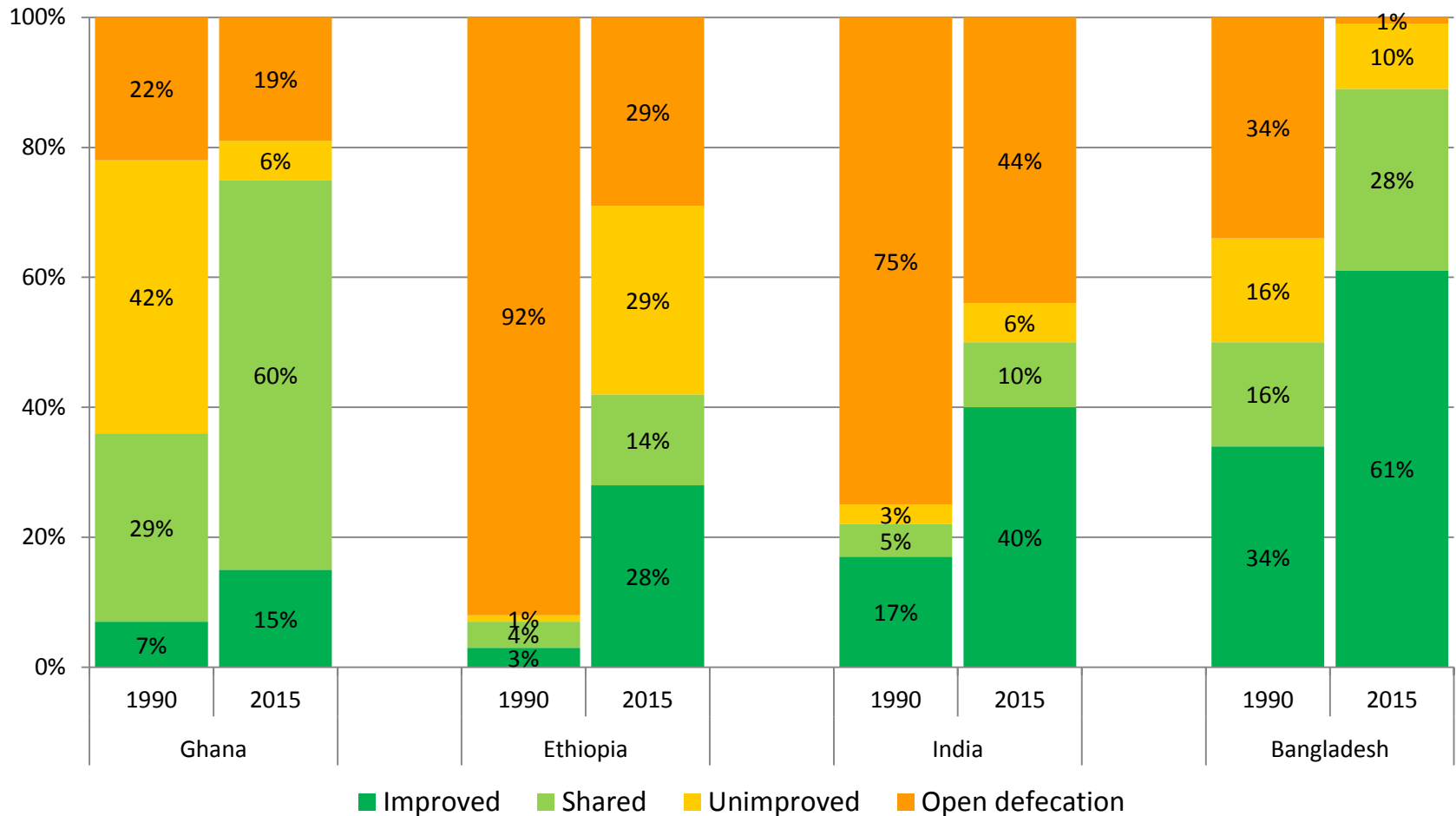
Water on premises (%), by income groups DHS Data



