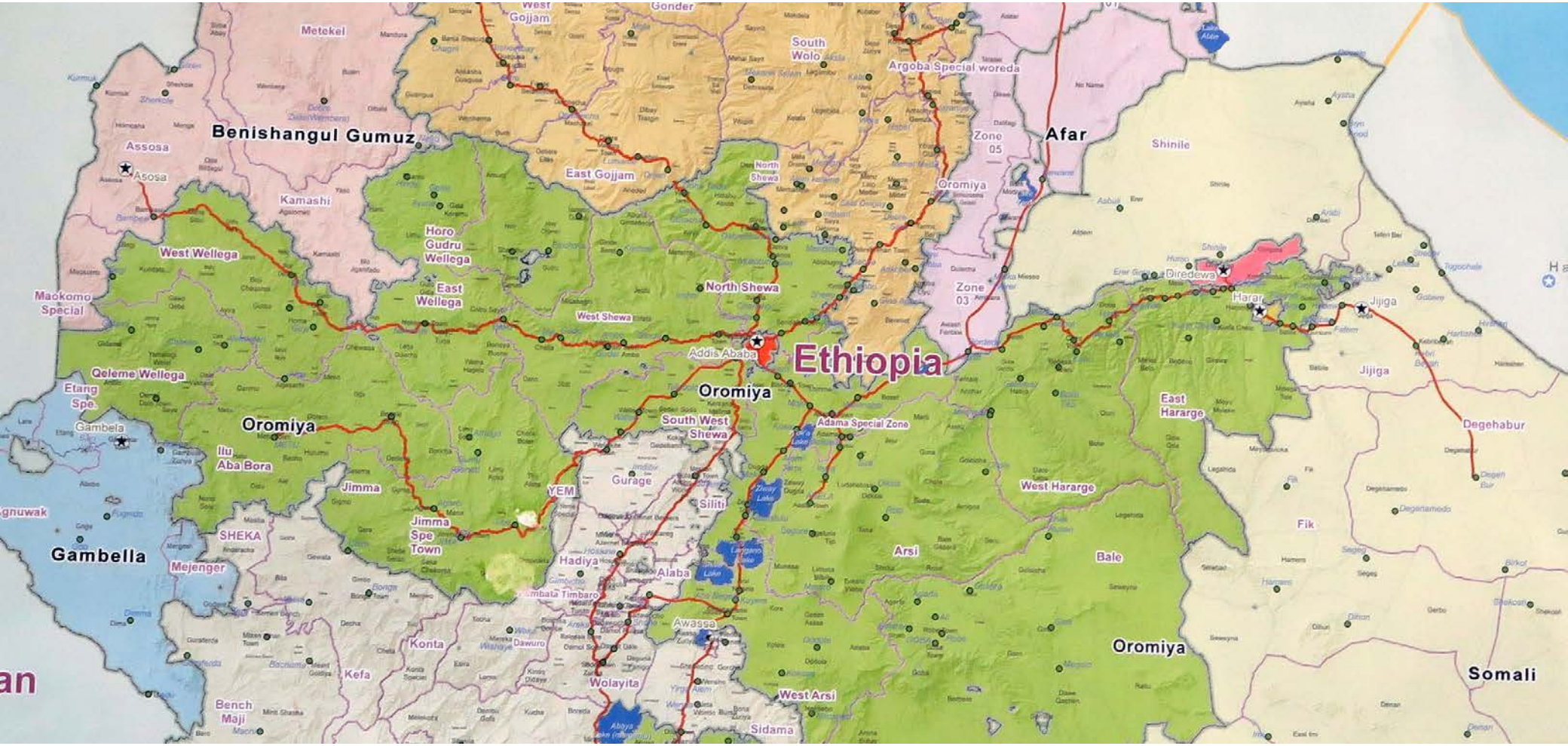
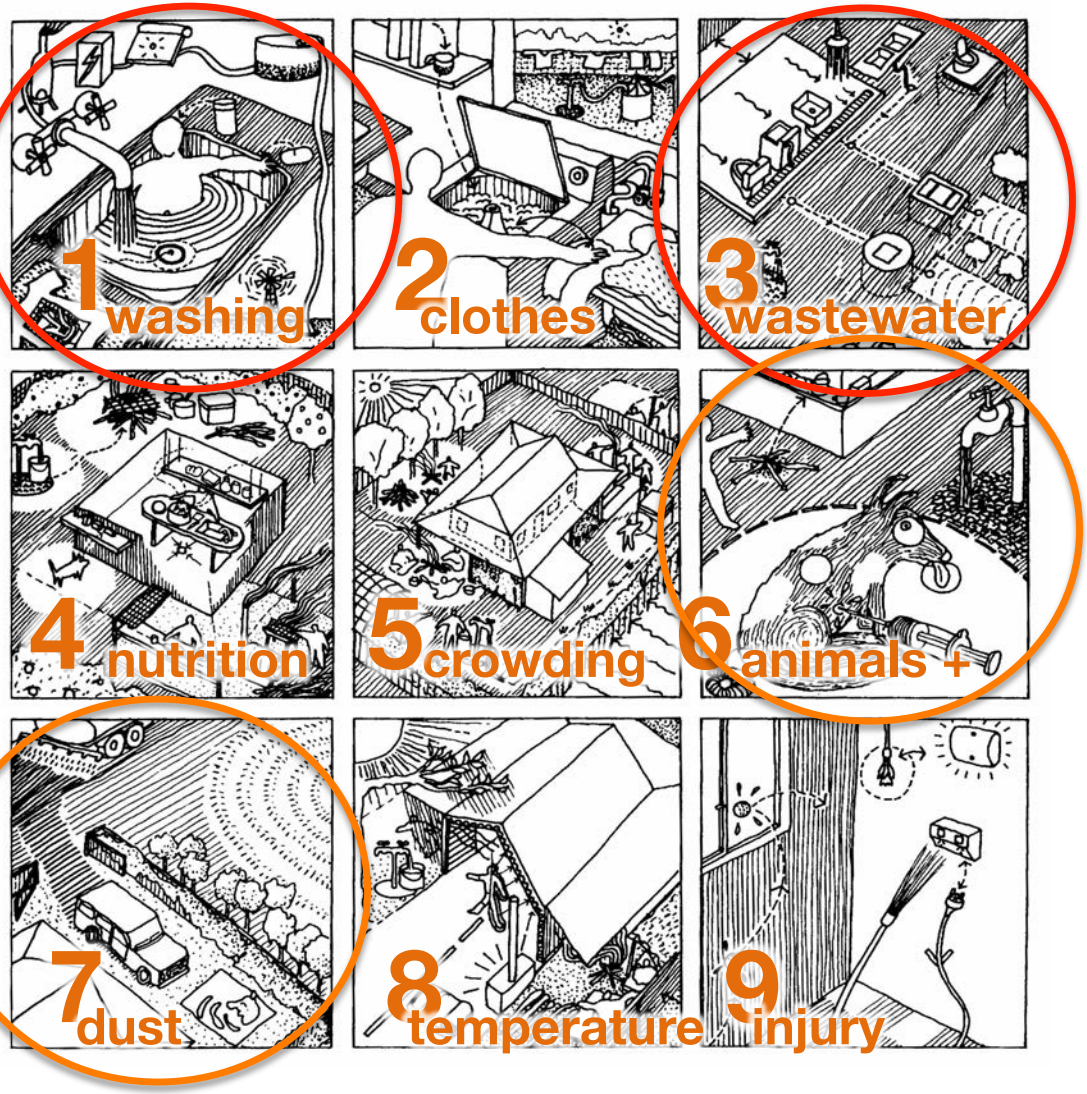
Reducing trachoma
by improving the living environment in Ethiopia



Healthabitat was invited by The Fred Hollows Foundation (TFHF) to advise on parts of the SAFE program, related to the ability to carry out face washing and the condition of living environment, to help eliminate trachoma in the Oromia region of Ethiopia. This report summarises a short visit to the project made in August 2014.

