Sanitation in Developing Countries – Understanding User Preferences and Experiences

Zakiya Seymour
Laura Kovalchick
Lillian Ponitz
Joseph Hughes

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Motivation

Sanitation can improve global health
  • WASH interventions have the potential to reduce incidents of water-borne diseases.

Sanitation practices are user-specific
  • Sanitation interventions are challenged by the need to incorporate users preferences.

Relevant literature is selective
  • The specificity of previous work makes it difficult to generalize the results in a sufficient manner.
Approach

Objectives

• Explore overall user satisfaction with various sanitation systems
• Explore commonalities and variances throughout sanitation user preference studies
• Investigate perceived drivers and deterrents of sanitation usage for adopters vs. non-adopters

Search Methods

• Database Search and Bibliography Cross-Check
  • Databases: Web of Science, JSTOR, Google Scholar, ProQuest
• Criteria:
  • Inclusion: Emerging Regions, Peer-Reviewed and Grey Literature, written in English
• Search: user
  • AND ONE OF: sanitation, toilet, wastewater, latrine
  • AND ONE OF: preference, behavior, attitude, belief
Methodology

Meta(ish) Analysis

49 studies reviewed (13 unusable)*

- Regions: Africa, Asia, South America
- Setting: Rural, Peri-Urban, Urban
- Implementation: Household, Communal
- Technology: None/Bucket, Pit Latrine, Composting/Ecosan Toilet, Ablution Blocks, Toilets Connected to Piped Sewer/Septic Tank * representing 7,583 households

Limitations

- Necessary statistical data ($T$, $\chi^2$, $\sigma$) is missing/unavailable.
- Historical work is not superimposable.
- “There is no placebo for a pit latrine.” -- Cairncross
What percentage of sanitation users are satisfied with their existing technology?

- Rural
- Peri-Urban
- Urban

---|-----------------|-----------------|-------------------|-------------------|-----------------|-------------------|---------------|-----------------|---------------|-----------------|--------------|--------------|-------------|--------------|--------------
Shared | 12 | 536 | 300 | 480 | 11 | 84 | 593 | 207 | 198 | 300 | 29 | 57 | 83 | 52
Not Shared | | | | | | | | | | | | | | | |
Type | No Facilities | Bucket | Pit Latrine | Water Closet | Ablution Block | Toilets | Ecosan
---|----------------|---------|--------------|--------------|---------------|---------|-------
* 81.3% of users utilize pit latrines
Why are pit latrines undesirable?

Household Pit Latrines

- Lack of Cleanliness (smell, flies)
- Not Private (visually, socially or informedly)
- Not convenient or comfortable
- Difficult to Maintain
- Not Affordable
- Queuing
- Distance from household

Communal Pit Latrines

- Lack of Cleanliness (smell, flies)
- Not Private (visually, socially or informedly)
- Not convenient or comfortable
- Difficult to Maintain
- Not Affordable
- Distance from household

Bar charts illustrate the percentage of each factor contributing to the undesirability of pit latrines according to various studies.
What percentage of users indicate **cleanliness** as a driver for usage?

### Cleanliness

- **Pit Latrine**: 13%
- **Composting/ UDDT**: 27%
- **Composting/ UDDT**: 6%
- **Various**: 47%
- **Ablution Block**: 53%
- **Ablution Block**: 33%
- **Pit Latrine**: 83%

### Urban, Peri-Urban, Rural

- **Rural**
- **Peri-Urban**
- **Urban**
What percentage of users indicate **privacy** as a driver for usage?

![Privacy Chart]

- **Pit Latrine:**
  - Rural: 3%
  - Peri-Urban: 10%
  - Urban: 24%
  - 33%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

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**Legend:**
- Green Diamond: Rural
- Green Triangle: Peri-Urban
- Green Circle: Urban
What percentage of users indicate **convenience and comfort** as drivers for usage?

<table>
<thead>
<tr>
<th>Type</th>
<th>Convenience &amp; Comfort</th>
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</thead>
<tbody>
<tr>
<td>Pit Latrine</td>
<td>30%</td>
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<tr>
<td>Pit Latrine</td>
<td>18%</td>
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<tr>
<td>Pit Latrine</td>
<td>39%</td>
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<tr>
<td>Pit Latrine</td>
<td>27%</td>
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<tr>
<td>Composting/ UDDT</td>
<td>5%</td>
</tr>
<tr>
<td>Ablution Block</td>
<td>47%</td>
</tr>
<tr>
<td>Ablution Block</td>
<td>56%</td>
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</tbody>
</table>

**Legend:**
- Rural
- Peri-Urban
- Urban
What **deterrents** to system usage are perceived by sanitation users?

**Personal/Situational - Lack of income/money**

- Lack of income/money is not typically given as a reason to not building a sanitation system.

**Implementation - Lack of knowledge**

- Lack of knowledge regarding construction, materials suppliers, or reliable information can deter adoption.

