



What do consumers think about recycling human urine as fertiliser? Perceptions and attitudes of a university community in South India

Prithvi Simha ^{a,*}, Cecilia Lalander ^a, Anooj Ramanathan ^b, C. Vijayalakshmi ^c, Jennifer R. McConville ^a, Björn Vinnerås ^a, M. Ganesapillai ^{b,**}

^a Swedish University of Agricultural Sciences, Department of Energy and Technology, Box 7032, SE-750 07, Uppsala, Sweden

^b Mass Transfer Group, Department of Chemical Engineering, VIT University, Vellore, 632 014, India

^c Department of Mathematics, School of Advanced Sciences, VIT University, Chennai, 600 127, India

ARTICLE INFO

Article history:

Received 23 April 2018

Received in revised form

30 June 2018

Accepted 3 July 2018

Available online 4 July 2018

Keywords:

Survey

Ecological sanitation

New ecological paradigm

Source separation

Theory of planned behaviour

Wastewater

ABSTRACT

Sanitation systems based on source separation and valorisation of human urine can improve the environmental sustainability of wastewater management. Yet, the social acceptability of such new, resource-oriented sanitation practices have not been assessed systematically. We attempt to address this research gap by reporting the findings of a survey conducted at a South Indian university that evaluated support for urine recycling among 1252 Indian consumers. We place our findings in the context of the Theory of Planned Behaviour, quantify consumer attitude to urine recycling through an exploratory numerical approach, and identify explanatory factors that shape consumer beliefs and perceptions. Overall, a moderately positive attitude was observed: 68% stated human urine should not be disposed but recycled, 55% considered it as fertiliser, but only 44% would consume food grown using it. While 65% believed using urine as crop fertiliser could pose a health risk, majority (80%) believed it could be treated so as to not pose a risk. The respondents' 'willingness to consume' urine-fertilised food was found to be strongly influenced by their willingness to pay. Consumer environmental attitudes, as evaluated using the New Ecological Paradigm scale, did not influence their attitude towards urine recycling behaviour. We thus believe that simply appealing to people's environmental sensitivities is not enough for introducing environmentally-friendly technologies like urine recycling, but that more targeted marketing messages are needed. We find sufficient support among our surveyed consumers for urine recycling but highlight that further research is needed to identify what information and agency will help translate positive attitudes into action and behaviour.

© 2018 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

In the sanitation sector, there is growing recognition that conventional systems in place today will not be able to fulfil the world's sustainability mandate (Guest et al., 2009). Several experts are convinced that the sector is in urgent need for a paradigm shift that transforms sanitation planning, functioning, and management by placing more emphasis on recycling human wastes (Langergraber and Muellegger, 2005; Guest et al., 2009; Larsen et al., 2013).

Over the past few decades, *new sanitation* systems based on source separation and valorisation of various domestic wastewater fractions have started to attract research attention (Lens et al., 2001; Vinnerås and Jönsson, 2002; McConville et al., 2017; Poortvliet et al., 2018). Urine diverting toilets that separately collect human urine and faeces are in use in several parts of the world (von Münch and Winker, 2011; Okem et al., 2013; Cheng et al., 2017). In Northern Europe, source separating sanitation systems are being piloted across several cities such as Sneek (Netherlands), Helsingborg (Sweden), Ghent (Belgium), and Hamburg (Germany) (Skambraks et al., 2017). In many places, source separated toilet wastes are applied to soil as crop fertiliser (Jönsson et al., 2004; Langergraber and Muellegger, 2005).

It has been however been suggested that, people's perceptions and willingness to change their sanitation behaviour can be significantly affected by culture, traditions, and beliefs (Rosenquist,

* Corresponding author. Department of Energy and Technology, Swedish University of Agricultural Sciences, P.O. Box 7032, SE-75007, Uppsala, Sweden.

** Corresponding author. School of Civil and Chemical Engineering, VIT University, Vellore, 632014, India.

E-mail addresses: Prithvi.Simha@mespom.eu, Prithvi.Simha@slu.se (P. Simha), maheshgpillai@vit.ac.in (M. Ganesapillai).

2005; Jewitt, 2011a, 2011b; Nawab et al., 2006; Simha et al., 2017). What people think of human excreta and how they manage it, varies both spatially and temporally (Rosenquist, 2005; Jewitt, 2011b). Jewitt (2011a; p. 765) in fact suggests that “... deeply rooted emotions and taboos associated with human waste often occlude rational responses to its disposal, handling and reuse”. People’s sanitation outlooks and behaviours do not rely solely on apparent logic or scientific knowledge, but may be affected by socio-demographical, cultural, and environmental factors (Black and Fawcett, 2010). These factors might include age, gender, religion, education, income, occupation, and surrounding environment, as well as people’s necessities, circumstances, and aspirations. There is evidence that interventions aimed at improving sanitation tend to fail if they do not consider this social complexity (Black and Fawcett, 2010).