SAFE = Surgery, **A**ntibiotics, **F**ace cleanliness & **E**nvironment



In Ethiopia the WHO endorsed implementation of SAFE (surgery, antibiotics, facial cleanliness, and environmental improvement) strategy using Azithromycin for Mass Drug Administration (MDA) was initiated in 2001(1). However, the F & E components have not been given adequate attention with the assumption that the government or the WASH sector would take care of it. The emphasis was on surgery and years of mass drug administration. To date, over 100 million doses of Azithromycin have been administered (2, 3). Only less than 10 woredas (districts) graduated, reaching elimination levels, following implementation of such an incomplete but huge and resource intensive undertaking for over a decade (4). This finding is in agreement with the evidence that suggests that in highly endemic areas, such as Ethiopia, sustainable control of blinding trachoma is not possible without improvement to the WASH-related environmental factors that contribute to transmission (5,6).
(extract from WASH – Tra Concept note)

The Nine Healthy Living Practices (left) indicating the 4 HLPs that will form the core of improving the Face washing and Environment components of SAFE.

1) Washing people, (particularly children's faces), once a day
3) Removing wastewater safely
6) Reducing the impact of flies
7) Reducing dust

Background - The Fred Hollows Foundation work in Ethiopia

The Fred Hollows Foundation

2014 Country Brief: **Ethiopia**

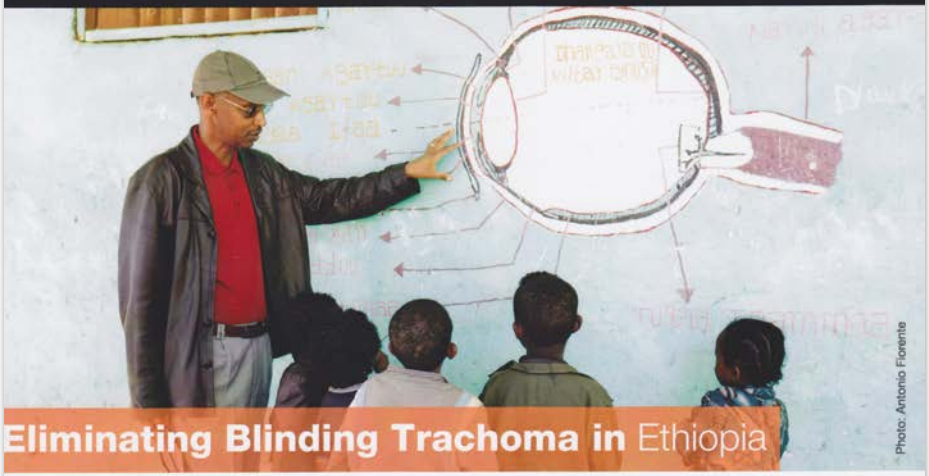


Photo: Antonio Fiorente

Eliminating Blinding Trachoma in Ethiopia

Trachoma is a debilitating eye disease that can slowly and painfully lead to blindness. The disease contributes to a vicious cycle of poverty and infection; poor living conditions lead to disease and disease leads to further disadvantage.

Ethiopia has the highest burden of blinding trachoma in the world. More than 76 million people are living in trachoma endemic areas and 800,000 people are at risk of blindness.[1]

The Fred Hollows Foundation is working as part of a global effort to eliminate trachoma and end this form of avoidable blindness.

1/3 of the world's trachoma burden is in Ethiopia[1]

27 million people are at risk of trachoma in Oromia[1]

US $0.27 the cost of antibiotics for one person[1]

US $46 the cost of lid surgery for one person[1]

Trachoma in Oromia

In Oromia, 27 million people are at risk of contracting trachoma. In 225 of this region's 265 rural districts, the disease is confirmed to be endemic. In more than 40% of districts it is hyper-endemic and will require a minimum of five years of intervention to eliminate.

Such a high burden of trachoma severely degrades the quality of life of those affected and their communities. People who suffer eye damage and blindness as a result of continued infection are often unable to carry out productive work and are reliant on the care of family members. This task often falls to girls, who then miss out on education.

Tremendous progress has been made in controlling trachoma in Oromia, but much ground must be covered to completely eliminate the disease.

Photo: Antonio Fiorente

Our Objectives

As part of our global efforts to eliminate this disease, The Foundation is tackling trachoma in Oromia, one of the worst affected areas in the world.

Working under the lead of the Oromia Regional Health Bureau, we are targeting the elimination of trachoma by 2020.

Reaching this target will bring Ethiopia closer to achieving the Millennium Development Goals. Eliminating the disease will reduce morbidity, mortality and disability. This improvement in people's health will help address factors that keep them in a state of poverty.

A Coordinated Approach

Treating people with the disease is relatively cheap and simple. Eliminating trachoma is more difficult, but it is within our reach.

To achieve this, the Oromia Regional Health Bureau is coordinating the roll out of the World Health Organization's S.A.F.E. strategy, which is designed to treat the disease, stem its spread and prevent it from reoccurring. Successful implementation of this strategy requires the expertise, commitment and resources of a range of actors, including development organisations from the water, sanitation and hygiene sector, as well as regional and local governments.

An action plan is in place to guide and coordinate these organisations. Our contribution includes increasing antibiotic distribution to all endemic districts and stepping up the number of annual surgeries carried out on people with advanced scarring of the eyelid. We also promote face washing and help improve access to safe water and latrines.

What is needed now is a massive scale-up of the S.A.F.E. strategy, as well as sustained support through to 2020.

S SURGERY to prevent blindness by correcting in-turned lashes

A ANTIBIOTICS to treat active infections

F FACIAL cleanliness to stop infections spreading

E ENVIRONMENTAL improvements so people have better access to water and sanitation

Where we work

$71.8 million to eliminate trachoma in Oromia by 2020[1]

$36.3 million to provide 27 million people with antibiotics[1]

$6.4 million to provide surgery for 170,000 people[1]

$28 million to improve hygiene, water and sanitation[1]

Our Targets in 2014

Support 18,980 trachoma lid surgeries

Administer 5,200,536 doses of antibiotics

References

1. Oromia Regional Health Bureau (Ethiopia). Trachoma Action Plan, Achieving elimination of blinding trachoma by 2020. 2013.

The Fred Hollows Foundation is an international development organisation, focusing on blindness prevention and Australian Indigenous health. We are independent, not-for-profit, politically unaligned and secular. We are inspired by the life and work of Professor Fred Hollows (1929-1993), an internationally acclaimed eye surgeon and an activist for social justice who championed the right of all people to high quality and affordable eye care and good health.

Ahmed Abajobir | Ethiopia Country Manager
The Fred Hollows Foundation Ethiopia
PO Box 23360/1000, Addis Ababa, Ethiopia
www.ethiopia.hollows.org | Email: ethiopia@hollows.org

The Fred Hollows Foundation

Some key facts about the zone, district and village visited

Oromia
2m people
Zone office

Kuyu district (woreda)
150,000 people
District office
Trachoma prevalence
(TF) = 47.1%
>15 yrs TT =.6%
% access to improved water = 41%
% access to water < 1km = 44%
% access to sanitation OK=2%

Briti (kebele) village
10,000 people
Village office
3 wells inspected

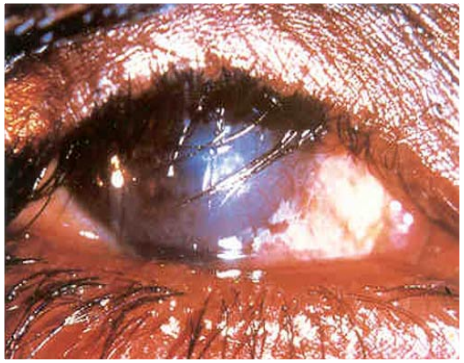
Summary: suggestions / recommendations

Water
1) Based on information supplied, there is currently a lack of water supply to achieve the required 20 litres / household / day
2) Assuming this base level of water supply can be achieved, by the zone and district resources, a day to day sustained water supply, and the consequent health benefits, will most likely be achieved locally, at the village level. The focus of future trial programs, training, management, economic structure and planning should start at the village level.
3) Water supply monitoring, at the village level, will be essential for assessing the health benefits of water and the impact of available washing on trachoma.
4) Establishing standard, repeatable measures of the effectiveness of water provision, water use, effective sanitation and improved environmental conditions will be important if the Face cleanliness & Environmental improvement. components of SAFE are to gain at least the equivalent funds of the more easily quantified activities of Surgery & Antibiotic distribution.
5) Mapping of water supply points and the surrounding population should be started in one village to link water supply, use and population.
6) Monitoring of flies should commence using a standard method, in at least one village. This can be used as one surrogate measure of sanitation improvement.
7) Monitoring of airborne dust should commence using a standard method in at least one village (lower priority). This can measure environmental change.

