Research Paper

Cultural determinants of sanitation uptake and sustainability: local values and traditional roles in rural Bali, Indonesia

Ni Made Utami Dwipayanti, Shannon Rutherford and Cordia Chu

ABSTRACT

There is a wealth of literature indicating that socio-cultural understanding is crucial in the implementation of sanitation programmes. However, in Indonesia, the exploration and response to this understanding in regard to sanitation uptake and sustainability remain weak. This study aims to gain an understanding of the cultural determinants underpinning sanitation issues across all sanitation stages in one part of Indonesia in order to address both uptake and sustainability.

A qualitative exploratory study in two rural communities in Bali identified some cultural values and traditional roles that can affect sanitation uptake and sustainability. A set of values relating to harmony and purity, and community and individual roles defined by culture appears to modify the perception of risks and barriers, and sets priorities for resources and commitment. The paper also discusses how to translate the understanding of local values and roles into action strategies in order to improve sanitation uptake and sustainability.

Key words | cultural determinants, local values, rural Bali, sanitation uptake, sustainability, traditional roles

Ni Made Utami Dwipayanti (corresponding author)
School of Public Health, Jl. PB. Sudirman, Udayana University,
Denpasar, Bali 80234,
Indonesia
E-mail: *nimadeutami.dwipayanti@griffithuni. edu.au*

Shannon Rutherford
Cordia Chu
Center for Population and Environmental Health,
School of Environment,
Griffith University,
170 Kessels Road, Nathan, Brisbane, Queensland 4111,
Australia

INTRODUCTION

In developing countries, 2.4 billion people lack access to safe sanitation and this situation contributes to many public health issues such as diarrhoea, helminth infections, malnutrition and stunting among children (WHO/UNICEF 2015). Since the establishment of the millennium development goals, however, little progress has been made in extending improved sanitation access to the poor in rural areas, while the issues relating to the long-term usage and functioning of sanitation systems require more consideration. The new sanitation target of Sustainable Development Goals (SDGs), which is to achieve universal access to equitable and adequate sanitation (UN 2016), poses a great challenge to a developing country like Indonesia, where only 47% of the population have access to safe sanitation and 20% of the population are still practising open defecation (OD), mostly in rural areas (WHO/UNICEF 2015). Although the Government of Indonesia has implemented a national programme to improve access to sanitation in rural areas, named STBM (community based total sanitation), progress has varied from district to district (UNICEF 2013). Cultural diversity in Indonesia, with more than 230 million people speaking more than 300 languages (Taylor 2003), might be one of the reasons for the programme's lack of success. There has been criticism that the national programme has ignored the cultural and social context of Indonesian communities (Stein 2009; Engel & Susilo 2014).

Socio-cultural understanding is important to the success of a sanitation programme. Socio-cultural aspects may affect the acceptance of a technology in a particular community (Avvannavar & Mani 2008; Murphy *et al.* 2009). Some sanitation planning and assessment frameworks also include cultural aspects to ensure the sustainability of sanitation infrastructure (Brikké & Bredero 2003; McConville & Mihelcic 2007; SuSanA 2007). Recent studies from elsewhere have shown that many issues of sanitation access are related to cultural values and traditions. For example, in India, a quantitative study showed that the religious composition of a neighbourhood affects exposure to a sanitary environment, and can explain the rate of infant and child mortality (Geruso & Spears 2015). Qualitative studies in India also have shown that beliefs about purity and pollution can explain why the toilets provided have not been used (Coffey *et al.* 2014; Routray *et al.* 2015).

Understanding culture requires the understanding of both cultural values and social systems (Geertz 1973). In term of cultural values, Douglas (1978) provides a valuable insight into sanitation and hygiene, suggesting that different cultures develop different values of what dirt is, which are based on a system of order in every culture. She suggests that the perceived risk of pollution is very culturally influenced and is not merely attributed to knowledge based on medical health standards. For example, people of a certain caste might refuse to use a toilet because of the polluting effect of entering the toilet space (Routray *et al.* 2015). A review by Jewitt (2011) summarises the worldwide variation in cultural values relating to excrement, finding that variation exists in the level of tolerance to contact with human excreta, thus creating challenges for water and sanitation interventions.

In regard to social systems, Bisung & Elliott (2014) use Bourdieu's concept of social capital to explain that in the context of the water-health nexus, social capital can shape individual behaviour by enforcing social control and facilitating collective action in communities such as action to improve access to facilities. The style and level of participation in community actions are determined also by community characteristics (e.g., complexity of social structure, existing values, social and economic goals, acceptability of the change-agent, degree of internal control and existing involvement in community) (Bracht & Tsouros 1990). Ignoring these characteristics will hinder successful participation.

