Handwashing and Habit Formation: A Theory of Behavioral Change

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Global Handwashing Partnership Webinar
Handwashing with soap

- High rates of child stunting and mortality worldwide due to bacterial and viral transmission
  - Diarrhea, ARI
  - 2 million child deaths yearly (WHO 2013)

- Handwashing with soap
  - “the most effective vaccine against childhood infections” (World Bank 2005)

- But handwashing rates abysmally low (3-35%) worldwide, especially during critical times. Why?
Why don’t people wash their hands?

1. **Scarcity of information**
   - Information interventions have not worked. (WSP 2015, Galiani et al. 2015)
   - People believe washing is important.

2. **Scarcity of resources**
   - Resource interventions, including our own, have not worked. (WSP 2013, Ejemot et al. 2015, SHDS 2015)
   - People have soap and water.

3. **No health returns in high-disease environments**
   - Not true in our setting: handwashing reduces acute respiratory infection and loose stool incidence
   - Translates into significant improvements in weight and height

People still don’t wash.
Key features of handwashing with soap

1. Preventive activity.
   - Returns are not salient.

2. Not a social norm.
   - No persistent social costs to shirking.

3. Repetitive activity.
   - Repeated engagement is costly...unless it becomes a habit.

These features apply to many important health activities: water treatment, latrine use, clean cookstove use, etc.
Conceptual framework: habits and rational addiction


1. Habit formation: intertemporal complementarities in the utility from consumption

2. **Rational** habit formation: Agents are aware of complementarities, so changes in future consumption affect current consumption
What we do in practice

We implement an RCT among 2900 rural households with young children in West Bengal.

1. Our experimental design randomizes:
   - whether agents receive monetary incentives, social incentives, only a soap dispenser, or no intervention for daily handwashing
     ⇒ habit formation
   - whether agents anticipate monetary incentives, social incentives, or neither
     ⇒ rational habit formation

2. We observe:
   - precise measure of handwashing behavior before, during, and after withdrawal of the interventions
   - willingness-to-pay for soap
   - child health: diarrhea, ARI, weight, height
Measurement technology: from the Media Lab
Measurement technology: to the field
Handwashing outcome measure

Primary outcome: binary measure of dispenser use during the family’s self-reported evening mealtime.

Maximize $\sigma$ by making handwashing amenable to habituation:  
⇒ **habit loop**: trigger, routine, feedback (Neal et al. 2015)
Experimental design

Households are visited once every two weeks.
Incentives intervention

Incentivized households receive:

1. calendar
2. dispenser to keep
3. soap for one year
4. tracking of behavior on calendar
5. tickets (one or three) per night dispenser active
   - redeemed for child and household prizes (on day of receipt or later)
   - 1 ticket = Rs. 3 = USD 0.05

Note: tracking measured and incentives earned daily, but recorded and received every two weeks
Incentives

Incentive villages

- pure control
  - 1 ticket (2 mo)
  - 1 ticket (2 mo)

- 1 ticket (2 mo)
  - 3 tickets (2 mo)
  - ANTICIPATE

- 1 ticket (2 mo)
  - 3 tickets (2 mo)
  - SURPRISE
Parallel monitoring experiment

Disentangling incentives from feedback alone:

- Full sample
  - Incentive villages (IV)
  - Monitoring villages (MV)
## Monitoring intervention

<table>
<thead>
<tr>
<th>Household Receives</th>
<th>Incentive</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>calendar</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>dispenser to keep</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>soap for one year</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>feedback on calendar</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>tickets</td>
<td>×</td>
<td></td>
</tr>
</tbody>
</table>
Monitoring villages

- pure control
  - dispenser (2 mo)
  - dispenser (2 mo)

- dispenser (2 mo)
  - monitoring (2 mo)
  - ANTICIPATE

- dispenser (2 mo)
  - monitoring (2 mo)
  - SURPRISE
Roadmap

1. Introduction
2. Conceptual framework
3. Experimental design
4. Habit formation results
   • Contemporaneous effects
   • Persistence effects
   • Anticipatory effects
5. Child health results
6. Conclusion
Contemporaneous effects
Contemporaneous effects: receiving any tickets increases handwashing at dinnertime
Contemporaneous effects: tripling tickets has little effect on handwashing.
Contemporaneous effects: monitoring increases handwashing

![Graph showing fraction of households who used at dinner time](image)
Persistence effects
**Habit formation**: previously receiving incentives makes you wash more on extensive margin.
Habit formation: previously receiving triple vs. single tickets does not persist.