Sanitation,
1) The ability to dispose of human waste safely appears to be currently non-existent in the village visited. Model projects should be established at the village, district and zone ‘office’ level and schools to demonstrate working systems that are able to dispose of human waste safely.

'Thus, the continued provision of MDA cannot alone constitute an effective and sustainable approach to elimination of blinding trachoma. To quote WHO's GET 17 Report, "The F and E components of the SAFE strategy must be integrated into the overall strategy in a coordinated way with the involvement of all partners. ***WASH interventions are often perceived as complex, costly and infrastructure-based*** *but that is not necessarily the case if the right partners are involved, as shown by the examples of the Gambia and Ghana" (7).'*

Extract from
WASH-Tra: The way forward for a sustainable control of blinding trachoma
A concept note



Surgery and **A**ntibiotics

+

Face cleanliness & **E**nvironment improvement
(water for face washing & sanitation to reduce flies)

=

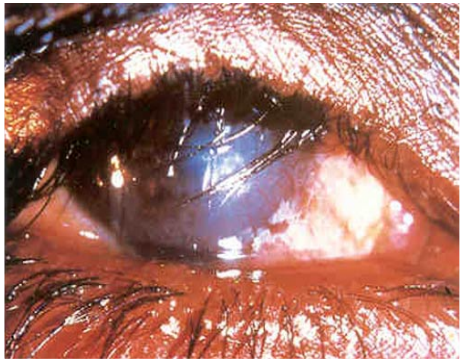
If it is clear that the long term effectiveness of surgery and antibiotics relies on face cleanliness and an improved living environment.

The budget for the F & E components of SAFE should be set at a level at least equal to the S & A components.

To secure the budget for, and to be able to 'compare' the F&E with the simply quantifiable S&A, **water availability, water use and sanitation gains will also need to be quantified by standard, repeatable methods.**

Other health benefits will also result in improvements in water use, sanitation and environmental improvement.

The FHF makes the strong point that the combination of SAFE will reduce blindness *and* impact on all aspects of peoples lives.



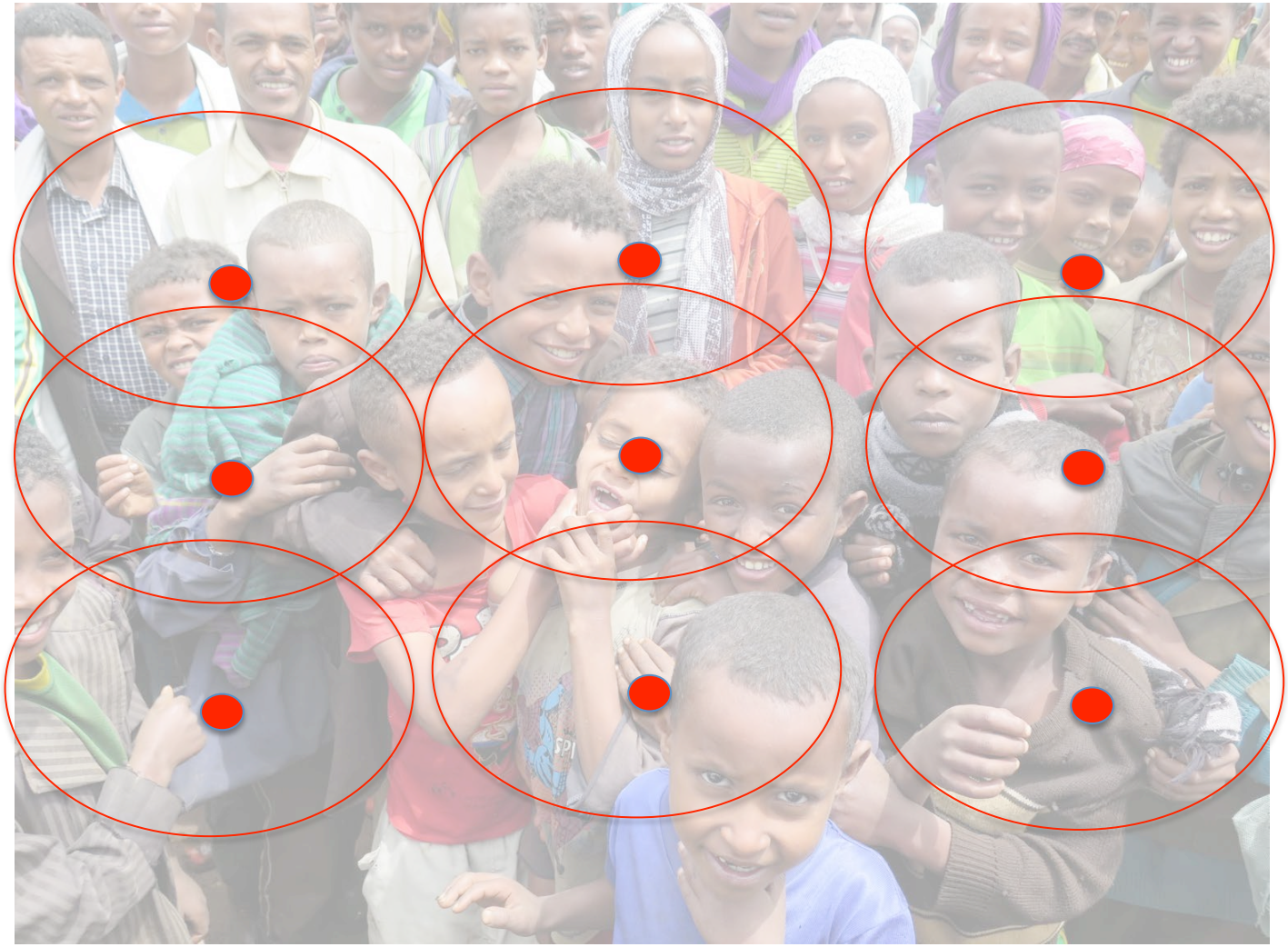
Surgery and **A**ntibiotics
US $65 / person

+

Face cleanliness & **E**nvironment improvement
(water for face washing and sanitation to reduce flies)
US $65 / person

=

Water distribution to people ?



Achieving ‘critical mass’ is essential

80% of children need to able wash their faces, 80% of the time

If only one child in the photo has access to face washing water and sanitation, many other children will still spread trachoma

