

Handwashing enabling products for developing countries: Design features, preferences, and behavior change from an in-depth product trial in Cambodia

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HANDWASHING WITH SOAP and HEALTH

Handwashing with soap (HWWS) is one of the most effective interventions in reducing diarrheal diseases (Curtis & Cairncross 2003) and respiratory illnesses (Aiello et al. 2008), the two top killers of children and responsible for major portions of infectious disease burdens in developing countries and in Cambodia.

Routine handwashing with soap at critical times for health, however, is rarely practiced in low income communities where it is most needed, despite the availability of water and soap in the home (Curtis et al. 2008).

A HWWS PRODUCT ?

HWWS at critical times is observed at much higher rates in homes with a dedicated handwashing facility are present where water and soap are maintained (Biran et al. 2005; Luby et al. 2009). Higher rates of HWWS and lower hand contamination levels were observed in trials of handwashing devices over verbal messages alone (Pinfold 1995).



Fig 1. Cambodia Map & Study Area



STUDY DESIGN

Phase I: Survey of existing handwashing practices, equipment and perceptions

- 10 villages (Fig 1)
- 79 randomly selected households
- Interview and HW demonstration with adult female child caretaker

Phase II: Consumer testing of HW devices

- Lit review of device options, features
- 5 prototype test designs (Fig 2)
- 22 Phase I households, 5 study villages
- Each household tested 2 different prototypes, each one for 1 week
- In-depth debrief, each week
- End of trial device purchase option



Water Delivery Mechanisms:

- Foot-operated Tipity Tap
- Controlled Tap
- Gravity Hose
- Perforated Ladle

Fig 2. Phase II Device Designs



Installation:

- On surface
- Free standing
- Hanging

Water Container Qualities:

- Translucency
- Rigidity
- Durability
- Handle
- Re-fill opening
- Volume

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TYPICAL HW PRACTICES & EQUIPMENT



Search around yard for a basin and soap, fill basin with water from outdoor water storage jar using dipper or bowl, immerse hands into the basin to wash, re-fill the bowl from jar, often several times, to rinse, while squatting near the jar.



WATER & SOAP ACCESS

Rainwater used in wet season, but more distance, costly, varied quality sources in dry season. Difficulty with dry season water (58%). Soap use for HW reported (100%), use in demo(84%).

HW DEVICE INTEREST

High latent demand: 52% have considered buying, building HW facilities. The most desired features for a HW device were a **Tap** (71%), **Soap Holder**, (49%) and **Basin** (45%).

HW BEHAVIOR & ATTITUDES

A majority of study households (67%) are aware that diseases can be spread by hands, but associate this mostly with food prep and eating, rather than fecal contact. Before eating considered the most important HW occasion. In contrast, not washing hands provoked feeling unclean as a person, feeling smelly, frustration or anger, disgust, repulsion and social rejection, lack of confidence, in addition to fear of disease.

Table 1. Reported HW Occasions

<i>Before eating</i>	87 %
After eating	71%
<i>Before preparing food</i>	68 %
After preparing food	49 %
After cleaning dishes	39 %
After cleaning around house	28 %
After waking in the morning	27 %
After working in the fields	24 %
<i>After defecating</i>	23 %
After washing clothes	5 %
Before sleeping	14
Before taking care of children	10
After cleaning child's feces	6.7%
After cleaning animal feces	2.5%

HW DEVICE PREFERENCES, PURCHASE & FOLLOW-UP

Water Delivery Mechanism

- Controllable Tap most desired & preferred
- 80% testing Tap device installed on non-collapsible container purchased tap device over alternative (ladle, hose)
- Ability to turn on/off & control flow valued
- Tap most desired feature in survey
- Tap provides functional and aspiration value

Water Container & Installation

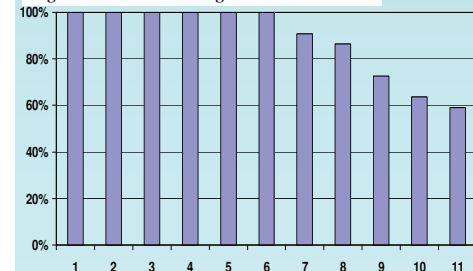
- Highly durable, sturdy, for rough handling, outdoor installation
- Rigidity & stability, empty or full, stay in place on surface & during refill
- Wide mouth opening, easy-to-remove lid, for easy refilling at storage jar
- Min 15 L to 20 L, 1-2 refills /day max
- Strong handle for easy refill carrying
- Accommodate child refilling
- Place on surface, dislike of hanging

The 20 L white plastic bucket, lid & tap device was consistently most liked for reasons at left, & purchased at the highest rate (Table 2). At follow-up 8 months after the trial, 11 of 21 purchasers were still using for HW, 4 had repurchased, & 6 had abandoned their purchased device.

Table 2. Trial Device Purchase Rates

Device Type	Tested	Purchased
Coleman (tap)	10	3 (30%)
Tipity Tap	6	1 (17%)
Bucket w/ Tap	10	8 (80%)
Bucket w/ Hose	10	5 (50%)
Bucket w/ Ladle	8	4 (50%)
Total	44	21

Fig 3. Perceived Advantages of the HW Device



1. HW much more often
2. Family HW much more often
3. Much more easy & convenient
4. Child HW w/o help
5. Hands cleaner
6. Child hands clean
7. Now HW w/ soap
8. Reminds to HW
9. Stored water no longer dirtied
10. Disease free hands
11. Everything in 1 place

Table 3. Device Trial Changes in Reported HW Occasions

Occasions Hands Washed (last 24 hours; selected)	Phase I		Phase II	
	# (87)	Wk I #(%)	Wk II #(%)	Wk II #(%)
<i>Before eating</i>	19 (87)	22 (100)	22 (100)	22 (100)
<i>Before preparing food</i>	14 (64)	22 (100)	22 (100)	22 (100)
After preparing food	7 (32)	22 (100)	22 (100)	22 (100)
After working in fields	6 (28)	18 (82)	18 (82)	18 (82)
After eating	17 (77)	18 (82)	19 (86)	19 (86)
After waking in morning	6 (27)	16 (73)	15 (68)	15 (68)
After cleaning the dishes	5 (23)	14 (64)	16 (73)	16 (73)
<i>After defecating</i>	7 (32)	9 (41)	11 (50)	11 (50)
Before sleeping	4 (18)	8 (36)	9 (41)	9 (41)
<i>After clean'g child feces</i>	1 (8.3)*	1 (8.3)*	4 (33)*	4 (33)*
<i>After clean'g animal feces</i>	0 (0)	3 (14)	3 (14)	3 (14)
Avg # Occasions	4.3	7.4	7.8	7.8

TRIAL BEHAVIOR CHANGE

- More frequent daily HW from base of 4 up to 8 times/day
- Increased rates of HW at critical times
- Child HW after defecation (54%)