Fraction of households who used at dinner time.

- Dispenser control
- Former standard incentive
- Former triple incentive
**Habit formation**: previously being monitored makes you wash more.

![Graph showing habit formation results](image-url)
Rational habit formation effects
Rational habit formation: no evidence in households anticipating triple tickets

Dinnertime dispenser use: incentives

- Fraction of households
- Day

- Unanticipated 3X tickets
- Anticipated 3X tickets
**Rational habit formation**: strong evidence in households anticipating being monitored

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**Dinnertime dispenser use: monitoring**

- **Y-axis**: Fraction of households
- **X-axis**: Day
- **Legend**:
  - **Dashed line**: Unanticipated monitoring
  - **Solid line**: Anticipated monitoring

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**Legend**:

- **Unanticipated monitoring**
- **Anticipated monitoring**
Child health effects
Handwashing decreases loose stool and ARI incidence

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any loose stool</td>
<td>-0.0315***</td>
<td>-0.0817***</td>
<td>-0.0393**</td>
<td>-0.204**</td>
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<tr>
<td>Total days of loose stool</td>
<td>[0.00975]</td>
<td>[0.0236]</td>
<td>[0.0154]</td>
<td>[0.0884]</td>
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<td>Any ARI symptoms</td>
<td>-0.0393**</td>
<td>-0.204**</td>
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<tr>
<td>Total days of ARI</td>
<td>-0.204**</td>
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<td></td>
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<tr>
<td>Mean of pure control</td>
<td>0.100</td>
<td>0.209</td>
<td>0.270</td>
<td>1.247</td>
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<tr>
<td></td>
<td>[0.00572]</td>
<td>[0.0151]</td>
<td>[0.00886]</td>
<td>[0.0504]</td>
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<tr>
<td>Observations</td>
<td>3,820</td>
<td>3,830</td>
<td>3,830</td>
<td>3,830</td>
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</tbody>
</table>

Notes: Observations are at the child level. "Received dispenser" is any household that received a dispenser, pooled over treatment arms. p-values adjusted for multiple hypothesis testing using Anderson (2008). *** p<0.01, ** p<0.05, * p<0.1.
Handwashing improves child anthropometric outcomes

<table>
<thead>
<tr>
<th>VARIABLES</th>
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<tbody>
<tr>
<td>Weight for age z-score</td>
<td>0.135*</td>
<td>0.227*</td>
<td>0.0752*</td>
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<td></td>
<td>[0.0640]</td>
<td>[0.0902]</td>
<td>[0.0518]</td>
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<td>Height for age z-score</td>
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<td>Mid-arm circ. for age z-score</td>
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<tr>
<td>Received dispenser</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mean of pure control</td>
<td>-2.167</td>
<td>-1.866</td>
<td>-1.365</td>
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<tr>
<td></td>
<td>[0.0459]</td>
<td>[0.0666]</td>
<td>[0.0432]</td>
</tr>
<tr>
<td>Observations</td>
<td>863</td>
<td>862</td>
<td>858</td>
</tr>
</tbody>
</table>

Notes: Observations are at the child level. "Received dispenser" is any household that received a dispenser, pooled over treatment arms. p-values adjusted for multiple hypothesis testing using Anderson (2008). *** p<0.01, ** p<0.05, * p<0.1.
To summarize:

1. Handwashing alone has **substantial impacts on child health**

2. Financial incentives and monitoring without incentives increases handwashing

3. **Handwashing is habitual**: effects persist after incentives or monitoring are removed
   \[\rightarrow\] optimal scheme: frontload incentives

4. **Agents are rational habit formers**: anticipation of a rise in the future likelihood of handwashing increases current handwashing
   \[\rightarrow\] optimal scheme: delay and announce incentives