One of the 10 wells and pumps provided by the zone and district

Water

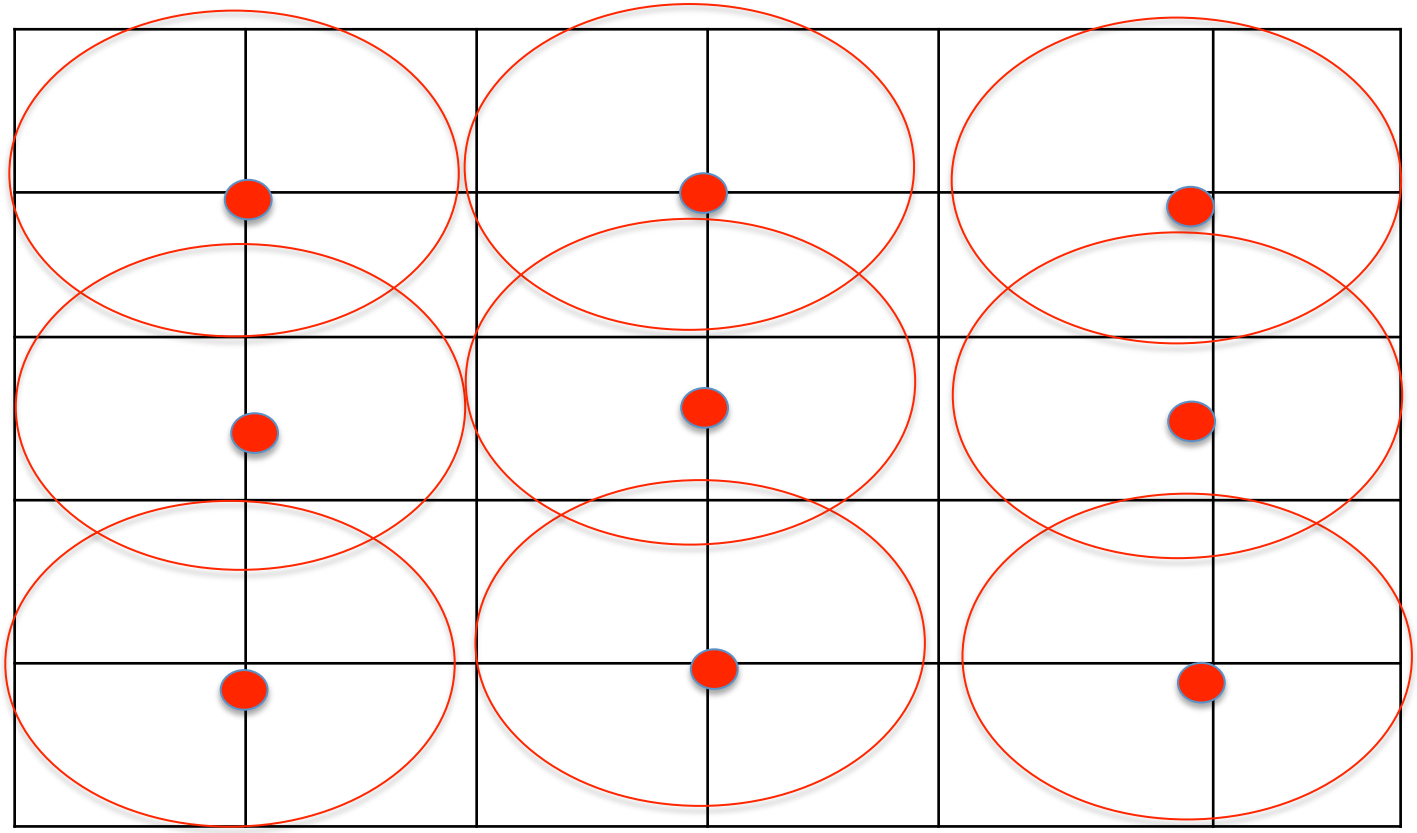
The provision of wells and pumps alone will not necessarily improve eye health.
Will water get to the faces of these kids?

From the brief village visit, there are currently no data that confirm the link between people and water.

- Volumes of water produced & distributed?
- Does the distribution of the water benefit all villagers?
- Is there a regular supply from the wells and pumps?

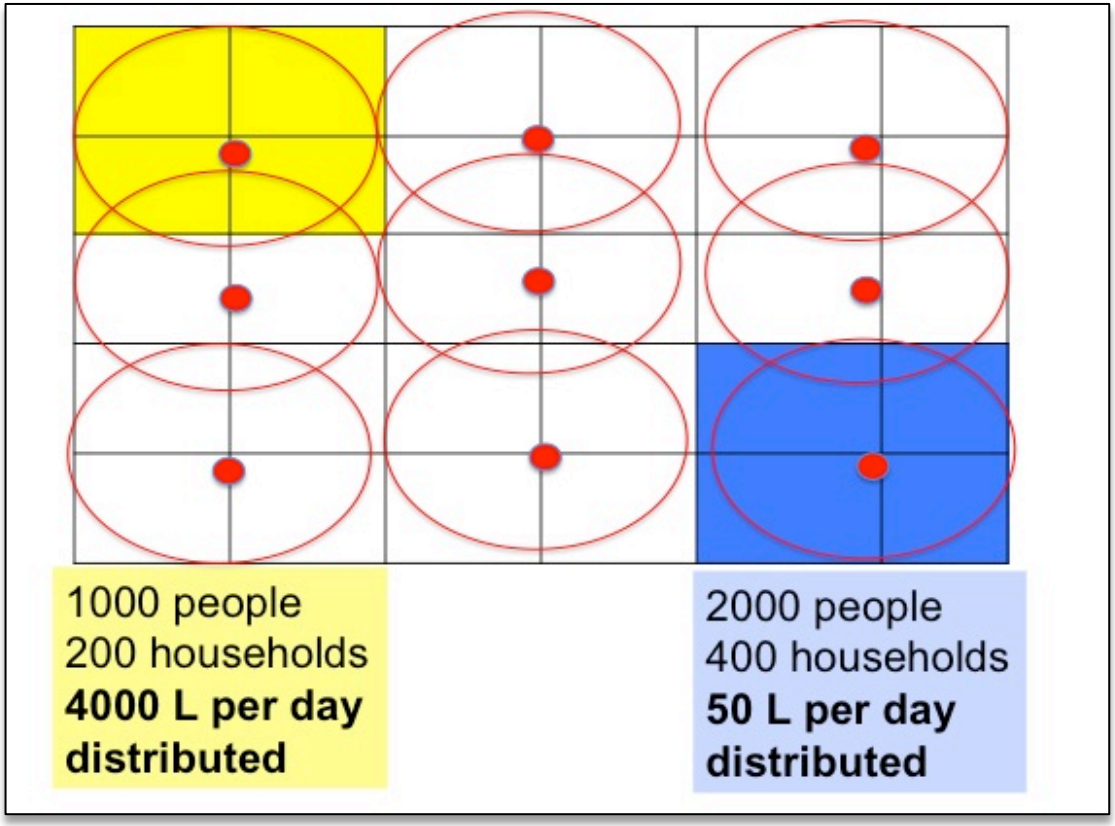
As the majority of the pumps and well points are new – this is an ideal time to make these connections.

Briti – water distribution



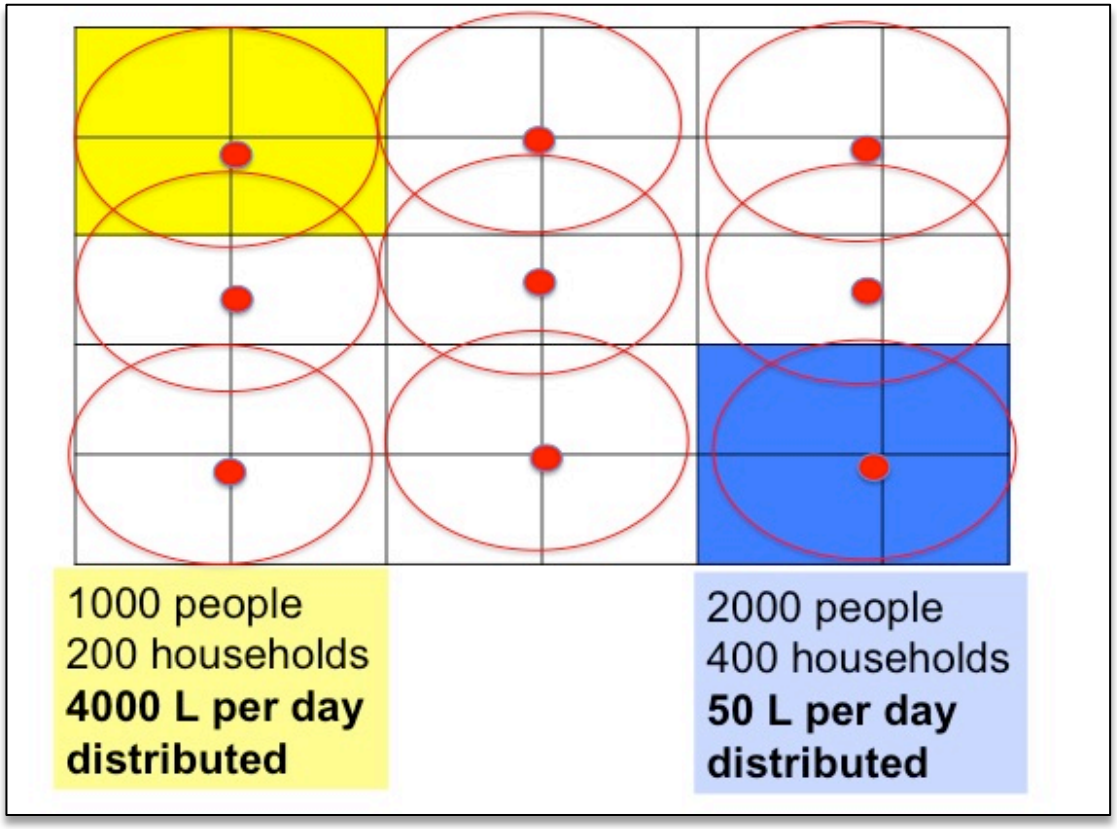
Based on the village area and well numbers:
The red dot indicate a water point and the light red line a 1 kilometre radius
An ‘ ideal’ distribution of 9 wells (10 wells available) across 3000 Ha (6 kilometres x 5 kilometres.
The Zone office noted that 90.9% of the population are within 1.5 km access to well point
As access to water has been defined within a 1.5km radius the gaps in the above diagram would be covered. However the unknowns that a trial project would need to map / define inlcude:

- Shape of the area ?
- Population pockets and well locations?
- Are all wells equally productive?



Whilst no water data are available, the above example could be happening despite the well numbers and prescribed distances all complying with guidelines.
Water may not be well distributed for the following reasons;

- Poor access to water, difficult terrain, long distance, poor location
- Limited hours of pumping available ,
- Pump failed due to lack of maintenance



IF water data *were* available regularly over a long period of time the above could be explained and used to make evaluation, management and planning decisions such as

- Evaluate overall village management of the water supply system
- Evaluate specific maintenance effectiveness and need
- Check water revenue compared to volumes distributed
- Direct future planning regarding well numbers and locations
- Have a water measure to compare to any measured health impact

Briti village water calculations

Water demand (based on available information from district and village)
10,000 people on 3000Ha

For 3 months of wet season + 2 after local office estimates 7,000 people use ponds and springs for water.
For 7 months of the year 10,000 people will still require well water.

Say 2,000 households each requiring 20L / day
Daily demand 40,000 L

Water supply
10 wells
Pump rate in height of wet season with new pumps around 20 litres in 1.5 minutes. Say in the dry season this rate drops to 20 litres in 2 minutes or **10 litres a minute.**

Pump points were opening on average **6 hours a day. (3 x am /pm)**
Assume some change over time between water collectors, the distribution rate is reduced to 5 litres a minute.
Then each day the water delivered per well = 360 minutes x 5 litres = **1,800 litres**

Therefore 10 wells will distribute 18,000 litres a day,
around ½ the required **40,000 litres per day calculated demand.**

If water meters were installed on all pumps, the data will confirm or refute these estimates.

Methods to increase water production in Briti village

Ways to better meet the gross water demand (this assumes the 20 L per household per day is a realistic minimum so the problem is not of demand management but increasing supply)

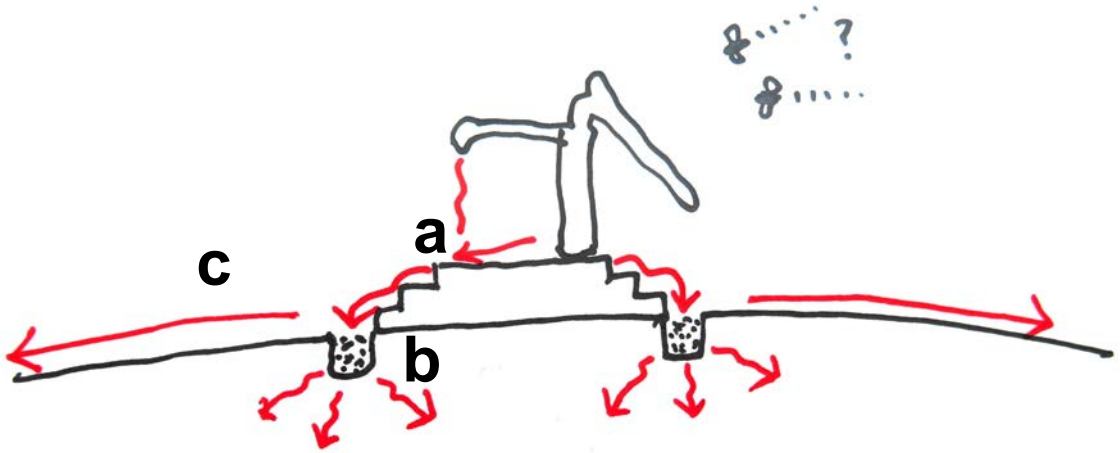
- **Increase the opening hours** of the water points in higher population areas. This extension of opening hours may occur naturally with local demand.
  Increasing opening times to 8 hours a day for all 10 wells would increase water supply to 24,000 litres from 18,000

- **Develop family water points** (rope pumps or alternatives) should be explored and trialed to evaluate
  - Capital cost of the pump and excavation for the well
  - Local ability to manufacture the pumps
  - Volumes of water delivered
  - Local acceptance
  - Maintenance levels and ease of local maintenance

- **Better management of springs and ponds** to increase there effective supply times. During the wet season + 2 months after it is estimated that 7,000 people (of the total 10,000) gain water from springs and ponds. Ways to increase their effective life could include lining ponds, building small spring dams, covering springs catch areas to reduce evaporation

- **Build more well points** (constructed by the zone and district). This is where water data would be invaluable to map the best location of the new wells to best serve the population.

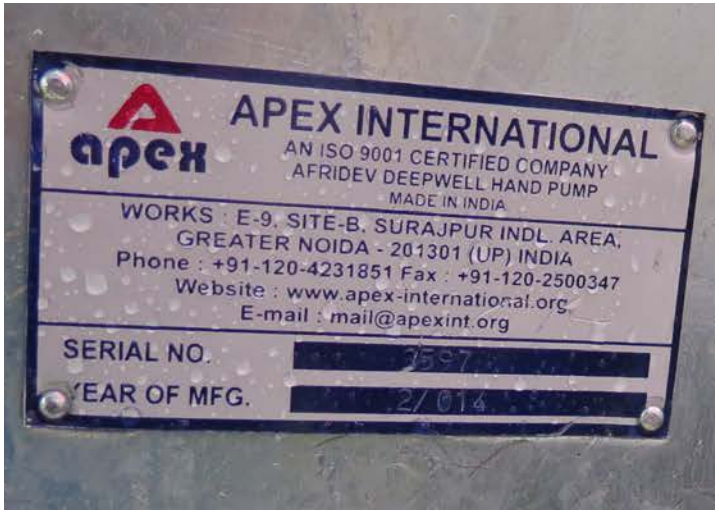
Detailed improvements to the water stations -
Pump point grading & drainage to reduce flies



a) Consider grading all concrete surfaces away from the pump stand during or after construction (mortar bed)

b) Gravel drain to soak water.

c) Crown general area to distribute water away from pump point



Detailed improvements to the water station -

Include the ability to clean water containers and reducing waste when filling containers

To improve water potability, consider a tethered brush, connected to the pump base, for householders to clean the water container before filling.

To reduce water wastage, consider a nozzle to the pump spout supply point to to better direct water into the containers and improve efficiency of delivery.

The volume of water pumped at each well point should be monitored - along with key condition items of each well point as measured by a standard repeatable test.

1) A water meter point at each pump is preferred for measuring water pumped from the source.
2) A stroke measurement device to count the number of time the pump handle is activated could be used BUT will be less accurate.
3) Alternate filling methods may be designed and added to each pump to allow a water meter to be used without restricting water flow or filling time
4) A mobile phone application could record the total daily water use from each pump and send the recorded data as a text message to TFHF in Addiss Ababa to collate.
5) Graphic condition assessments to record the conditions at each well point / water station should be developed with local workers (see Example 1 later)
6) The condition assessment should have standard yes / no answers, involve tests easily conducted by local workers and be repeatable without value judgement required (ie “Is the pump is dirty?” is NOT a good question as it requires a value judgement, whereas “Is the pump was surrounded by a fence that prevents all animals entering?” Is a better question as the fence can be checked for holes or gaps.
7) These condition assessments should allow for low literacy, be paper based to allow for early amendment and development and then, in the future, easily become a mobile phone application.

