Dear Dwipayanti, N, Rutherford, S., Phung, D, and Chu, C,

Congratulation! After being reviewed, we are pleased to inform you that your paper entitled “How important is culture to sanitation uptake? The influence of local values in rural Bali” has been accepted to be published at Advanced Science Letters as Conference Proceeding of International Conference on Public Health for Tropical and Coastal Development (ICOPH-TCD 2016).

Thank you very much for your participation.

Semarang, 29 December 2016

Warm regards,

Dr. Martha Irene Kartasurya
Chair of ICOPH-TCD 2016 Organizing Committee
How Important is Culture to Sanitation Uptake? The Influence of Local Values in Rural Bali

Authors: Dwipayanti, N; Rutherford, S; Phung, D; Chu, C
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Abstract

Background: Addressing complex sanitation issues requires a comprehensive understanding of all determinants, including local values. These determinants are considered here within an ecological approach that is used to assess sanitation uptake and sustainability. Method: A survey of 202 respondents was conducted in rural Bali, Indonesia. Data was collected on attitudes, beliefs, and practices related to sanitation. Bivariate and multivariate statistical analyses were applied to identify significant factors of sanitation uptake and maintenance. Results: Only 31.2% of respondents reported having a toilet. A majority presented a negative attitude towards open defecation (OD), but they still considered it acceptable. Aside from other well-researched factors such as asset ownership (OR 197.5, 95% CI 23–1690), education of family member (OR 3.3, 95% CI 1.2–9.1) and toilet ownership in the neighborhood (OR 10.4, 95% CI 3.2–33.6); cultural beliefs relating to supernatural power (OR 1.5, 95% CI 1–2.3) also had a significant influence on toilet uptake. Other local beliefs that affected sanitation uptake and maintenance were polluting nature of a toilet and the need to regularly purify dwellings. 90.6% of non-owners would give priority to expenses for religious activities over building a toilet and only 31.7% accepted the reuse of treated human waste as agriculture fertilizer. Conclusion: Because of the importance of the local values and their interactions with other factors in rural communities, future programs need to comprehensively assess determinants and take local priorities and needs into account, in order to address sanitation issues.

Keywords: Comprehensive Assessment; Local Values; Rural Bali; Sanitation Uptake; Sustainability

Document Type: Research Article

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How important is culture to sanitation uptake? The influence of local values in rural Bali

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Abstract

Background: Addressing complex sanitation issues requires a comprehensive understanding of all determinants, including local values. These determinants are considered here within an ecological approach that is used to assess sanitation uptake and sustainability.

Method: A survey of 202 respondents was conducted in rural Bali, Indonesia. Data was collected on attitudes, beliefs, and practices related to sanitation. Bivariate and multivariate statistical analyses were applied to identify significant factors of sanitation uptake and maintenance.

Results: Only 31.2% of respondents reported having a toilet. A majority presented a negative attitude towards open defecation (OD), but they still considered it acceptable. Aside from other well researched factors such as asset ownership (OR 197.5, 95% CI 23-1690), education of family member (OR 3.3, 95% CI 1.2-9.1) and toilet ownership in the neighborhood (OR 10.4, 95% CI 3.2-33.6); cultural beliefs relating to supernatural power (OR 1.5, 95% CI 1-2.3) also had a significant influence on toilet uptake. Other local beliefs that affected sanitation uptake and maintenance were polluting nature of a toilet and the need to regularly purify dwellings. 90.6% of non-owners would give priority to expenses for religious activities over building a toilet and only 31.7% accepted the reuse of treated human waste as agriculture fertilizer.

Conclusion: Because of the importance of the local values and their interactions with other factors in rural communities, future programs need to comprehensively assess determinants and take local priorities and needs into account, in order to address sanitation issues.

Keywords: comprehensive assessment, local values, rural Bali, sanitation uptake, sustainability.

1. INTRODUCTION

The lack of access to safe sanitation contributes to many public health issues such as diarrhea, helminth infections, and stunting among children in developing countries1. In order to reach the new target of universal sanitation access and improved service in Sustainable Development Goals by 2030, professionals in developing countries like Indonesia – with 47% safe sanitation coverage and 20% open defecation (OD)1 – need to establish a comprehensive understanding of local dynamics in the context of cultural diversity.