Although understanding culture is generally accepted as an important aspect in development projects, the issue of how to respond to this understanding remains challenging (Hamlin 2001; Avvannavar & Mani 2008; Routray *et al.* 2015). Generally, sanitation development programmes are implemented by professionals with a technical and health background but without cultural understanding. Most studies on sanitation intervention in Indonesia focus on individual, socio-economic, or technological aspects with less focus on cultural and social aspects (e.g., Roma & Jeffrey 2010; Arifin 2013; Cameron *et al.* 2013; Komarulzaman *et al.* 2016). Very few studies provide an example on how to respond to cultural understanding (e.g., Sarwono 1993; Jamasy & Shatifan 2011). There is an urgent need to provide a systematic way for local professionals to explore the local culture and assist them to incorporate those understandings in a sanitation programme.

In order to systematically achieve the equitable and adequate sanitation access of the SDG, sanitation needs to be considered as a complete system, so that it is used by all and functions continuously (Kvarnstrom *et al.* 2011; Verhagen & Carrasco 2013; UN 2016). Thus, it is necessary to consider the cultural aspects across all the life stages of the sanitation system in order to improve both the acceptance and the sustainability of sanitation facilities. A review of the sanitation literature suggests that the sanitation life stages to be considered are acceptance and construction in the uptake stages, and utilisation, maintenance and safe disposal for the sustainability stages (Dwipayanti *et al.* 2017).

This paper examines the cultural aspects of sanitation uptake and sustainability across the sanitation life stages in a rural setting in Indonesia by examining the influence of culture on environment, village policies, individual perceptions and sanitation service (Figure 1). For this study, a case study in rural highland Bali, which holds strongly to its traditional culture, shows how cultural aspects can influence sanitation uptake and sustainability. Despite the number of studies of Balinese culture, this is the first to examine the cultural beliefs and norms as they relate to sanitation. By providing this analysis and illustrating the developing of local actions, we aim to provide further understanding for professionals with a
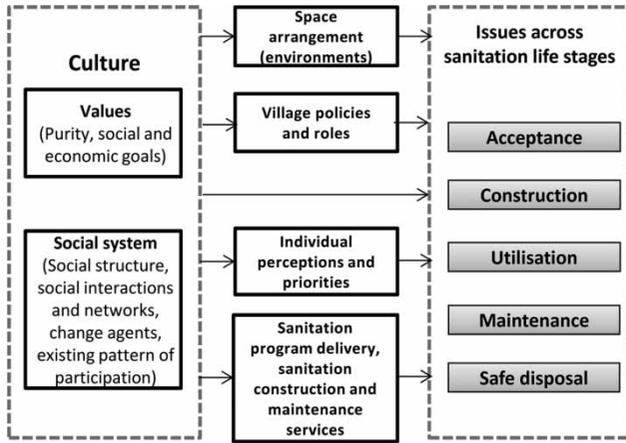
Figure 1 | Cultural aspects of sanitation uptake and sustainability.

non-anthropological background on how to respond to local cultural understandings.

BACKGROUND OF BALINESE CULTURE

To understand culture and sanitation in rural Bali, one must first have insight into the Balinese culture. The majority of the population of Bali is the Balinese ethnic group, who practise the Bali-Hindu religion. The world view of Bali-Hindu 'divide[s] reality between *sekala*, the material realm we know through our senses, and *niskala*, the realm of the unmanifest' (Barth 1993; Hobart *et al.* 2001). Within this view, 'material causality is only a small part of the causalities that govern our existence' (Barth 1993). These other causalities include magic, ancestral pleasure, *karma pala* (the belief that what people experience today is the result of their own previous acts) and spirit actions. Another belief is the importance of harmonisation of relationships between humans on the one hand, and the upper world (*parahyangan*/God), the middle world (*pawongan*/other humans) and the lower world (*palemahan*), both physical (e.g., plants, animal, land and water bodies) and spiritual (daemons), which is called the Tri Hita Karana principle (Suwantana 2015). The Bali-Hindu religion is a practice-oriented religion (Geertz 1973 cited in Nakatoni 2003), in which the preparation of offerings (*banten*) and perform-ance of religious ceremonies to maintain harmony play an important part (Hobart *et al.* 2001; Nakatoni 2003).