Ongoing management and maintenance of water facilities

Given the lack of observed or described systems to adequately detect maintenance problems and repair them, it is unlikely the water pumping facilities will continue to function.

Some preliminary suggestions include:

1) Capital works remain the responsibility of the district and zone. This includes the provision of the well points and pumps.
2) All water maintenance be considered a local (village) responsibility.
3) If water charging is introduced it should linked to actual water use, *not* pay per month by each household.
4) All water charges should be reinvested directly into into water production, distribution, management and maintenance staff. Water then becomes a local business with incentives for improving water stations to encourage custom.
5) The volume of water pumped at each well point should be monitored along with key condition items of each water point measured by a standard, repeatable test. (water pump OK, rate of water pumped per minute, graded surrounds OK, surrounding fence OK, pump handle lock OK, opening hours… etc)
6) Cyclical maintenance of pumps and well points be considered on an annual or 2 yearly schedule depending on the accumulated water data and known failure. Ideally this scheduled maintenance would be done during the wet season when there are more water options (ponds and springs) available.

Sanitation

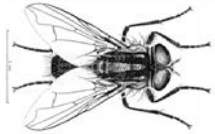
Given the lack of village sanitation facilities at a family level, for schools or at village, district of zone offices and the cost of establishing these facilities, the ‘gap’ role that the FHF could play in leading sanitation improvement should involve the following:

- Ensure that short term, poor quality, cheap toilet solutions, so commonly built by aid projects, are not allowed to compromise the safe disposal of human waste. Poor quality shallow latrines will not improve sanitation nor will they reduce flies. Possible solutions will include dry, in ground composting ventilated improved pit latrines with specific fly exclusion provision with associated hand washing, sited at least 100m from well points.
- Establish trial projects at village, district and zone office and several schools to act a s catalysts for local community members visiting these community service locations. As these are public facilities the trials must include provision for a paid worker to secure the facilities outside hours, and carry out regular cleaning and maintenance for at least 2 years after construction.
- These community toilets and hand washing points will introduce the benefits of removing waste safely and hand washing to a maximum of village members.

The current toilet facilities at district and zone offices.

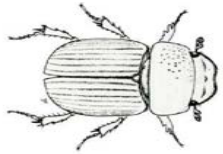
Fly monitoring as a measure of sanitation improvement success

1) Fly trap location points could be positioned at standard points around the village
2) Every week at the same time, traps could be baited and positioned on the location points for 1 hour
3) Fly counts could be recorded
4) If fly numbers are significant, assessment of the trachoma levels being carried by flies could be assessed
5) Fly reduction methods could then be implemented
6) As sanitation measures are implemented, fly number counts could be one measure of the success of sanitation in reducing trachoma



LEFT Fly trap on permanently location stand.

RIGHT and BELOW Dung beetles were released to eliminate the camel dung that was the main fly food source



Dust monitoring as a measure of environmental improvement

1) Develop strategies for dust reduction in the living environment
2) Establish dust monitoring points
3) Measure collected dust regularly to assess the effectiveness of environmental improvement

LEFT Typical simple dust monitor located in a predetermined grid around the village

RIGHT : a typical dust reduction measure uses earth mounds to reduce the volume of wind driven dust entering the living areas of houses and people's eyes.

EXAMPLE 1
The ongoing management and maintenance of water facilities

Examples of locally developed and implemented monitoring and maintenance systems to ensure ongoing function and health. These could be developed for pump, water point area and latrine maintenance and management.

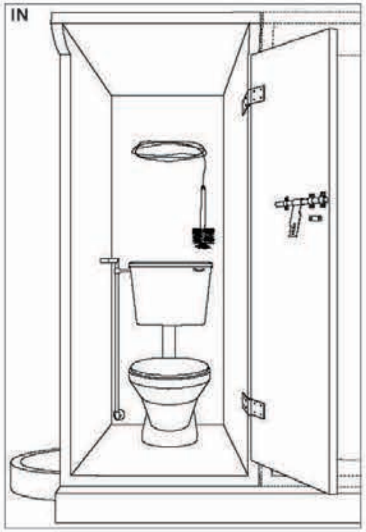
The systems were developed with local people and considered:

- Low literacy
- Limited access to technology including printing, copying and electronic media
- No regional support
- Making direct links between maintenance assessment and the work of local maintenance teams

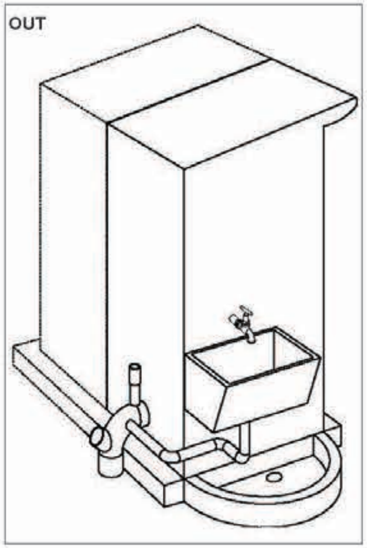
Community worker assessment sheet, South Africa

DATE:

IN



OUT



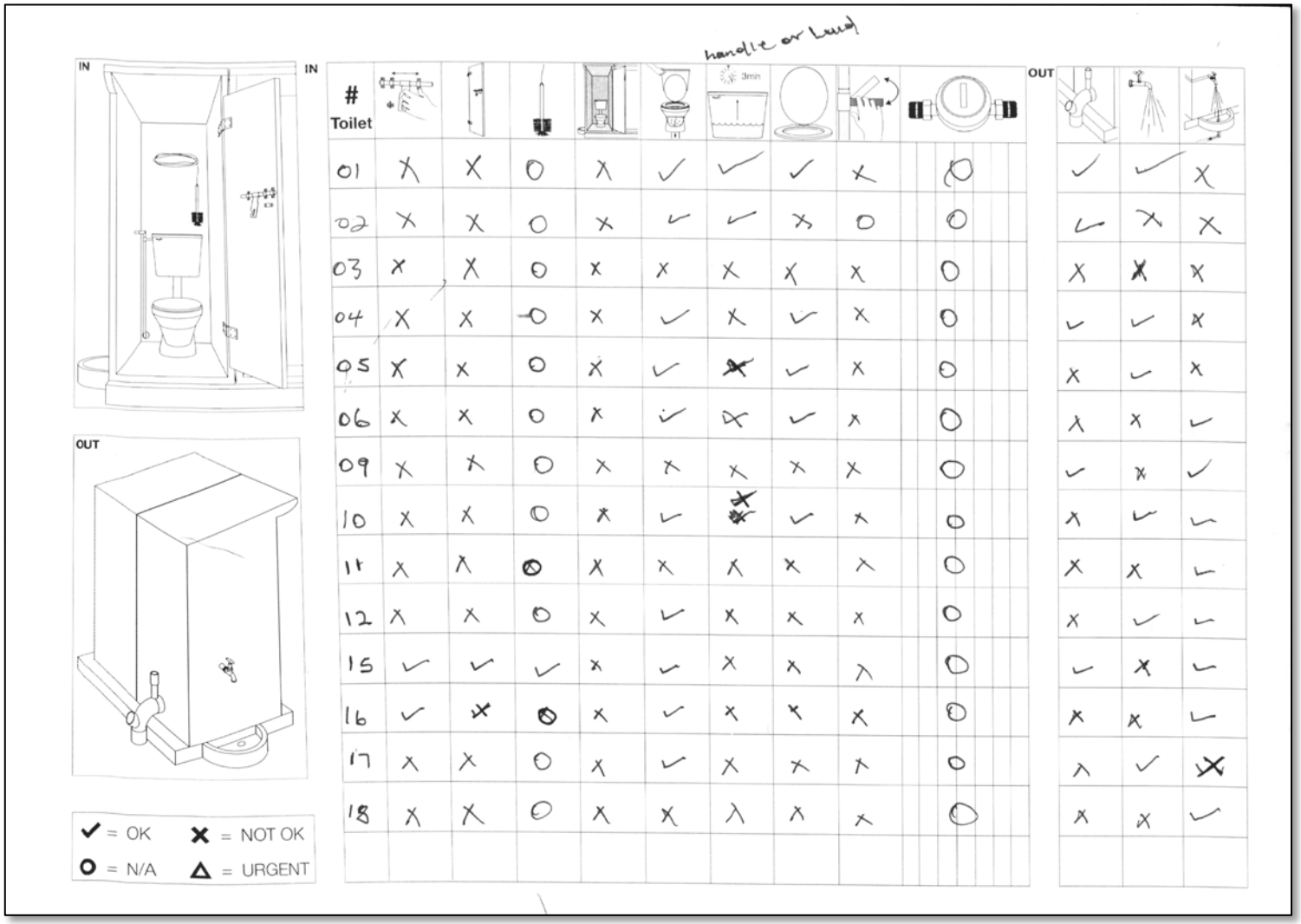
✔ = OK	✖ = NOT OK
O = N/A	△ = URGENT

IN

# Toilet									

OUT

Completed WASSUP team assessment sheet, South Africa



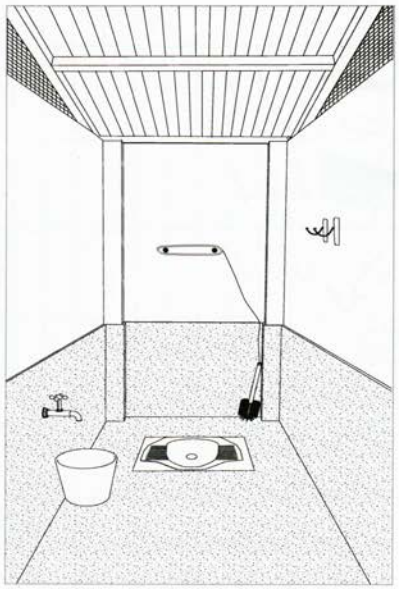
Community toilet assessment sheet, development - Nepal

The ultimate success of the **Nepal Village Sanitation Program** relies on high quality design & construction of the toilets and waste water systems *and* the training of local teams to ensure the ongoing maintenance and continued function. This Manual has been developed to establish local training & maintenance

The manual includes:

- Drawings and key phrases about each item needing to be maintained for training purposes (these can be translated into Nepali or local languages as appropriate)
- The graphic checklist, linked to the drawings that can be photographed with a phone camera and sent by the village workers to the Nepali NGO at regular intervals.
- A simple code noting the function of each item tested: OK, faulty, not applicable or in need of urgent repair.

A partly completed toilet (and waste) assessment sheet - Nepal

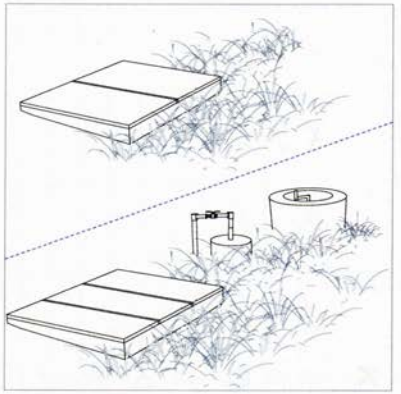


TOILET #	2	5	6
	✓	✓	✓
	✓	✓	X
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓
	✓	✓	✓

	✓	✓	X
	✓	✓	X
	✓	✓	✓
	X	✓	✓
	✓	✓	✓
	✓	✓	✓

✓ = OK X = NOT OK O = N/A △ = URGENT

TOILET #	2	5	6
	✓	✓	✓
	✓	✓	✓
	O	✓	✓
	✓	✓	✓
	✓	X	✓
	✓	✓	O
	✓	✓	✓
	✓	✓	✓



	✓	✓	✓
	O	✓	O
	O	✓	O
	O	✓	O

✓ = OK X = NOT OK O = N/A △ = URGENT

EXAMPLE 2
An example of how a local monitoring system can provide essential design and planning data for future capital works.

The project involved the design of 2 trial wash and toilet building for village poor families in the rural north of Bangladesh.
A major health issue in the region if the high incidence of gut infection, caused by human waste contaminating drinking water. The water is obtained from shallow wells.
The design of 2 types of septic tank systems (varying in size shape and construction) were to be evaluated.

To allow the evaluation of the waste water treatment systems and effectiveness of the trial units, the following data were collected:

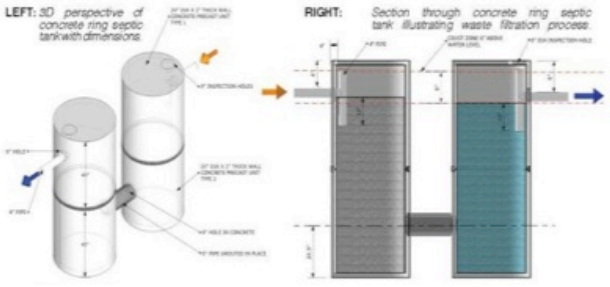
- Daily total volume of water entering the waste treatment system, recorded using a water meter and local staff
- The use of the wash area and toilet area as measured by door opening events. This was recorded using data loggers, regularly downloaded by local staff.

The combination of this use data in combination with micro biological testing of the final treated effluent stream where it enters the surrounding land will enable:

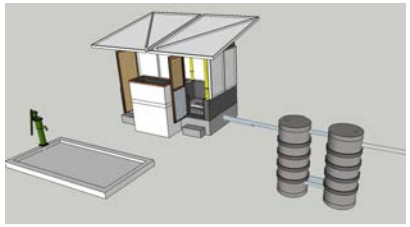
- Ensuring the systems are being used, and the extent of use on a daily basis
- Developing baseline data on use of the facilities
- Better sizing of the system components saving construction costs
- Redesign of system components and details

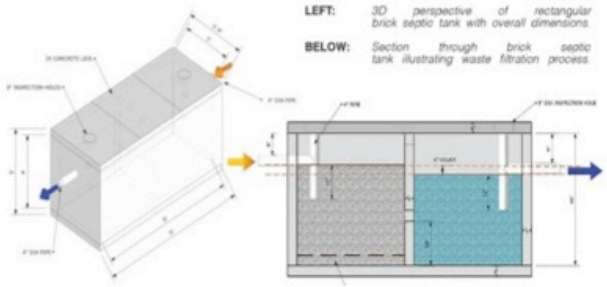
The monitoring systems developed for, and used by, local staff took into account

- Low literacy
- No regional support
- Support from HH to collate the data and report back (the gap)

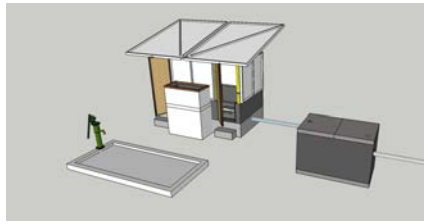


Waste treatment
Option 1
Concrete rings septic tank





Waste treatment
Option 2
Brick septic tank



Disposal of human waste safely: to prevent water contamination is difficult in a high water table (pictures top right).

The two septic tank systems under trial are shown.

The final disposal bed is not shown.

Community water monitoring sheet, Bangladesh

- Water was pumped from the hand pump to a cistern then the water flowed through a meter to both the toilet (for dip flushing) and the was area
- The data was collected daily using pre formatted recording sheets that related to the meter exactly
- The data was sent to HH monthly for checking and collating
- The compiled data was sent back to the local teams

The inside lock in the open position but the door is secured externally to prevent access by young children and animals

The inside lock in the closed position and the magnetic reed switch stores the event and duration into the data logger for future download

Data logger probes on each door will record when the doors are locked from the inside by the user and for how long.
This will help determine if the main water use occurs in the wash area or toilet and may determine the size of future waste treatment systems.
The software was installed on a local SAFE computer and the files will be downloaded regularly during the testing period by SAFE staff.

EXAMPLE 3
Examples of sanitation ‘solutions’, widely used, that will *not* improve health.