The public health promotion approach suggests that complex public health issues should be addressed by considering not only individual level factors but also other factors beyond individual control including biophysical and socio-economic environments. This is known as the ecological approach2-4. Among these environments, the cultural context, particularly in rural areas has been identified as having influence in sanitation uptake and sustainability5, 6. An ecological model derived from the Ottawa Charter enables us to comprehensively assess the cultural and other environment and structural contexts7-9 as well as individual factors. This paper presents an assessment of the cultural aspects of sanitation uptake, using this ecological model. Here the non-uptakers are those who may or may not accept or have intention for a toilet,
and by the study time do not have a toilet of any type in their household.

2. METHOD

Two hundred and twenty households were randomly selected from selected sub-villages in the catchment of Kubu II Primary Health Centre, Karangasem, Bali, Indonesia using cluster sampling methods. The survey was conducted with in-person interviews using a questionnaire regarding demographic profile, sanitation profile, construction, utilization and maintenance history and barriers, attitudes, beliefs, and practices related to sanitation. Barriers were assessed with binary questions, perspectives on toilet advantages were assessed using a scale from 1 to 4, while other beliefs were assessed using a Likert scale from 1 to 5. An asset index was used for wealth information due to the difficulty of collecting income information from rural respondents and was calculated using a method suggested in Gross and Guenther.

To understand determinants at the early stages of sanitation uptake, Pearson Chi-Square Test and Mann-Whitney U test were used to identify significant differences between toilet owners and non-toilet owners. A logistic regression model was used to control for possible confounding factors such as education, road access, and occupation. Due to the low response rate, descriptive analysis was used to assess factors at the later stages.

The ethical clearance was obtained from the Griffith University Ethics Committee (GU Ref No: ENV/35/14/HREC). Further permission was also obtained from the Bali Provincial Government and Karangasem District Government.

3. RESULTS AND DISCUSSION

Household respondent characteristics and sanitation profile

From 202 valid responses, all respondents are of Balinese Hindu ethnicity, 58% of those interviewed are males, 52% have a family member with >6 years of education (post-primary), and 63.4% are farmers. Although a majority of respondents (86.6%) had experience of using a toilet, toilet coverage is only 31.2%, and 75% of toilets were built within the last five years.

Individual factors

Respondents’ attitudes towards particular sanitation practices were sought according to 10 criteria: cleanliness, odour, ease of use, privacy, acceptability, safety, environmental cleanliness, health, prevention of disease and convenience, using a semantic scale from 1 to 3. A Majority of respondents have a negative attitude towards OD (mean 1.5 SD 0.53), although OD is still considered as acceptable (mean 2.35 SD 0.940). While respondents are unlikely to accept a pit latrine (mean 1.25 SD 0.589), the majority of them have a positive attitude towards pour flush toilets (mean 2.9 SD 0.17). Thus encouraging people to change behavior by adopting pit latrines in these communities would not be easily accepted.

Health does not appear to be the primary motivation for having a toilet. However, compared to the non-toilet owners, more of the toilet owners had a positive attitude and ranked health benefit higher (p<0.005). The health related advantages only present at the 7th rank and ninth rank, while advantages related to convenience such as difficulties finding a place for OD, convenience at night and when raining are mentioned as the three most important advantages by respondents.

Lack of funding and construction difficulty are significant barriers for toilet uptake. All non-toilet owners mentioned financial barriers as a reason for not having a toilet. A higher percentage of non-owners who do not plan to have a toilet (79.1%) mentioned that construction work for the toilet is difficult (p<0.05) compared with those who plan to build one (58.9%). Toilet owners also more frequently mention technical constraints such as lack of construction skill and issue with soil type than non-toilet owners. This finding could be explained by Jenkins who found that at the earlier stages of preference and intention, more barriers are related to motivation and permanent factors such financial barriers, while non-permanent factors such as technical barriers are more apparent for toilet owners who have already made a choice. Thus to better target the non-toilet owners in this community, it is important to understand and respond to their motivations and perceived barriers.

Socio-demographic characteristics and other variables that show significant correlations with toilet ownership based on bivariate and multivariate analysis are presented in Table 1. In multi-variate regression analysis, households that have a higher asset index (OR 197.5, 95% CI 23-1690) and those who have a member with more than six years education (OR3.3, 95% CI 1.2-9.1) are more likely to have a toilet. The findings confirm that socio-economic status and education level have a positive relation with toilet ownership in rural areas as pointed out in other studies in East Java.

In regards to the later stages of maintenance and safe disposal, a high proportion of toilet owners do not know that the toilet pit or septic tank needs to be emptied (61.9%), nor the period when the pit should
be emptied (85.7%). This finding suggests a future priority to ensure the long-term functioning of the toilet.