**Implementation - Environmental Conditions**

- Users are also deterred from sanitation adoption due to matters outside of their control:
  - Poor terrain
  - High water table
  - Lack of space
<table>
<thead>
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<tbody>
<tr>
<td>Driver</td>
<td>Adopters (22)</td>
<td>Adopters (647)</td>
<td>Adopters (647)</td>
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<td>Non-Adopters (298)</td>
<td>Non-Adopters (71)</td>
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<tr>
<td><strong>Gain prestige from visitors</strong></td>
<td>4.00</td>
<td>3.96</td>
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<td><strong>Feel royal</strong></td>
<td>2.74</td>
<td>2.75</td>
<td>NSS</td>
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<td><strong>Make my life more modern</strong></td>
<td>3.48</td>
<td>2.93</td>
<td>**</td>
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<tr>
<td><strong>For health (spontaneous mention)</strong></td>
<td>1.05</td>
<td>1.29</td>
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<tr>
<td><strong>Make it easier to defecate due to age/sickness</strong></td>
<td>3.05</td>
<td>2.58</td>
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<td>3.89</td>
<td>3.65</td>
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<tr>
<td><strong>Save time</strong></td>
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**Relative Importance Scale:** 1 = Least Important 4= Most Important

**p-values:**
* p<0.1
** p<0.05
*** p<0.005
**** p<0.0005

**NSS** = Not Statistically Significant
Summary

**Overall Satisfaction**

- Stated user satisfaction levels are dependent on sanitation technology, implementation approach, and sample size.

**Generalizability of Drivers and Deterrents**

- Drivers and deterrents for usage of sanitation systems vary by technology and geographical setting.

**Comparison of Adopters and Non-Adopters**

- Sanitation usage drivers are perceived by both adopters and non-adopters with relatively similar levels of importance.
Conclusion

Access vs. Usage

- Access to sanitation systems does not equate to continued sustained usage.

Rigor in Studies

- Use of standardized terminology would assist with inter-study comparison, JMP monitoring data, national survey data,....

- The provision of relevant statistical data would aid in analyzing significance of results.

Advancement of Subject

- Further studies are needed to examine the behavioral patterns of sanitation adopters vs. non-adopters.


Jenkins, M. W., & Scott, B. (2007). Behavioral indicators of household decision-making and demand for sanitation and potential gains from social marketing in Ghana. *Social Science & Medicine, 64*(12), 2427-2442. doi: 10.1016/j.socscimed.2007.03.010


Thank you.

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Identifying User Preferences

**Prestige**
- Identification with higher social status
- Express new experience and new lifestyle
- Elevate intergenerational family status
- Doesn't have to share toilet (avoid conflicts with neighbors)
- Self-esteem

**Well Being**
- Health benefits
- Safety
- Convenience and comforts
- Cleanliness (smell, flies)
- Privacy (visual, social, or informational)

**Personal/Situational Characteristics**
- Ease of restricted mobility (sick, elderly)
- Financial Considerations (incomes increases, working hours increase)
- Efficiency Considerations (time saved)

**Design**
- Ease of use
- Use of by-product
- Better than alternative
- Durability
- Functionality (proper excreta disposal)

**Implementation**
- Availability of construction materials
- Distance from household
- Knowledge of usage (training)
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Relative Importance Scale: 1 = Least Important 4= Most Important

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Open defecation: when human faeces are disposed of in fields, forests, bushes, open bodies of water, beaches or other open spaces or disposed of with solid waste.

Unimproved facilities: do not ensure hygienic separation of human excreta from human contact. Unimproved facilities include pit latrines without a slab or platform, hanging latrines and bucket latrines.

Shared sanitation facilities: Sanitation facilities of an otherwise acceptable type shared between two or more households. Only facilities that are not shared or not public are considered improved.

Improved sanitation facilities: ensure hygienic separation of human excreta from human contact. They are use of the following facilities:
- Flush/pour flush to:
  - piped sewer system
  - septic tank
  - pit latrine
  - Ventilated improved pit (VIP) latrine
  - Pit latrine with slab
  - Composting toilet
Well Being Drivers –
Cleanliness and Health Benefits

Well-being: Cleanliness

- The impact of cleanliness ranges across geographical setting and technology.

Well-being: Health Benefits

- Health benefits appears to dichotomous.
Well Being Drivers – Safety and Convenience & Comfort

• Safety does matter, but its importance may be skewed due to availability of other alternatives.

Well-being: Safety

- Schouten (2010)
- USAID (2009)
- Hernandez (2009)
- Jenkins (2005)
- O’Loughlin (2006)

Well-being: Convenience & Comfort

- Fe (2010)
- USAID (2009)
- Hernandez (2009)
- O’Loughlin (2006)
- Jenkins (2005)
- Roma (2010)

• Convenience and comfort appear to be important drivers depending on geographic setting.
There appears to be an absence of user preference integration into sanitation systems, representing a true disconnect between the design of appropriate sanitation technology and the implementation of acceptable and affordable technology.

Still questions remain regarding this disconnect and its manifestation in increasing sanitation usage:

- What are the drivers and deterrents, as viewed by users, to sanitation system use?
- Can these drivers and deterrents assist in predicting usage?
- Are users satisfied with their sanitation technology?
Where Does that Leave Us...