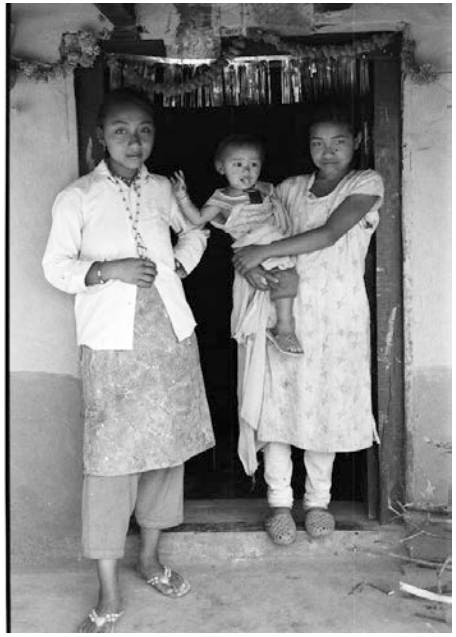
Removing waste safely is fundamentally different to building toilets or latrines.

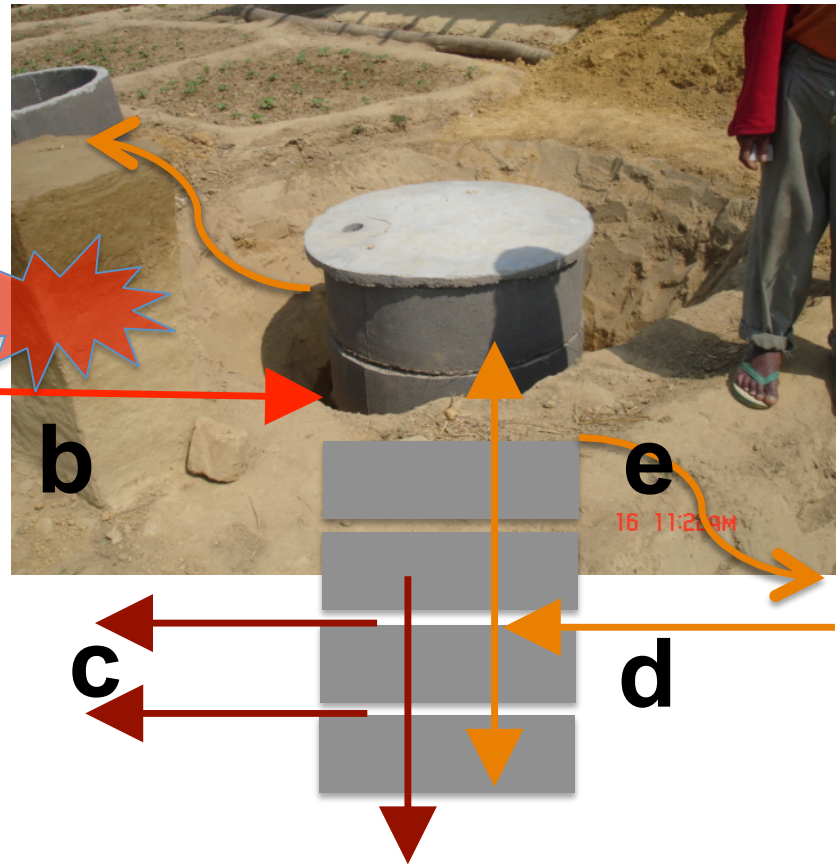
The toilet enclosure may at best provide privacy and collect the waste.

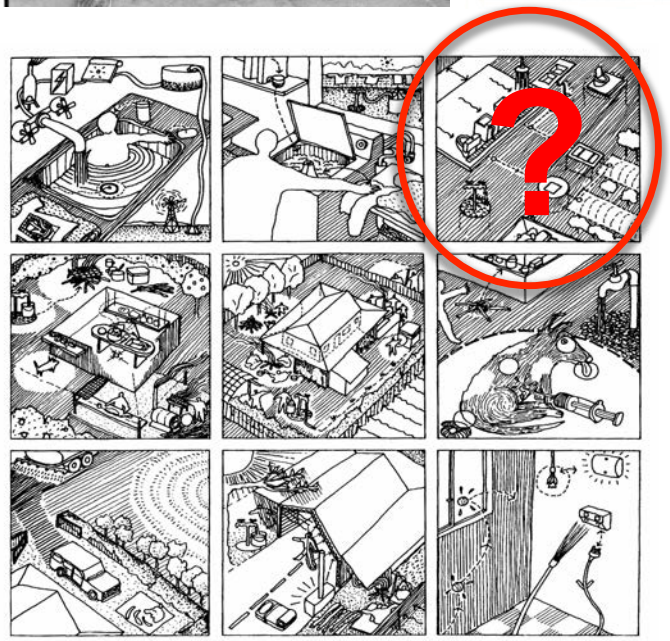
If the the waste material is not adequately disposed of, it will impact on:
- The spread of flies and disease, such as trachoma
- The contamination of the water table and, potentially, drinking water
- Increase the risk of fecal oral disease transmission (also greatly increased if no adequate hand washing is available)

The following examples, taken for many countries, show the specific failures of the systems and how simply having a toilet building is not enough to improve health.

When is a toilet *NOT* a toilet ? When it does not dispose of human waste safely. (Nepal)







a. The toilet has no door and lacks privacy
b. The above ground pipe connecting toilet to pit gets damaged
c. The concrete rings are meant to let the waste soak into ground
d. After a month the waste clogs the ground and pit fills
e. Waste flows to the surface untreated
f. The toilet no longer removes human waste safely

When is a toilet *NOT* a toilet ? When it does not dispose of human waste safely. (Bangladesh)

This toilet, provided by an aid project, lasted one wet season. The pan and foot pads were covered in dried mud and had to be excavated for this picture. The toilet was used for less than a month.

This toilet, provided by an aid project, also lasted one wet season. The pan and foot pads were higher than ground level but the shallow pit below filled with water once the wet season commenced. The toilet was used for less than a month.

When is a toilet *NOT* a toilet ? When it does not dispose of human waste safely. (Ethiopia)

The current toilet facilities at Kuyu district and zone offices.

The roof over the latrine area (above) stops some rain but the human waste is neither covered not disposed of and will encourage flies.

The latrine (right) was blocked and the surrounding tin walls and door had many opening to allow flies to enter the area.

Thanks to:
The Fred Hollows Foundation

In Australia
Joanne O'Sullivan and Tom White
In Ethiopia
Ahmed Abajobir
Dr Wondu Alemayehu
Amanuel Atomsa
Berhanu Bero
Kalkidan Teferi

In the Village, District and Zone offices, those staff that gave generously of their time.

References from WASH-Tra: The way forward for a sustainable control of blinding trachoma - A concept note

1Trachoma Control in Ethiopia. Experiences in the new millennium p. 6 Vision & Development IssueII/2010
2 FMOH presentation, Ethiopia-Trachoma National Overview GET 2020, 2014
3 www.cartercenter.org
4Proceedings of Zithromax Supply Chain Assessment Report Dissemination and Trachoma MDA-Review of the National Guideline & Harmonization Workshop Jan 9-10,2014
5Stocks ME, Ogden S, Haddad D, Addiss DG, McGuire C, Freeman MC. Effect of water, sanitation, and hygiene on the prevention of trachoma: a systematic review and meta---analysis. *PLoS medicine* 2014; 11(2): e1001605.
6Water, Sanitation, and Hygiene (WASH): A Critical Component for Sustainable Soil-Transmitted Helminth and Schistosomiasis Control Suzy J. Campbell, Georgia B. Savage, Darren J. Gray,Jo-An M. Atkinson,Ricardo J. Soares Magalhães,Susana V. Nery,James S. Carthy, Yael Velleman, James H. Wicken, Rebecca J. Traub, Gail M. Williams, Ross M. Andrews, Archie C. A. Clements mail Published: April 10, 2014 DOI: 10.1371/journal.pntd.0002651
7 REPORT OF THE 17th MEETING OF THE WHO ALLIANCE FOR THE GLOBAL ELIMINATION OF BLINDING TRACHOMA GENEVA, 22–24 APRIL 2013
8Global Trachoma Mapping Project-Oromia, 2012-2014.