Table 1. Determinants of toilet ownership among rural respondents in Kubu II, Karangasem, April 2015

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Toilet ownership</th>
<th>Bivariate</th>
<th>Multivariate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Yes</td>
<td>ORb 95% CI</td>
<td>ORb 95% CI</td>
</tr>
<tr>
<td>Asset index</td>
<td>0.419</td>
<td>0.743</td>
<td>385.8</td>
<td>197.5</td>
</tr>
<tr>
<td></td>
<td>(0.243)</td>
<td>(0.209)</td>
<td>(62.9-2366.3)**</td>
<td>(23.1-1690.6)**</td>
</tr>
<tr>
<td>Highest education in household</td>
<td>&lt;=6 yrs</td>
<td>83 (85.6%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 6 yrs</td>
<td>56 (53.3%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Infant &lt;= 5 years in household</td>
<td>No</td>
<td>79 (63.2%)</td>
<td>2.055</td>
<td>1.423</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>60 (77.9%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dwelling with four wheel road</td>
<td>No</td>
<td>81 (76.4%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>58 (60.4%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Distance to secondary water</td>
<td>&lt;=500 m</td>
<td>87 (64.0%)</td>
<td>2.092</td>
<td>1.164</td>
</tr>
<tr>
<td></td>
<td>&gt;=500 m</td>
<td>52 (78.8%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Have bad experience with OD</td>
<td>No</td>
<td>54 (58.1%)</td>
<td>2.558</td>
<td>1.126</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>85 (78.0%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Many neighbours practicing OD</td>
<td>No</td>
<td>13 (30.2%)</td>
<td>9.087</td>
<td>10.436</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>126 (79.7%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Receive health information from</td>
<td>No</td>
<td>65 (77.4%)</td>
<td>2.034</td>
<td>1.316</td>
</tr>
<tr>
<td>external source</td>
<td>Yes</td>
<td>74 (62.7%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 (37.3%)</td>
<td>(1.08-3.83)*</td>
<td></td>
</tr>
<tr>
<td>Receive health information from</td>
<td>No</td>
<td>103 (74.6%)</td>
<td>2.289</td>
<td>1.085</td>
</tr>
<tr>
<td>media</td>
<td>Yes</td>
<td>36 (56.3%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>28 (43.8%)</td>
<td>(1.22-1.74)*</td>
<td></td>
</tr>
<tr>
<td>Believe in supernatural power</td>
<td>No</td>
<td>21 (48.8%)</td>
<td>1.508</td>
<td>1.563</td>
</tr>
<tr>
<td>as disease cause</td>
<td>Yes</td>
<td>113 (76.4%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>35 (23.6%)</td>
<td>(1.02-2.39)*</td>
<td></td>
</tr>
<tr>
<td>Believe in the need to consult</td>
<td>No</td>
<td>27 (50.0%)</td>
<td>1.395</td>
<td>1.418</td>
</tr>
<tr>
<td>with traditional healers</td>
<td>Yes</td>
<td>111 (75.5%)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>36 (24.5%)</td>
<td>(1.12-1.74)*</td>
<td>(1.00-2.00)*</td>
</tr>
</tbody>
</table>

- a p-value of Chi Square test, except for Asset Index was calculated with Mann-Whitney U Test, Significant at p<0.05
- b Significant at p<0.05, Significant at p<0.005**, n.s. is not significant

Cultural factors

In regards to traditional beliefs, there are three main groups of traditional beliefs related to sanitation, namely, the risk of misfortunes from supernatural causes, the need to regularly purify dwellings, and the ritual polluting nature of a toilet. After adjusting for other socio-demographic and environmental factors, non-toilet owners are more likely to adhere to beliefs that supernatural powers are the cause of disease (OR 1.5 95% CI 1.18-1.93) and adhere with the need to consult traditional healers in regards to toilet location (OR 1.4 95% CI 1.12-1.74) (Table 1). Similarly, those beliefs are stronger among non-toilet owners who do not plan to build toilets than those who do (p<0.05).