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Still questions remain regarding this disconnect and its manifestation in increasing sanitation usage

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- Can these drivers and deterrents assist in predicting usage?
- Are users satisfied with their sanitation technology?
Drivers by Sanitation Type and Geographic Setting

Peri-Urban Setting

- In peri-urban settings, convenience and durability matter most users.

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<td>Toilets</td>
<td>Ablution Block</td>
<td>Connected to Piped Sewer System</td>
</tr>
<tr>
<td>Well-being - Safety</td>
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<td></td>
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<tr>
<td>Design - Better than other alternative</td>
<td></td>
<td></td>
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<tr>
<td>Design - Durability</td>
<td></td>
<td></td>
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<tr>
<td>Design - separate bath from toilet</td>
<td></td>
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<tr>
<td>Personal/Household Situational - Financial Considerations (income increases, working hours increases) (affordability)</td>
<td></td>
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<tr>
<td>Implementation-Responsive management</td>
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</tbody>
</table>
Indentifying User Preferences

- Prestige
- Well-Being
- Personal
- Implementation
- Situational
Measurements
Well Being Drivers – Privacy

- Hernandez (2009)
- Jenkins (2005)
- O’Loughlin (2006)
- USAID (2009)

Well-being: Privacy
Diffusion of Innovation

- Innovators: 2.5%
- Early Adopters: 13.5%
- Early Majority: 34%
- Late Majority: 34%
- Laggards: 16%
Measurements

Maslow, A. Motivation and Personality (2nd ed.)

SELF-ACTUALIZATION
Pursue Inner Talent
Creativity Fulfillment

SELF-ESTEEM
Achievement Mastery
Recognition Respect

BELONGING - LOVE
Friends Family Spouse Lover

SAFETY
Security Stability Freedom from Fear

PHYSIOLOGICAL
Food Water Shelter Warmth
**Approach and Objectives**

**This Approach**

Integrated method to examine
- both the user experiences and
  the impact that various contextual variables have on sanitation preferences and behaviors.

**Historical Approaches**

Detailed studies focused on
- specific geographical region
- particular type of sanitation technology
- particular implementation approach

**Objectives**

Investigate perceived drivers and deterrents of sanitation
Examine characteristics of adopters vs. non-adopters
Explore overall satisfaction with sanitation systems
Approach and Objectives
Difficulties in Increasing Sanitation Coverage in Emerging Nations

- “Conventional” developed world sanitation approaches are often unsustainable in developing nations.

- Little social acceptance is needed when conventional approaches are designed and implemented; thus, there little no need for higher socio-economic classes to be active participants in their sanitation decision-making process [Patterson et al. 2007].

- The minimal or lack of user participation has been identified as a key barrier towards increasing sanitation access. [Paul 1958, McPherson and McGarry 1987, UN 2010].

Abandoned Wastewater Facility in Kyrgyzstan, Central Asia

Photo Credit: http://www.sowacon.co.jp/index10f.htm
Challenges Exist in Defining “Sanitation”

Several working definitions exist…

An improved sanitation facility is a system that “hygienically separates human excreta from human contact.”

[Joint Monitoring Programme (JMP) 2003]

Basic sanitation the lowest-cost option for securing sustainable access to safe, hygienic, and convenient facilities and services for excreta and sullage disposal that provide privacy and dignity while ensuring a clean and healthful living environment both at home and in the neighborhood of users.

[UN Millennium Project Task Force on Water & Sanitation 2005]
Identifying User Preferences

**Design**
- Ease of use
- Use of by-product
- Better than alternative
- Durability
- Functionality (proper excreta disposal)

**Prestige**
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- Availability of construction materials
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**Personal/Situational Characteristics**
- Ease of restricted mobility (sick, elderly)
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- Efficiency Considerations (time saved)
Motivation

Impact of Sanitation on Global Health

• WASH interventions have the potential to reduce incidences of water-borne diseases.

• While several factors can impact increasing sanitation coverage, the overall objective is to improve overall global health.

• Yet, the health impact of these initiatives can only be sustained through the continued use by their users.
Sanitation Practices are User-Specific

• Sanitation interventions are challenged by the need to incorporate users preferences.

• Understanding motivation for sanitation usage is complex.
  • Affordability, Safety, Convenience, Comfort, Cleanliness…
Motivation

Sanitation Practices are User-Specific

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• Understanding motivation for sanitation usage is complex.
  • Affordability, Safety, Convenience, Comfort, Cleanliness…
Motivation

Sanitation Practices are User-Specific

- As previous work examining various user perceptions for sanitation systems often focus on specific contexts, it can be difficult to synthesize the results.
  - Geographical Settings, Types of Sanitation Technology, Implementation Approaches
• Safety does matter, but its importance may be skewed due to availability of other alternatives.

• Convenience and comfort appear to be important drivers depending on geographic setting.
Investigate Perceived Drivers and Deterrents of Sanitation

Drivers by Sanitation Type and Location: Rural Setting

- While well-being and prestige are consistently linked as drivers to pit latrine usage, design and implementation of sanitation system rank higher for ecosan users.