Tropical Environmental Health
182-626
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What is “Tropical Environmental Health?"

• Is environmental health different between tropics and temperate zones..?
• OK, then what conditions should we examine, rural and/or urban ?
• What are the important health issues and what health conditions cause these problems?
Classification of diseases

- Waterborne diseases
- Water based diseases
- Water-washed diseases
- Diseases of defective sanitation
Waterborne Diseases

- From what sources do people get water?
- If water is polluted, with human or animal excrement......
- *Enteritides*: *Vibrio cholerae*; *Salmonella spp.* Various variants of *E. coli*. Enteroviruses, polio, norwalk etc.,
Water based diseases

- Diseases acquired when people are exposed to natural water.
- Schistosomiasis
- Guinea worm (*Dracunculus medinensis*)
- Cholera and other waterborne pathogens
- Malaria, and other mosquito-borne diseases
Water washed diseases

- Diseases/infections acquired because of insufficient water available.
- Contaminated clothing: scabies, lice, louse borne diseases e.g typhus,
- Unwashed cooking utensils: enteritides
- Unwashed bodies, skin rash, degenerate life conditions....
Diseases of defective sanitation

- Faeces in water: bacterial and viral enteritides, schistosomiasis, fish tape worm.
- Cysticercosis: from pork tape worm.
Latrines and Education

Another School Barrier for African Girls: No Toilet
By SHARON LaFRANIERE (NY Times: 23 Dec: 2005)

BALIZENDA, Ethiopia - Fatimah Bamun dropped out of Balizenda Primary School in first grade, more than three years ago, when her father refused to buy her pencils and paper. Only after teachers convinced him that his daughter showed unusual promise did he relent. Today Fatimah, 14, tall and slender, studies math and Amharic, Ethiopia's official language, in a dirt-floored fourth-grade classroom.

Whether she will reach fifth grade is another matter. Fatimah is facing the onset of puberty, and with it the realities of menstruation in a school with no latrine, no water, no hope of privacy other than the shadow of a bush, and no girlfriends with whom to commiserate. Fatimah is the only girl of the 23 students in her class. In fact, in a school of 178 students, she is one of only three girls who has made it past third grade.

But that impact is substantial. Researchers throughout sub-Saharan Africa have documented that lack of sanitary pads, a clean, girls-only latrine and water for washing hands drives a significant number of girls from school.

*The United Nations Children's Fund, for example, estimates that one in 10 school-age African girls either skips school during menstruation or drops out entirely because of lack of sanitation.*

Latrine facilities cannot function without maintenance and toilet paper.
Dispersal and prevention
What about the pit-latrine, is this a solution to the problem of faecal disposal?
Alternative Pit Designs

- **Circular pit with brick lining**
  - 400-600 mm joints laid with mortar
  - Open joints

- **Round pit with partial lining of tree limbs**

- **Bored pit with concrete lining**

- **Unlined pit**
  - Soil dug from pit
  - Squatting plate
  - Concrete on soil cement

- **Square pit with partial concrete-block lining**
  - Squatting plates
  - Lean concrete backfill

- **Raised pit latrine for use in areas of high groundwater table**
  - Ground level
  - Built-up plinth
  - Sealed brickwork
  - Open brickwork

Source: Top, adapted from Wagner and Laneix (1958); bottom, World Bank.
What about the superstructure? Which is best?

- Mud and wattle walls and palm thatch roof
- Timber walls and corrugated iron or asbestos-cement roof
- Brick walls and tile roof (an alternative is concrete block walls and corrugated iron or asbestos-cement roof)
- Rough-cut tree limbs and logs
Exploded schematic diagram of ferrocement spiral VIP latrine.
An early example of the Blair Pit Latrine
Looking inside the toilet: although this one has a door, one can see the interior is clean and hygienic.
Building Your Latrine

YOU WILL NEED
500 bricks
5 bags cement
sand & stone chips
reinforcing wire
flyscreen gauze
helpers, tools

1. Dig the Pit
2. Brick Lining
keep the walls straight
leave spaces between bricks to allow waste to drain

3. Brick collar
Provides:
- strong foundation for cover slab
- airtight seal under slab

4. Mark out concrete cover slab
5. Make concrete cover slab

6. Lift concrete cover slab onto brick collar

7. Make brick foundations
   - Entrance width: 2 ft
   - Backfill: drop, soil, half bricks, vent hole

8. Make the latrine floor
   - Slab floor towards hole
   - Use: part cement, part sand

9. Complete the walls

10. Make roof slab
    - Slab thickness: 2"
    - Use: part cement, part sand, chicken wire

11. Lift roof slab

12. Fit the flyscreen

13. Care for your latrine well
An example of the pit, and toilet slab ready to be put in place
A simple floor plan, bricks in a spiral
Another spiral, (sort of) with the vent outside, and most of the weight of the building away from the pit.
The gauze screen at the top of the flue: essential for fly control
This is one complete and ready for use... after you?
Biological control of flies: a gecko on the screen
A rustic pair, vakadzi/varume
Final acceptance: the latrine is in the compound!
For mass production, forms can be made, and plastered to be the latrine
Concrete slabs can be fabricated on the spot: this is about 4 inches deep and reinforced.
See the plastered walling with chicken wire reinforcement. (side view!)
Alternate slab design, this is curved and supposedly does not need reinforcement!
Here you see one “in situ”: note the closure, could a child lift it??
Alternative designs:

The Vietnamese double vault.

Water seal in position  
Flushing

The Watergate flushing pan (from 1008)
A mechanized “pour-flush” system designed at Blair Research labs
Pour-flush design: this fits over a pit: a water seal is supposed to form to prevent odours
It works something like this, which is an indoor version. Rarely seen, strongly smelled.
So where does all the effluent go?