Source: The DHS Program

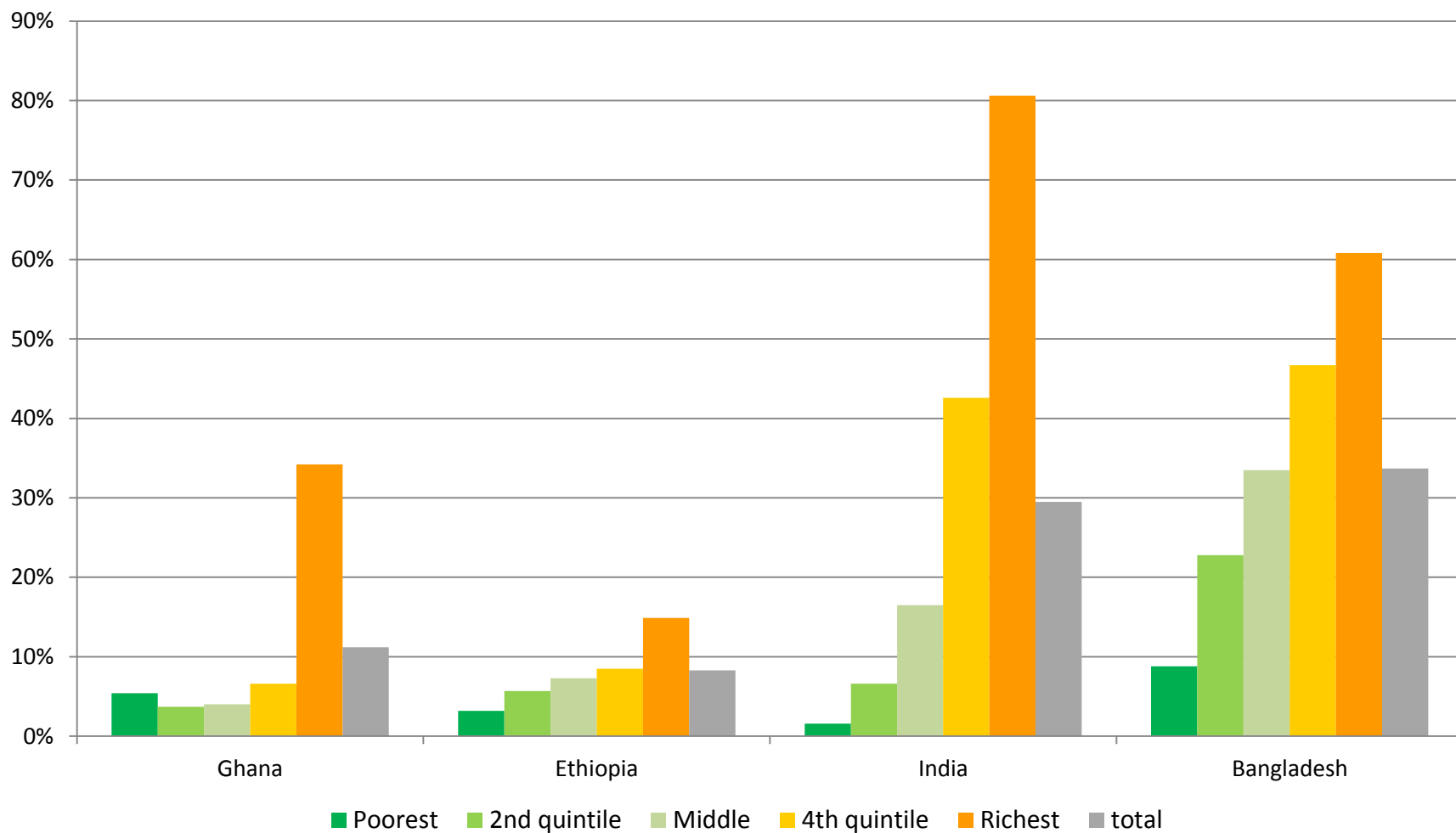
Current SANITATION situation

Trends in sanitation coverage (%), by country JMP reporting