One important characteristic of the Balinese culture is that people orient themselves spatially by the cosmological system of *kaja* (mountainward)/*kelod* (seaward) (Kagami 1988; Hobart *et al.* 2001). This order also has an additional religious meaning of purity/pollution, where *kaja* is the 'sacred direction' and *kelod* is the opposite (Kagami 1988). This concept of space is the basic rule in Balinese architecture, dividing the space of family compounds, temples and village areas into three main categories (*Tri Mandala*), namely, *utama* (upper), *madya* (intermediate), *nista* (lower). This has obvious implications that restrict the location of a toilet.

Social organisation in Bali is based on traditional (*adat*) village systems rather than the national legal system. Custom villages do not necessarily coincide with the admin-istrative village boundaries. The custom villages, led by a *bendesa* (traditional leader), mainly manage the religious ceremonies, traditional customs and social activities based on their customary regulations (*awig-awig* or *adat* law) (Hobart *et al.* 2001). These regulations and customs differ for different villages (Sujana 1999; Hobart *et al.* 2001). In the *adat* structure, adult men (with their female partners) have certain rights and responsibilities, which include prep-aration for local temple ceremonies, rites of passage of a member and other types of community work. These are considered constant and time-consuming, and are gender based (Hobart *et al.* 2001; Nakatoni 2003). Each member of the *adat* community has equal rights regardless of their caste membership (Hobart *et al.* 2001).

METHODOLOGY

The study presented in this paper was guided by an analysis of cultural values, norms and social system informed by the literature on values related to sanitation (Douglas 1978; Avvannavar & Mani 2008), social networks (Bourdieu 1986; Bisung & Elliott 2014) and community characteristics that influence participation (Bracht & Tsouros 1990), as well as the literature on Balinese culture. The influences of these cultural aspects on sanitation development are explored across the sanitation stages (acceptance, con-structions, utilisation, maintenance and safe disposal) (Dwipayanti *et al.* 2017).

The study setting

For this study, two traditional (*adat*) villages – Muntigunung (1,500 households) and Pucang (150 households) – in highland areas, were selected within the catchment areas of the Kubu II Community Health Centre in Karangasem district, Bali. *Adat* villages were selected because the social bonds are stronger than in the state government administrative village units (Hobart *et al.* 2001). Kubu sub-district has the lowest sanitation coverage (49.7% in 2015) in the district (MOH 2015). The population of Kubu sub-district is 125,548 with 314 people/km^2, and 38% of the households were classed as 'poor' in 2013 (GBP 2013). Both *adat* villages depend on subsistence agriculture with only a small proportion using agriculture for cash income. These *adat* villages were selected within two large administrative villages based on the uptake level of toilets in the sub-district since the national sanitation program (STBM) began. The first case was selected from an administrative village having the highest uptake, the second case was selected from a village having a very low uptake. Both *adat* villages include a mixture of households who have or have not had exposure to the STBM programme. Both villages still have a significant proportion of households not having a toilet and practising OD. The average proportion of households practising OD in the Karangasem district is 36%. The main source of water in both villages is rainwater and most of the toilets are pour flush type (a toilet pan with water sealant).

Methods

The data collection took place from February to April 2015. After a formal introduction to the Community Health Centre and to the village head of the community, the main researcher, who was acquainted with some of the people in Muntigunung (the first village) from previous work, developed a rapport by attending community activities and familiarising herself with the local customs. The researcher was assisted by a young guide at each village to travel within the village and visit houses to cover all different sections of the villages. Potential participants were suggested and introduced by community leaders and local sanitation workers. Participants were recruited based on their availability and willingness to participate, aiming for a wide

variety of economic levels, sanitation status and experience. New interviewees were recruited until we reached saturation of information in each village.

In-depth interviews with households with either the head of household or his wife (15 toilet owners and 19 non-toilet owners, with a balance of genders) covered issues related to preferences, values and beliefs related to sanitation service stages, i.e., acceptance stage, construction of toilet, utilisation, maintenance and waste disposal. All interviews were audio recorded and conducted in a mix of Bahasa Indonesia and Balinese, which is also the mother tongue of the main researcher/interviewer, in order to understand local practice and decision-making about sanitation. In-depth interviews were also conducted with the community leaders and other community stakeholders. Extensive field notes on impressions and observation of social and environmental aspects were also taken.

