



## 2x2x2x2 Health & Design Challenge / NSW

Competition details / prepared by Healthhabitat

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### The Challenge

**2 x Eyes 2 x Hands 2 x Litres 2 x Days**

Develop, design and construct a prototype solution to successfully use less than 2L of water per person, per day (the estimated maximum water available in an Ethiopian village devoted to these specific activities) to achieve the following *in order of priority*:

1. Washing faces (eyes)
2. Washing hands
3. Water stored for other uses (such as extra water for drinking and cooking)
4. Washing a concrete toilet floor with wastewater from uses 1 and 2 above

### Background

Healthhabitat was invited to partner with The Fred Hollows Foundation (TFHF), who are working in Ethiopia to eradicate trachoma by implementing the SAFE strategy; Surgery, Antibiotics, Face Washing and Environmental change.

Trachoma is a preventable disease that causes blindness. When people reach the point of surgery they've often encountered a lot of pain and some blindness already and it is too late for the other interventions (Antibiotics, Face Washing and Environmental change) to work.

HH have been asked to look at the Face Washing and Environmental change components of SAFE. HH has been to a village site in Ethiopia and have made some preliminary designs for increased water supply to increase the water available for face washing and a toilet system and method of construction to remove human waste safely and reduce flies.

### Assumptions

The following are design considerations and information based on HH's field visit and local information.

- The trial village may have a population of 10,000 people
- Families consist of, on average, 5 people and people live in family clusters
- Access to common water pumping points can be up to 1.2 km from the living area and people walk with containers to obtain the water
- Water is paid for by village families and is scarce for 10 months of the year, for 2 months there is a wet season.
- Measurement of water pumping rates and times when the hand pumps are operated showed a total of around 2 litres per person per day (10 litres per family) would be available if all the village pumps worked their normal hours. This is currently about *half* the minimum water needed per person (as defined by the WHO).



- HH will look at ways to increase water production and this is NOT part of this challenge. You can assume water per person will be around 4 litres (20L per family group) and available for washing face and hands per day will be 2 litres per person (10L per family group).
- Toilets do not exist in the village at present and HH proposes to build toilets (per family or family cluster but not public toilets) to remove human waste from the surface of the ground to reduce illness and reduce flies that breed in the human waste and spread trachoma.
- The example of the toilet construction shown is not a final solution but an idea for you to consider when linking your solution for face and hand washing to the family.
- Water should be stored on, at or near to the toilet structure to protect the water and enable family hand and face washing.
- Water points and toilets are also planned for the schools and community office. Your solution would also be used there.
- Our target group is children and then adults so think about the ergonomics of any solution.

## Re-stating the Challenge

Water is scarce.

Families (of average 5 people) manually collect water daily from well points up to 1.2 km from their houses, for drinking and cooking (a 2.4 km round trip). The water supply will be increased to 20L of water per day for all the needs of each family. Rationing water for basic survival before hygiene will impact on the success of introducing any hygiene practise, if water is scarce and their children are thirsty, face washing may not happen.

For this challenge, we are suggesting half the ideal daily quota of water goes toward sanitation to make an impact on the *Face Washing* component of the SAFE strategy. In a family of five this equates to a total of 10 litres per family or **2L of water, per person, per day** for washing faces and hands.

The solution, and the core of this challenge, is how teams can effectively wash the faces and hands of 5 people using only that 2L quota per person. Ideally there will be some unused water left over to give back to other household needs like cooking and drinking. The aim is ***to use as little water as possible to achieve effective face and hand washing.***

In addition, to ensure sanitation and hygiene are maintained, any wastewater resulting from the face and hand washing would be collected and used to clean the (proposed) toilet floor and pan. Teams can use water from the total 10L quota or, better still, re-use the wastewater (used to wash face and hands) to achieve this.



## The Competition schedule and scoring criteria

### The Venue

This is yet to be confirmed but assume

- it will be an internal venue
- all teams will compete in close proximity and areas will be marked for each team
- power may be available for construction (on day1) but NOT during the competition
- your team will get the venue details at least a week before the competition.

### Schedule

**Day 1** Saturday the 18<sup>th</sup> July | 10am – 4pm

Each team are to completely construct their solutions **on Day 1** of the competition.

Teams can come prepared with models, strategies and tools to construct, however the prototype cannot be built until the first day of the competition. The details of your Challenge budget and materials requirements follow the schedule.

**Day 2** Sunday the 19<sup>th</sup> July | 9.30am -1pm

At 9.30 am 'standard' dirty faces will be applied to each team member. Prototypes must be completed for testing by 10am. At 10am, 10 litres of water will be made available to each team from a filling point. Each team must be able to transport the water to their testing area and commence the face washing processes detailed below. After the face washing is completed 'standard' dirty hands will be applied to each team member and washing continues. Toilet pan cleaning will follow, and finally, the judges will measure any remaining water.

The judges will use the scoring system noted below to assess each team. The number and qualifications of the judges will be revealed on the day of the testing.

### Scoring

FEATURE	TEST	SCORE
Face washing	All team members, a min. 5 of people, are to wash their 'standard' dirty faces. The 'dirt' will be applied by an HH specialist to 5 members of the team or 4 team members + an audience / supporter to make up the number. Sample 'dirt' will be available on Day 1 for team testing. After washing, faces will be blotted/wiped dry on a paper towel, provided by HH. The towels will be pinned up and later assessed. The dirt on the towel will be a measure of how much dirt was left on the face <i>after washing</i> . <b>The cleaner the towel the more points gained.</b>	/ 10
Hand washing	All as above with 'standard' dirty hands.	/ 7
Toilet floor washing	Water is used to wash 'standard' dirtied concrete tile provided. A blot test will assess	/ 3



	cleanliness after washing.	
Water security	Total volume of clean water left over after all the above will be measured. The team with most will get 5 marks, next will get 4 marks etc. If NO water is left over score of 0 will be given.	/ 5
<b>TOTAL SCORE</b>		<b>/ 25</b>

## Budget

HH have budgeted a total \$AUD325 per family for toilet construction, increasing the overall water supply, water storage and washing system. Teams have \$25 of this budget to use for their prototype.

## Materials

A budget of \$25 will allow you to purchase ANY materials. Your team will be reimbursed on Day 1 but we need receipts for ALL materials bought to ensure you stick to the budget. HH also will provide each team, at NO cost, a variety of the following materials for use as you see fit. There is no requirement to use any of these materials and you can cut, chop, and modify the materials if you wish:

- 1 Plywood sheet 15mm thick x 1200mm x 2400mm uncut
- Variety of PVC pipe sizes and lengths (100dia PVC pipe x 1 metre, 2 end caps for 100mm pipe, 50mm PVC pipe x 1 metre, 2 x end caps for 50mm pipe)s
- Variety of water storage vessels (3 plastic water vessels at least 1 of which can hold 10 litres of water)

HH will not provide any tools for construction but these need NOT come out of your \$25 budget.

## PLEASE invite people to the event

The testing day in particular should be an exciting morning so please feel free to invite friends, fellow students, student society groups, lecturers, teachers and family. This can help spread the serious message about trachoma and how your work as a future designer or health professional can contribute to a solution.

Thanks for all the effort and time you are contributing to this event. HH will sponsor a simple dinner for all teams on the night of Day 1 as a small gesture of thanks.

## For questions and further information contact:

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