Current SANITATION situation

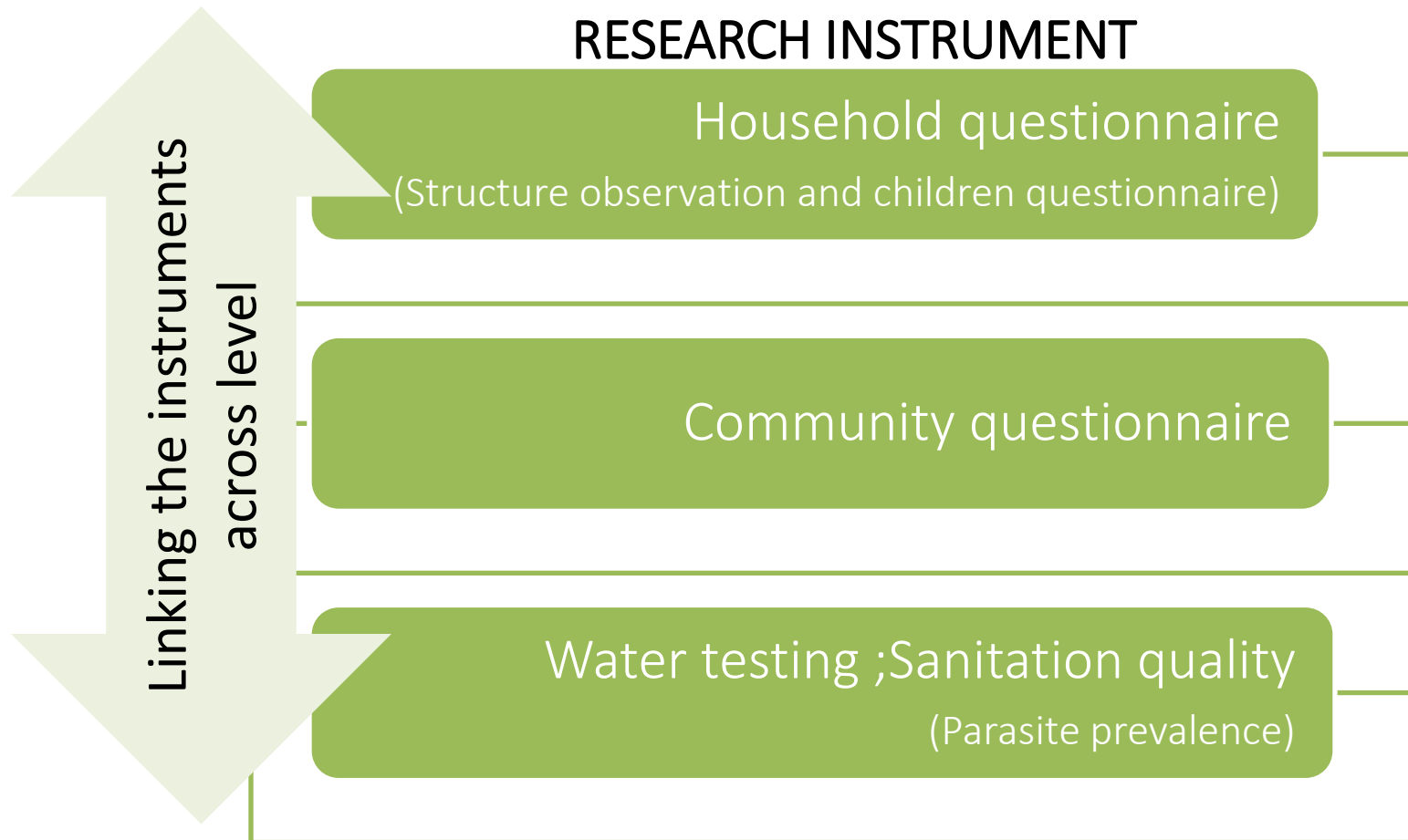
Access to improved sanitation (%), by income groups **DHS data**