Interviews were transcribed but not translated into English for analysis. The preliminary coding was also discussed with a local public health researcher to capture all codes that emerged from the data. The classification and sorting processes of transcriptions and field notes were supported by the NVivo 10 software. The cultural related perspectives towards sanitation practice and sanitation facilities are explored across the sanitation stages and are grouped into some factors. These perspectives were re-categorised into groups of local values, norms and social structure underpinning those perspectives. The analysis of the culture used a broader system of values and norms explained in the literature about Balinese culture to understand the meaning of, and implications for, sanitation practice among the informants (Coffey *et al.* 2014).

The ethical clearance was obtained from the Griffith University Ethics Committee (GU Ref. No. ENV/35/14/HREC). A study permit was also obtained from the Bali Provincial Government and Karangasem district government.

FINDINGS ON CULTURAL ASPECTS INFLUENCING SANITATION UPTAKE AND SUSTAINABILITY IN RURAL BALI

In regard to the process of accepting and maintaining sanitation practice, the interviews revealed that factors in each

Table 1 | Factors relating to sanitation life stages and programme implementation which are affected by cultural values and norms in rural Bali

Sanitation service stages	Factors	Cultural perspectives in regard to sanitation	Cultural value/norms
Acceptance	Perceived health risk of unhygienic behaviour	Harmony needs to be maintained with non-material world, which has great influence on illness	H
	Perceived risk of current defecation place	Defecation and disposing of human excreta in dirty (*nista*) place such as backyard (*teba*) and valley (*pangkung*) is appropriate; no problem as long as it is not in a pure place	P
		Women's safety is not an issue when OD	H
		It is not accepted to pollute other people's field/property	H
		It is important not to pollute (by OD) or disturb the unseen world, because it could harm/cause misfortune	H/P
	Women's role in sanitation program	Women have less role in decision-making for toilets	R
		Due to religious work, women have limited time for participating in participatory programme	R
Construction	Competing financial priorities	Religious ceremonies as competing priorities to toilet	H/P
		Responsibility to contribute work and money for village ceremonies and development as economic burden for poor households	H/P/R
		Contribution of work and money for neighbours' ceremonies add to economic burden of poor households	H/R
		Construction priority based on purity level of building	P
	Construction procedure	Toilet should be built and completed in one phase, so that it only needs one purifying ceremony	P
	Perceived availability of space for toilet	Toilet should be placed in dirty place	P
		Toilet should not be attached to a main (pure) building	P
	Perception of issues as private or public	Sanitation can/cannot be ruled (included) in *awig-awig* (custom regulation) by *adat* (custom) village because it is public/private issue	R
Utilisation	Perceived risk of sharing	It pollutes the pure status if toilet is shared with others of lower status	P
Maintenance	Perceived spiritual risk of toilet location	Wrongly placed toilet can disturb/pollute the unseen world and it could harm/cause misfortune	H/P
	Perception of issues as private or public	Damaged individual toilet is a private responsibility	R
Safe disposal	Perceived risk of waste treatment	Contact with human excreta can harm (*caruh*) because of its polluting nature (*ngeletehin*)	P

Notes: Cultural value/norms.

H: Harmony and balance – *Rwa Bineda* (the nature of opposites): *Sekala* and *Niskala* (seen and unseen world).

Tri Hita Karana (Three harmony): Harmonisation human with God; Harmonisation human with human; Harmonisation human with environment.

P: Purity/pollution – *Tri Mandala* Concept (space arrangement based on purity/pollution of a place); *Panca Yadnya* (compulsory religious ceremonies) some with purifying purpose; Purity of human body.

R: Roles defined by culture – Role of *Adat* (custom) communities; Responsibilities of community member; Men's role in decision making; Balinese women's responsibility for ceremony preparation; Role of traditional healers.

sanitation stage (from acceptance to safe disposal), that is, the perceived risk, perceived barriers, priorities and perceived role, are influenced by cultural perspectives, although each individual is influenced to a different extent. Table 1 represents the factors relating sanitation life stages and programme implementation (column 2) and the cultural perspectives (column 3) which affect each of the factors.

Drawing on the knowledge of Balinese culture provided in the earlier section, the factors which affect each stage of sanitation can be explained by thee interlinking categories

of values and norms: namely, balance and harmony, purity/pollution and traditional roles defined by culture (Table 1, column 4).

Balance and harmony

The desire for balance and harmony between human and other beings influences how Balinese people in this study area perceive the cause of illness, prioritise their expenses and prioritise support from their social network. This

desire works to reduce the demand for a toilet and forms a competing priority against the work and expenses necessary for a toilet.