These beliefs can affect motivation and perceived constraints on building a toilet. Because of their strong beliefs relating to supernatural risks, non-toilet owners are less convinced by the idea that a toilet can improve their family health. This influence of beliefs in supernatural powers on toilet uptake has also been found in other studies15. The beliefs related to the ritual polluting nature of a toilet (>90% of respondents) can lead to perceived barriers to locating a toilet in their dwelling. A majority of respondents (92.3%) agree that a wrongly placed toilet can harm, and thus they may end up demolishing the toilet. However, only one respondent in this survey mentioned that they knocked down their toilet because it brought misfortune to a family member. Moreover, a higher percentage of non-toilet owners mentioned construction barriers related to cultural consideration of toilet location than toilet-owners (p<0.05). Similarly, values related to purity also influence people to build a toilet in their dwelling in India16. Due to the value placed on purity, the local values are also less supportive of using human waste for agriculture
(only 31.7% respondents accept the idea). Their main priority to maintain harmony and purity in their dwelling and village is through religious ceremonies which also places expenses for a toilet as a lower priority than expenses for ceremonies. Therefore, in order to design appropriate support for toilet construction and maintenance it is crucial to consider and incorporate (instead of neglecting) these local meanings of toilet ownership in regards to other needs.

Although rural areas are characterized by strong social bonds, non-toilet owners are reluctant to use their social network to construct a toilet. A high percentage of respondents (69%) prefer to hire construction labor than request help from relatives. This is also more apparent among non-toilet owners than toilet-owners (p<0.05). This might be because of the perspective that the toilet is a private matter (mentioned by 84% of respondents) and is not considered as an urgent issue.

Environmental factors

A majority of non-toilet owners mentioned environmental factors such as the abundance of places for OD (80.4%) and lack of water (87.5%) as reasons for not having a toilet in their dwellings. The logistic regression analysis found that having fewer neighbors practicing OD was significantly associated with toilet ownership (OR 10.4, 95% CI 3.2-33.6) (Table 2) which is also pointed out in another study in Africa.

Service factors

There is no significant association observed between toilet ownership and health information services available to communities, although another study in Africa found that households with more exposure to health information through follow-up health visits and proximity to a health center are more likely to have a toilet.

Structural factors

The survey identified that structural factors such as economic status (based on assets index) in a community are a significant determinant of toilet uptake. Structural factors such as poverty and government policy for alleviating poverty also can inhibit sanitation uptake. Current government policy such as a subsidy for house improvement can create an environment of dependency among the poor. Thus people may feel unable to build a toilet without external support.

Potential strategies derived from the Ottawa Charter

Corresponding to these identified factors across the range of determinant categories, strategies can be recommended as derived from the five strategy groupings promoted in the Ottawa Charter as presented in Table 2.

<table>
<thead>
<tr>
<th>No</th>
<th>Ottawa Charter</th>
<th>Potential strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improve individual skills</td>
<td>Focus on personal convenience and local values in raising awareness and motivation about sanitary practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Provide more information on health, toilet construction, and maintenance.</td>
</tr>
<tr>
<td>2</td>
<td>Community action</td>
<td>Improve the participation of traditional healers and traditional leaders in using local values and norms for facilitating change and anticipating cultural influence on toilet building.</td>
</tr>
<tr>
<td>3</td>
<td>Supportive environment</td>
<td>Improve rural infrastructures such as road and water supply to support toilet construction and hygiene practice.</td>
</tr>
<tr>
<td>4</td>
<td>Healthy public policy</td>
<td>Redesign subsidy policies to better target and reduce dependency on subsidies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Incorporate sanitation issues into traditional village regulations.</td>
</tr>
<tr>
<td>5</td>
<td>Reorient service</td>
<td>Aim to reach the remote population and provide support for construction that considers local norms/principles of building</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use local calendars to adjust the program timing to suit local priorities and activities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Establish a local service for maintenance and safe disposal that considers local values.</td>
</tr>
</tbody>
</table>

4. CONCLUSION

This study highlights some cultural beliefs and social norms that can affect motivation and perceived barriers for sanitation uptake by the majority of non-toilet owners in this community. The importance of local values relating to religious ceremonies, the location of a ‘dirty toilet’ and maintaining ‘purity’ of their dwelling should be carefully considered in order to anticipate the perceived barriers and risks to toilet construction as well as to facilitate acceptance of reusing human waste as fertilizer. Other individuals, environmental and structural factors were also found to contribute to the sanitation uptake and sustainability. Because of the importance of the local values and norms and their interaction with other factors in rural communities, future sanitation programs need to comprehensively assess determinants and take local
priorities and needs into account as well as assessing wider factors. It is recommended that the ecological model of the Ottawa Charter be used for that purpose in order to assist local professionals in tailoring interventions to fit with local determinants and priorities. This paper provides an example of how this approach can guide us in identifying the range of issues across determinant categories and then designing corresponding strategies to address issues.

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We have no conflict of interest to declare.

REFERENCES