Source: The DHS Program

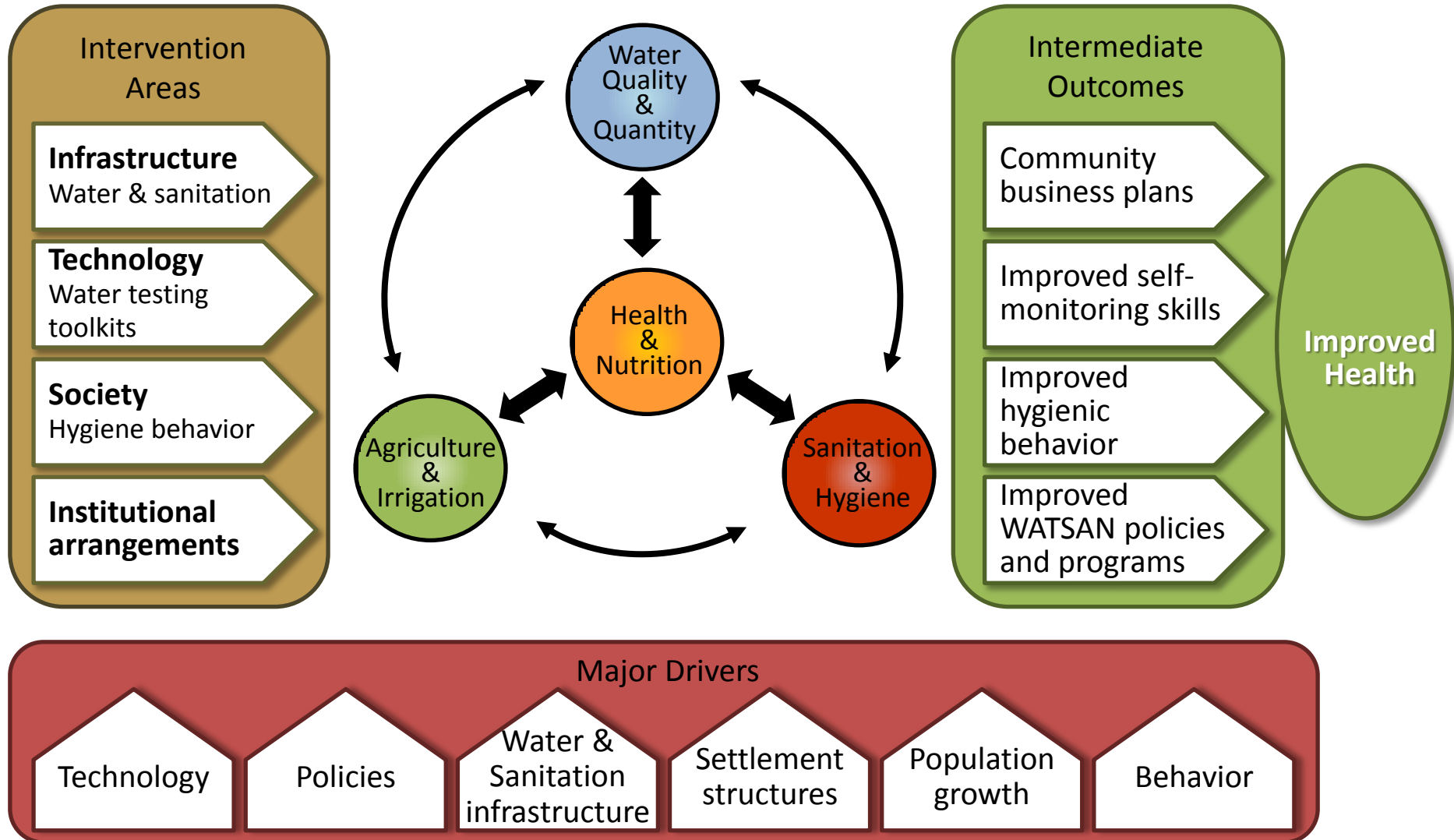
Studies at four sites in India, Bangladesh, Ethiopia, Ghana

