Foundations of Global Health

Environmental Health: Part 2

Water, like religion and ideology, has the power to move millions of people. Since the very birth of human civilization, people have moved to settle close to it. People move when there is too little of it. People move when there is too much of it. People journey down it. People write, sing and dance about it. People fight over it. And all people, everywhere and every day, need it.

—Mikhail Gorbachev

Learning Objectives

- Identify major categories of water use
- Identify water access goals
- Describe water ladder
- Identify examples of water sources
- Identify regions with highest water consumption, greatest water scarcity

Scope of the Problem

- 884 million people lack access to improved water
- 2.6 billion people lack access to improved sanitation
- Access to piped water through household connections
  - Developed nations: 99%+
  - Developing nations: urban (73%) vs. rural (31%)
    - Sub-Saharan Africa: urban (35%) vs. rural (5%)

Freshwater

- Only 2.5% of world’s water is freshwater, and 2/3 of that is in glaciers
- Main sources of freshwater: rain, surface water (risk of pollution), ground water (wells)
- 70% of water used for irrigation in agriculture

Water Pollution

- Agriculture, cities, and industry are enormous consumers of water
- Becoming more and more polluted from pesticides, chemicals, oil spills, and sewage—water less suitable for human consumption and agricultural use
- Continually recycled in the environment by evaporation and rain

Water More Deadly Than Atom Bomb

Water: water, everywhere. And all the boards did shrink; Water, water, everywhere, Nor any drop to drink.

—Samuel Coleridge (1772-1834). The Rime of the Ancient Mariner.
Warning Signs

Personal Water Needs
- Drinking
- Cooking
- Hygiene (hand-washing and bathing)
- Cleaning (clothes, pots, homes)

Water = MDGs

Water Access Goals
1. Quality
2. Quantity
   - Minimum 15-20 liters:
     - 1.3 for drinking
     - 2.3 for cooking
     - 6.7 for hygiene
     - 4.6 for laundry
3. Proximity
   - Women and children may spend several hours each day fetching water
4. Reliability
   - System can be maintained; appropriate technology
5. Cost

Water Access
- About 20% of people have no access to water services
  - May have <5 liters/person/day
  - Nearest water source >1km away
  - Quality not assured
  - Very high likelihood of health problems
- Limited access in Africa, Middle East, and parts of Asia & Latin America

Drinking Water Coverage
Countries in sub-Saharan Africa face the greatest challenges in drinking water

Figure 22: Drinking water coverage, 2006
**Disease Burden**

- Diseases contributing to the water, sanitation, and hygiene-related disease burden

**Sewer Water**

- Quality of surface water (rivers, lakes, etc.) suffers when there is limited sewage treatment
- May contaminate drinking water sources
- Largely impacts poor people

**Diarrheal Deaths**

- Water ladder
  - Improved
    - piped water
  - Other improved
    - public tap, standpipe, protected wells, rainwater collection systems
  - Unimproved
    - unprotected well, spring, tanker truck, surface water

**Good News**

- 87% of world’s population uses drinking water from improved sources
- 54% of population has piped water into household or yard

**But... Some Still Drinking Dirty Water**

- 884 million people – 37% of whom live in Sub-Saharan Africa – still use unimproved sources for drinking-water

Source: WHO & UNICEF. Progress on Sanitation and Drinking Water, 2010 Update.
Other Improved Sources

- **Middle** of the water ladder
- Drinking water likely to be protected from outside contamination, particularly fecal matter
- Includes public taps, rainwater collection, protected dug wells, etc
  - Does NOT include piped connections into dwelling, plot or yard
- Populations in Southern Asia rely heavily on these water sources

Unimproved Sources

- **Lowest rung** of the water ladder
- Drinking water **not protected** from outside contamination
- Unprotected dug wells or springs, cart with small tank/drum, bottled water, tanker truck, and surface water
- Sub-Saharan Africa has largest population using these sources

Time, time, time

- Millions of people do not have water in the home or nearby & must travel to collect it
- May determine if a household can collect **enough water** to maintain daily needs
- Water collection is TIME consuming:
  - Travel to source
  - Wait in line
  - Fill containers
  - Return home
- MDG indicator doesn't measure for time taken to collect water

Bringing Home The Water

- Women shoulder the largest burden in collecting drinking water

Empowering Women

In Practice...

In Bangladesh, only women tend to remain in the home during the day and it is not normally acceptable for men to visit who are not part of the close family. Since men have traditionally been engaged as pump repair mechanics, this has made repairing household handpumps problematic. Through UNICEF-supported community-based training of women as pump mechanics, handpump maintenance has improved. The women mechanics have also gained an opportunity to earn income and see their status in the community rise.
Largest Consumers

Stress on the System

Population Stress: Viva Las Vegas

Water Scarcity

Drinking Water: On Target

We can change the names in this sad story. Somalia. Chad. Israel. The occupied Palestinian territories. Nigeria. Sri Lanka. Haiti. Colombia. Afghanistan. All are places where shortages of water contribute to poverty. They cause social hardship and impede development. They create tensions in conflict-prone regions. Too often, where we need water, we find guns..." - Ban Ki-moon (UN Secretary General, 2008).

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Note: Fragile states are low-income countries that score below a threshold on the International Development Association's Country Policy and Institutional Assessment, a tool used to assess the quality of country policies. The list is prepared annually. Source: Based on UN & UNICEF. Progress on Sanitation and Drinking Water: 2010 Update.
That’s A Lot of People…

How many people need to gain access to an improved drinking water source to meet the MDG target?

Population gain access to an improved drinking water source annually (2006-2015) to meet the MDG drinking water target.

Source: UNICEF, Joint monitoring programme for water supply and sanitation, 2015

In Comparison: U.S. Water Footprint

American water footprint per capita: 1,240 gallons per year

- Urine: 890 gallons
- Sweat: 180 gallons
- Food: 170 gallons

Water footprint per capita, m³ per year:

- 2,000 m³
- 1,000 m³
- 500 m³
- 100 m³

Other Water Issues: Privatization

- Who owns water?
- What happens when water rights are sold?
  - Example: Cochabamba, Bolivia
- Is water a commodity or a human right?
Other Water Issues: Dams

- **Positives:** generate clean electricity; increase cropland through irrigation; control flood hazards
- **Negatives:** decrease in biodiversity of plant, animal and aquatic species; more water loss through evaporation; water reservoir may contribute to disease transmission (malaria, schistosomiasis); displacement of human population

Three Gorges Dam

- **What:** largest hydroelectric dam in world
- **Location:** Yangtze River, China
- **Submerged:** 13 cities, 140 towns, 1352 villages, 657 factories & 30,000 hectares of cultivated land
- **People Displacement:** 1.3 million people relocated in 3 stages in 1997, 2003 & 2009
- **Energy Production:** Supply 11-15% of China’s energy

Environmental Refugees

- 30 million refugees due to natural disaster, drought, flood
- No “official” rights under international law
- Most acute in Africa

Practice Questions

- What % of world’s water is fresh? What is it mostly used for?
- Name the 5 water access goals.
- Describe the water ladder.
- What percent of population drinks from improved water source? How many have access to piped water?
- Name one type of source from each rung on the water ladder.
- How does water collection times impact families?
- Who are the largest water consumers?
- Who owns water?
- How can dams HARM an ecosystem?

In Summary

- Fresh water necessary for daily life—basic human right, but in many regions it is scarce, polluted
- Water collection has significant impacts on women
- Growing stress on water systems, scarcity will influence stability of nations
- World is on track to meet MDG targets for water
- Access to basic water and sanitation has impact on economic development & poverty cycle