The supernatural world (*niskala*/unseen), which is beyond human control, is perceived as the power that controls this balance and illness. Due to this strong belief, hygienic practice through toilet use, which is material causality, is not seen to have a significant effect on their health.

Conducting ceremonies to maintain this harmony in Balinese communities is seen as compulsory and ensures protection by the upper spirit world. There is also a tendency in these religious ceremonies that expenses for festivals (celebration with guests and sharing food) are bigger than the expenses for religious offerings. The priority for religious ceremonies can affect how people prioritise their expenses, often competing with resources allocated for a toilet. As many informants mentioned, people would spend millions of rupiah for ceremonies, but would say they have no money for a toilet. For households with better financial capacity, this issue is reduced because they have the ability to afford the expenses both for ceremonies and for a toilet.

Harmony between humans is also maintained through strong reciprocity and conflict avoidance among community members. The contribution of work and resources to ceremonies of one's neighbours and relatives is also seen as a high priority – and the giver expects similar contributions in return – thus adding another competing expense to a toilet. In terms of reciprocity to construct a toilet, from the interviews, the impression is that asking a neighbour to help with ceremonies, constructing family temples or houses is common, but asking the same for construction of a toilet is considered small work and not as important as a house or other religious work. This perspective can also have an effect in the maintenance stage when the toilet is broken: network support from neighbours is rarely requested, which means that a longer time is required to rebuild or repair the toilet.

As indicated by informants, conflicts should also be avoided by not using other people's fields for defecating, which may serve as a driver for a toilet. On the other hand, interviews also reveal that women do not have privacy and safety concerns when practising OD, perhaps because of this conflict avoidance between members, and this factor thus reduces demand for a toilet.

Purity/pollution

Harmony and balance explained above are also maintained by maintaining purity in these communities, which is at the heart of many of their actions. For sanitation, the concept of purity can influence space arrangements and construction priority as well as construction procedure, which eventually can affect the appropriateness of OD and the consideration of toilet construction.

Almost all informants consider defecation as a polluting activity which should be located in lower (*tebenan*) or dirty (*nista*) places such as the bush in the 'lower land' or the backyard of their compound. Thus, the informants say that any waste present in these areas or OD practice in these locations is 'appropriate' or not polluting. It would be considered inappropriate and polluting if those activities were conducted in a pure place such as the upper side of a compound. This view can reduce the motivation for a toilet in rural areas, where generally, households are surrounded by a large area that is assigned as a *tebenan* part.

If people consider building a toilet in their compound, similar consideration is applied, that is, to locate the 'dirty' toilet in the lower part. As pointed out by informants, difficulty will arise for some households who have limited land, and who have used up their dirty space for other building functions. Traditionally, a toilet is not listed in Balinese architectural buildings of a family compound, and nowadays rural communities still commonly do not include a toilet in their initial building plan. The polluting nature of a toilet consequently does not allow a toilet to be attached to other buildings which are pure in nature such as the main bedroom building where one of the rooms is used to locate their shrine. In addition, restriction on the location of a toilet is also influenced by a belief that certain places surrounding the house are the home of particular spirits. This space arrangement and restriction, thus, adds more complexity in considering not only the construction of a new toilet, but also the maintenance of the existing toilet. A few toilets owned by study informants (five out of 15 toilets) were demolished because it is believed they were wrongly placed and had consequently caused a family member to be spiritually harmed (*pamali*). Apparently, some families only identified this issue after one of the family members became sick, particularly a young child,

through the mediation of a *balian* (a traditional healer who is the spirit medium to convey gods, ancestor or spirit message (Hobart *et al.* 2001).

As actually illustrated by some informants, the 'dirtiness' of a toilet also puts toilets at the bottom of the list of dwelling improvement plans. Moreover, the need for purification rituals of new equipment (such as motor vehicles) or facilities (such as buildings and toilet) influences their decision not to consider building a toilet in several stages, as is often suggested by a sanitation programme facilitator in order to spread the toilet cost.

The value of purity can also influence sanitation at the utilisation and safe disposal stages. A person who has been purified with ceremonies should avoid any 'polluting' activities, for example, using the same facilities such as a toilet or water bucket that have been used by other people with a lower purity level. This means that the concept of a shared toilet is not acceptable for certain groups. Eventually, although a toilet is available, in some cases the toilet is not used by all. This purity concept also explains why a person is reluctant to carry out polluting activities such as processing human excreta into fertiliser, as it is believed to cause harm and illness (*caruh*), requiring a complicated ceremony to cure. For that reason, sustainability in regard to safe reuse of waste product would be hard to accept in this community.