Analysis Plan: Linkage across Research Instruments



**A Study by ZEF supported by Bill&Melinda Gates Foundation
with partners in the four countries – BRAC, IIPHG, EEA, ISSER**

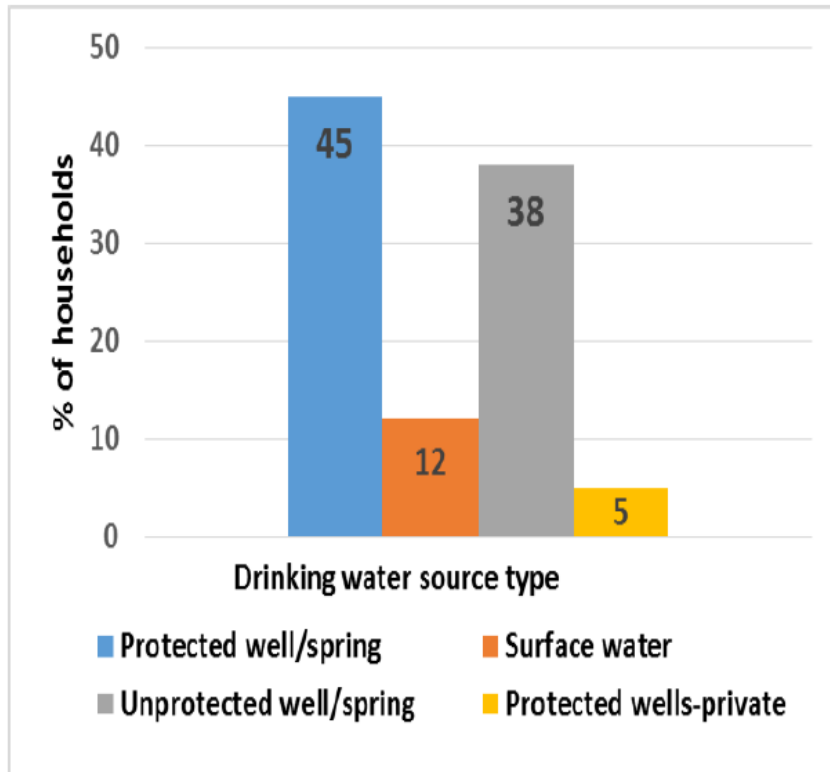
Systems concept of ZEF WATSAN-Agriculture research: Conceptual framework



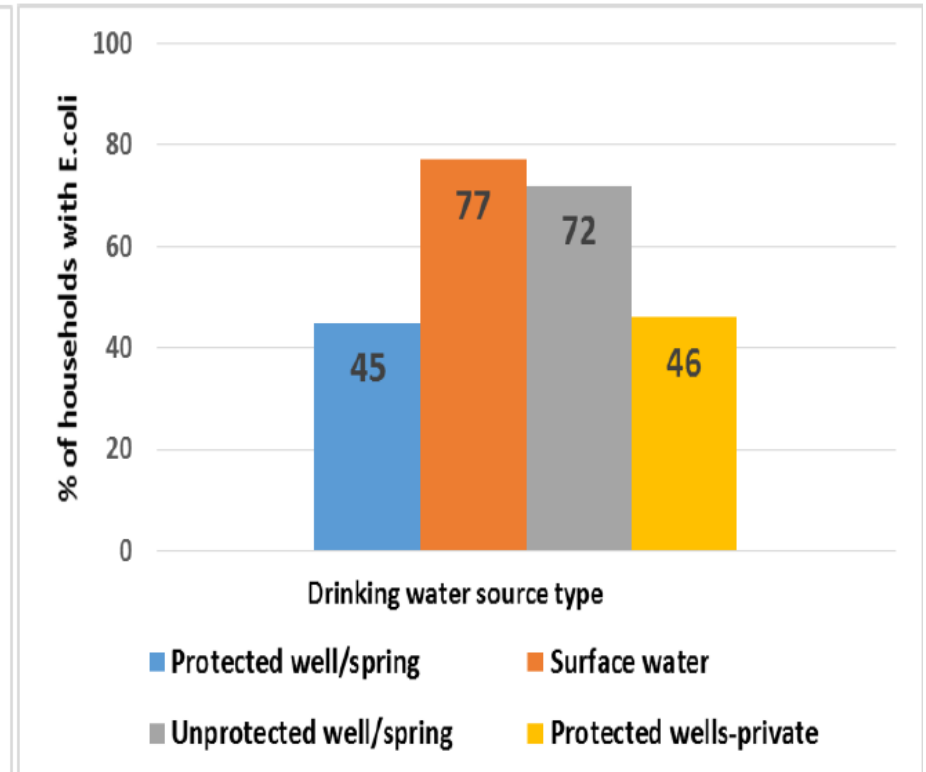
ZEF study: Ethiopia

What is the impact of drinking water quality and sanitation behavior on child health outcomes in rural Ethiopia?