Traditional roles defined by culture

This research identified that roles of different individuals and groups in society that are defined by their culture also influence some responses in the community that may affect the success of a sanitation programme. Balinese communities organised under traditional (*adat*) structure define certain roles and responsibilities based on cultural values. The common perceived role of *adat* communities among informants is that *adat* governance is only responsible for religious activities and other *adat* matters related to their *adat* regulation (*awig-awig*). As explained by a community leader (#C02), *adat* regulates only public issues; no sanction could be applied to private issues such as a toilet. If the sanitation issue could be accepted as a public issue by *adat* communities, it would impact a sanitation programme positively, because *adat* communities strongly bind their members to put common needs (such as

community level ceremonies) above private needs and members must accept any *adat* decision and participate in any *adat* activities (Hobart *et al.* 2001). As an example, when the *adat* community of a case village perceived that defecation on other people's fields was a public issue, they agreed to regulate the issue through *adat* by banning this activity, and assigned a village-owned plot of land as an OD place. However, the strength of this bond within a community also varies for different villages and different unit levels in communities. For instance, in the case village, a stronger bond is found in the smallest *adat* community groups (*kelompok*) than at the *adat* village level.

The patriarchal system in Balinese communities places males as the decision-makers both at family and at the community level. Roles and responsibilities are also defined clearly based on gender (Hobart *et al.* 2001; Nakatoni 2003). Given this, an attempt to gain full involvement of women in any sanitation programme to deliver sanitation messages would not be easily achieved. First, attending community meetings and deciding what to build in their compound is the man's role and responsibility. This explains why female sanitation cadre (community voluntary workers) often feel powerless because their voice is rarely considered by males or even other females.

Second, Balinese women are assigned responsibilities for ceremony preparation which are very time-consuming despite other regular domestic and income generation work (Nakatoni 2003). Most female gatherings in the communities have long and demanding agendas, so it can be difficult to insert other activities such as sanitation discussion in such gatherings. This responsibility could affect how Balinese women prioritise their time, work and concentration for their expected roles. Attending a sanitation meeting or talking about sanitation might require sacrificing valuable time, perceived as more important.

Another important role in the Balinese community in regard to the sanitation issue is the person who is believed to cure or solve illness. People commonly seek assistance from both medical doctors and traditional healers in solving illness (Sujana 1999; Hobart *et al.* 2001). The importance of traditional healers in identifying causes of illness or misfortune related to purity/pollution or spiritual mistakes was found to still be a prevailing part of health care practices. For example, as described in the analysis of 'purity',

the 'dirtiness' of a toilet is identified by the traditional healers as disturbing the harmony and causing harm to the families. Hence, the assistance of these traditional healers could support sanitation by providing consultation about the appropriate place for a toilet prior to construction.

Some sample quotes from interviews are provided in the online supplementary material, Table S1.

DISCUSSION

The influence of cultural values on sanitation uptake and sustainability

This study shows that sanitation uptake (from acceptance to construction stages) and sustainability (from utilisation to safe disposal stages) in rural Bali are strongly influenced by cultural values. In Bali, the dominant values are those of harmony (balance) and purity. These can be used to explain factors such as perceived risks, priorities and perceived barriers in regard to each stage of sanitation service.

The perspective that physical causes contribute less to illness than unseen causes such as supernatural beings and *karmapala* (law of causality), makes people believe that illness is beyond the control of physical matter such as dirt from human excreta. The influence of this belief about supernatural powers and other like factors regarding medical causes has been discussed in the anthropology literature (Chu 1993; Green 1999). Because of this belief, people have difficulty in relating health risks to defecation practice. The argument for building a toilet to control disease then becomes less persuasive. For many toilet owners in the study villages, this perspective is sometimes modified with a better education level.

Moreover, the principle to maintain harmony between community members creates strong community cohesion. This could partially explain why women informants tend to mention a low risk of safety in practising OD. Traditionally, most Balinese women and some women in these communities still consider bathing unclothed in open areas acceptable. In contrast, concerns regarding women's safety and privacy are strong drivers for a toilet in the case of rural India (O'Reilly & Louis 2014; Routray *et al.* 2015), while safety is also a concern for many women

in urban Uganda regarding public toilet usage (Kwiringira *et al.* 2014). Therefore, understanding different values related to women's safety and privacy is necessary in order to decide an appropriate message for sanitation promotion.

The study findings are also consistent with Douglas (1978) purity concept and other findings, in that values of purity influence sanitation decision-making (Jewitt 2011; Coffey *et al.* 2014; O'Reilly & Louis 2014; Routray *et al.* 2015). The symbolic meanings of the toilet, defecation and human excreta are all related to the perceived risk, which is not physically harmful but spiritually polluting and thus a risk. Illness and misfortunes are often linked to this pollution. This study confirms that the purity concept affects the perception of risks in having a toilet at home, or in using a toilet (Routray *et al.* 2015), and affects the acceptance of treated waste for reuse (Jewitt 2011). This study adds that this concept determines how people view the risks of sharing toilets and the risks in choosing a location for 'dirty' activities, and that perception affects the view of appropriateness of current practices and the availability of space for a toilet.

To maintain harmony and purity the community places a high priority on religious activities in households, neighbourhoods and communities which can successfully compete with sanitation for resources. Competing priorities for funding is an important barrier for people who already prefer to use toilets but have no intention of building one (Jenkins & Scott 2007). Therefore, financial capacity is an important factor that enables households to fulfil both their cultural and their health needs. When behaviour and activities based in cultural values compete for priority of resources and time, any attempt to modify the priorities needs to work *with* these values (Hahn & Inhorn 2009). For instance, there is potential to use the principle of harmony in promoting environmental protection and avoiding conflict with others by adopting the usage of toilets. This principle has been suggested as a way of encouraging *adat* communities in Bali to manage solid waste (Wardi 2011; MacRae 2012).

Influence of culturally defined roles on sanitation programme

In any community, social roles and responsibilities are defined according to cultural values and norms. This study

suggests that some of the roles can facilitate or hinder the implementation of aspects of sanitation programmes.

First, the social bonds in an *adat* community are very strong, providing social capital for community activities, especially religious activities (Hobart *et al.* 2001). However, these responsibilities can be very burdensome. Thus, people are reluctant to include sanitation in the *adat* system because of the extra work involved and because it is not related to religious activities. However, *adat* support for sanitation could be gained by convincing them that sanitation is a public issue, and can be regulated by *adat* communities as shown in one case study community. This exemplifies how the existing values about sanitation and organisational structure can facilitate participation in a sanitation programme (Bracht & Tsouros 1990). When the issues are managed by *adat* governance, the agreement will socially bind their members and will function as an injunctive norm through peer disapproval of unaccepted behaviour from their group (Shakya *et al.* 2015) as well as motivate collective actions (Bisung & Elliott 2014). However, it is also important to note that the strength of the bond and organisational management of *adat* life also varies for different communities and for different levels. Hence, understanding *adat* influence in each sub-community group is critical to considering culture in sanitation programmes in these communities. It is also important to ensure that the process of using this social bond takes into account the local values and norms to avoid social discrimination against vulnerable members of the community (Engel & Susilo 2014). A good example of *adat* involvement in Bali is in managing solid waste. The government of Bali annually conducts a competition of '*Desa Sadar Lingkungan*' (Village with Environmental Awareness) which is based on the *adat* village (not the administrative village). In this competition, an *adat* village is expected to be responsible for the cleanliness, health and sustainability of the environment (GBD 2016). Timing is also important. In order to prevent a burden on further community work, the time of entry of any participatory programme needs to be carefully chosen to avoid religious festivals. Further, other studies suggest that starting a programme just after harvest time when people have some cash can be helpful (Jamasy & Shatifan 2011).

Second, women and men have distinct roles in the community and in the household based on cultural norms. Many programmes related to water, sanitation and hygiene aim to empower women because many water, sanitation and hygiene activities are attached to women's roles and needs (O'Reilly 2010). However, gender roles can hinder women's participation in the programme. In this study, the important role assigned to women is preparation for ceremonies, while men's responsibility is household decision-making and attending community meetings. These separate roles affect the availability and acceptance of women as change agents in sanitation promotion activities. Another study in Bangladesh found that the local value of protecting women's privacy conflicts with the expected role as a change agent as designed in the latrine promotion programme (O'Reilly 2010). Acceptability of change agents is an important community characteristic that may affect participation (Bracht & Tsouros 1990). In order to gain effective participation, the form of involvement of women in supporting sanitation programmes should be designed so as not to affront local norms and roles (O'Reilly 2010).