Share of households by drinking water source

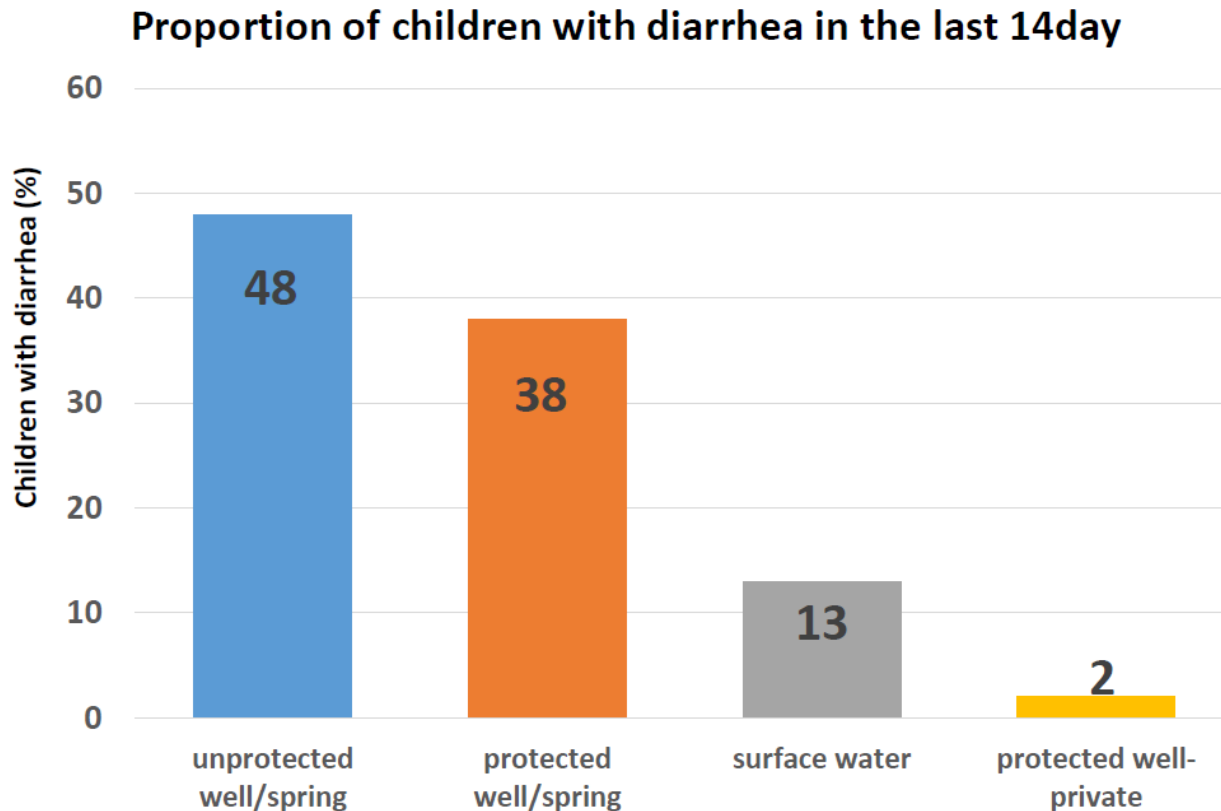


Proportions of households with E.coli by drinking water source



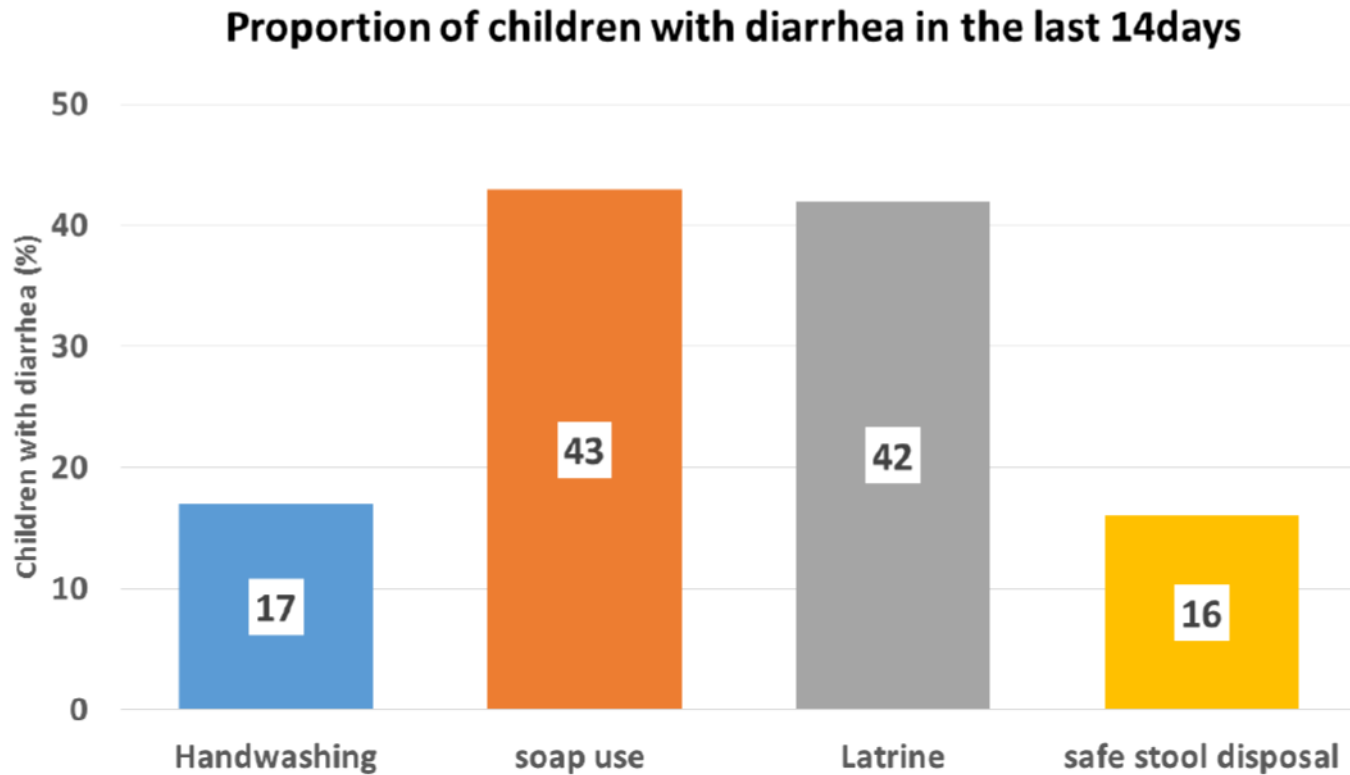
ZEF study: Ethiopia

Impact of drinking water quality on child health outcomes



ZEF study: Ethiopia

Impact of sanitation behavior on child health outcomes



Wastewater for irrigation (in India)