The role of traditional healers also is important because they are the source of advice of any practice related to beliefs surrounding supernatural powers and purity. Other studies have also found that support and involvement of religious leaders, as a source of knowledge in regard to religious beliefs, can strongly motivate communities to adopt sanitation and other health behaviours (Green 1999; Jamasy & Shatifan 2011). Hence, the path of influence requires different methods of involvement. For example, in Muslim communities, religious meetings have been augmented with discussions regarding sanitation and hygiene practices (Jamasy & Shatifan 2011). In rural Bali, traditional healers could assist with the identification of a proper place for a toilet, and to gain the healers' support we could begin by convincing them that sanitation is a public need, while also respecting their knowledge.

Recommendation for future design of sanitation programmes

From the findings, it is clear that it is crucial to understand existing local beliefs and priorities before implementing a sanitation programme in order to identify appropriate

Table 2 | Potential strategies that incorporate cultural values and norms to facilitate sanitation uptake and sustainability for the case study area

Targeted factors	Potential strategies	Values/ Norms
Modifying perceived risk to acceptance	Beliefs regarding harmony between humans and humans can be used to increase the importance of avoiding conflict because spreading excreta can harm/offend others (increasing risk of OD)	H
	Beliefs of harmony between humans and environment can be used to increase the importance of protecting the cleanliness of environment and avoiding disturbance of surrounding spirits (increase risk and barrier for OD)	H/P
	Purity concept of the self could be used to expand the purity definition to include physical hygiene, to maintain purity and reduce harm	P
Strategy to leverage priority for sanitation	Adjusting time for starting sanitation programme, consulting with local *adat* leaders and village leader on time period when people's resources are not needed for major ceremonies	P/R
Strategies to reduce perceived barriers to, and perceived risks of, construction	Use *Tri Mandala* concept of space in developing household understanding of their specific context in locating their toilet	P
	Encouraging community to consult with local traditional healers if there are difficulties of space availability or appropriateness	P/R
Strategy to anticipate perceived risk of utilisation	Ensuring no perceived pollution risk from sharing a toilet in targeted households and or community, before suggesting shared toilets	P
Strategy to anticipate perceived risk of waste treatment	Providing alternatives of sustainable sanitation solution that have less/no contact with human excreta in the treatment process. Explore the extent of tolerance towards using the final product in agriculture	P
Proper involvement of whole community	Using *Tri Hita Karana* principles to encourage *adat* communities to see sanitation issue as public issue and *adat* responsibility, in order to achieve collective action for sanitation improvement. There is a possible synergy with the scheme of Village with Environmental Awareness	H/R
	Women are a trusted source of information regarding types of offerings in ceremonies, but not for toilet-related information, if division of roles is strict; do not force a community to have women cadres in sanitation programme	R
	Build rapport and gain support from traditional healers to assist community in reducing risk of wrongly placed toilet	R

Notes: Cultural values/norm.
H, Harmony and balance; P, Purity/pollution; R, Role defined by culture.

facilitating values and approaches for effective participation. That understanding is necessary for the future design of sanitation programmes. Table 2 provides examples of how to use cultural understanding in identifying appropriate responses to those beliefs and customs in sanitation programmes. While these are very specific to these case communities, the key concepts of influence of religion, traditional healers, competing time and resources priorities, timing of programme implementation, gender roles and responsibilities, local governance structures and scope of influence are factors that should be considered in every community. Although cultural factors are important to consider, examining cultural determinants on their own is insufficient to fully understand the success of sanitation uptake and sustainability.

Limitation

As a case study, this study was not able to generalise the cultural factors in these communities into the greater communities of rural Bali. However, the process and findings of this study can provide an insight, if applied to other rural communities, that a deep investigation of socio-cultural aspects is very essential in assisting local professionals in designing a sanitation programme for a particular community.

CONCLUSION

This study confirms the conclusions of other researchers that cultural aspects in rural communities provide important

insights for a sanitation programme's design and implementation. This study highlights that in rural Bali, local values of harmony and purity, and culturally defined roles can influence sanitation practice across the life stages and programme implementation. Different individuals have a variety of considerations and motives, based on local cultural values of harmony and purity, which can modify perceived risk, barriers and set priorities in regard to acceptance, construction and maintenance of toilet facilities. In addition, a community's particular definition of community roles could affect the methods for involving different role-players in effective participation. Any sanitation programme needs to work *with* these values and norms. This means adapting the sanitation practice to the local needs and values and making the implementation and maintenance process fit with local norms and customs. Very few case studies show in depth what the local values and norms are or how to use those understandings in developing a sanitation programme. If our goals are to reach universal access of adequate sanitation, then we must continue to better understand the diversity of barriers that may relate to culture, so as to ensure underpinning influences are considered as much as possible in programme design.

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