Diarrhea Prevalence (%)- Under 5 Children by Irrigation area, Sanitation and Handwashing (in India)

| Diarrhea Prevalence (%)- Under 5 Children | | |
|---|------------|----------|
| Irrigation water | Freshwater | 5 |
| | Wastewater | 10 |
| Improved Sanitation(JMP Definition) | Yes | 4 |
| | No | 10 |
| Handwashing with soap | Yes | 4 |
| | No | 10 |
| Total Prevalence | | 7 |

Engaging new actors: Ghana school children



ZEF study: Ghana

Water testing and information experiment

🗣️ **Water Testing and Information Experiment**

- Water testing toolkits (Acquagenx's Compartment Bag Test (CBT))
- Water quality improvement messages

🗣️ **Research Design**

- Cluster-randomized controlled trials design
- Public basic schools and communities
- Time frame: 2013-2015
- Third party randomization

🗣️ **Sampling Procedures and Sample Size**

- 2 districts (1 rural; 1 urban)
- 16 public basic schools (4 child treatment; 4 child control; 4 adult treatment; 4 adult control)
- School children representing households
- 512 households

ZEF study: Ghana

Table 2: Differential Impacts on Safe Water Behaviors cont'd

| Dependent variable: | Safe water behaviors | | | | | |
|---|-------------------------------------|------------------|---|------------------|---|------------------|
| | Improved main general purpose water | | Household use sachet water as the main drinking water | | Surface water as main drinking water source | |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Panel A. ITT Estimation | | | | | | |
| Child treatment | 0.165*** | 0.138*** | 0.058* | 0.079*** | -0.110*** | -0.078*** |
| | (0.039) | (0.039) | (0.032) | (0.030) | (0.026) | (0.026) |
| Adult treatment | -0.024 | -0.025 | -0.012 | 0.017 | 0.007 | -0.018 |
| | (0.039) | (0.041) | (0.029) | (0.030) | (0.032) | (0.032) |
| Household Controls | No | Yes | No | Yes | No | Yes |
| Observations | 964 | 905 | 960 | 901 | 960 | 901 |
| R-squared | 0.022 | 0.100 | 0.005 | 0.157 | 0.016 | 0.127 |
| Mean (SD) of dependent variable in the comparison group | 0.479 (0.500) | 0.479 (0.500) | 0.169 (0.375) | 0.169 (0.375) | 0.196 (0.397) | 0.196 (0.397) |

Source: Charles Y. Okyere

ZEF study: Ghana

Preliminary conclusions

- Water quality testing and information could be used as “social marketing” strategy
- School children could be used as “agents of change”

MDG Target 7.C: “Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation”

- **“The world has met the target of halving the proportion of people without access to improved sources of water, five years ahead of schedule.**
- Between 1990 and 2015, 2.6 billion people gained access to improved drinking water sources.
- Worldwide 2.1 billion people have gained access to improved sanitation. Despite progress, 2.4 billion are still using unimproved sanitation facilities, including 946 million people who are still practicing open defecation”

<http://www.un.org/millenniumgoals/environ.shtml>

The meaning of having reached the water target is questionable (data inconsistent and indications from surveys)

SDGs Goal 6. Ensure availability and sustainable management of water and sanitation for all

- 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all
- 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
-
- **The agenda implies huge investment in infrastructure and behavioral change.**
- **Infrastructure improvement is a necessary, but not sufficient indicator.**
- **Keeping half of waste water untreated is inconsistent with the other goals.**
- **Actual household and community level water and sanitation quality assessment is called for.**