New sanitation systems based on urine diversion require wide behavioural changes, such as users familiarising themselves with diverting-type toilets at home and elsewhere; farmers adopting to new crop fertilisation practices; and, even consumers who are to purchase food grown using recycled toilet wastes as fertiliser (for an overview, see Lienert, 2013). Sociological studies investigating people’s willingness to accept such new sanitation practices have been performed across different settings (Pahl-Wostl et al., 2003; Nawab et al., 2006; Lienert and Larsen, 2009; Mariwah and Drangert, 2011; Lamichhane and Babcock, 2013; Okem et al., 2013; Ishii and Boyer, 2016; Simha et al., 2017). Findings from these studies suggest that a myriad of factors interact and determine whether people/communities think favourably of source separation technologies, if they intend to change their sanitation behaviour, and what would motivate or discourage them to do so. In some studies, surveyed populations with common attributes were homogenous in their stated attitudes and beliefs. For instance, Mariwah and Drangert (2011) found that 84% of the peri-urban residents they surveyed in Ghana, at an agricultural community with little variation in demographic characteristics, agreed that human excreta is a waste, suitable only for disposal. Perhaps similarly, but with contrasting results, Lienert and Larsen’s (2009) review of seven European countries revealed that a majority of the respondents liked the idea of using urine as a fertiliser. Situational and socio-economic aspects of sanitation behaviour are also more evident in some studies than others. For example, a stark contrast in willingness to pay for urine-diverting toilets was reported between residents in Pakistan (Nawab et al., 2006) and the United States (Lamichhane and Babcock, 2013; Ishii and Boyer, 2016).

Based on such findings in literature, it can be suggested that different attitudes to excreta/urine recycling exist in different settings. This is in line with Jewitt’s (2011a,b) assertion of the existence of spatial-cultural differences in sanitation practices and also, in how taboos surrounding excreta are conceptualised. If that is indeed the case, findings of perceptions and attitudes to new sanitation systems from a particular setting may not hold true in another. Hence, further sociological research will be necessary to explore whether new sanitation practices will be socially sustainable in different places, and to support sanitation planning and decision-making with evidence-based case studies.

In 2014, the Government of India launched the Swachh Bharat Mission (SBM), its flagship campaign to promote cleanliness and achieve universal sanitation coverage. The campaign’s aim is to eradicate open defecation, which according to the WHO and UNICEF (2017) was practiced by 40% of the population, as estimated in 2015. Unlike India’s past sanitation schemes (e.g. Nirmal Bharat Abhiyan), SBM has a strong focus on collective behavioural change. It encourages people to adopt and use, “cost effective and appropriate technologies for ecologically safe and sustainable

sanitation”, and “develop community managed systems for solid and liquid waste management” (Ministry of Drinking Water and Sanitation, 2017). However, as Tran (2017) observed in a case study that evaluated the implementation of SBM in India’s Punjab region, understanding people’s expectations about what constitutes appropriate behaviour (e.g. whether or not open defecation carries stigma) and finding ways to change such expectations is key to SBM’s success.

The separate collection and recycling of human urine using urine-diverting toilets is one way of promoting ecologically-sound sanitation but, as discussed above, requires significant changes to people’s sanitation behaviour. Hence, the objective in this study was to understand whether urine recycling will find support among consumers in India. To survey Indian consumers, this study elected to sample a university community in South India (VIT University), following work done elsewhere (Lamichhane and Babcock, 2013; Ishii and Boyer, 2016). Universities offer an interesting platform to evaluate people’s behavioural intentions, since they have been touted as experimental sites for introducing sustainable technologies (Evans and Karvonen, 2010), such as urine recycling. Universities also tend to shape how a country’s youth population could behave as local and global citizens (Tuncer, 2008). This aspect is perhaps more significant to India since it is home to the world’s largest youth population - according to the latest census, the youth (15–34 years) population of the country stood at 423 million people (Central Statistics Office, 2017).

The motivation to report on consumer behavioural intentions was two-fold: Firstly, to the authors’ best knowledge, this is the first study to investigate what Indian consumers think of using human urine as crop fertiliser; Secondly, the results of the present investigation complement those obtained by the authors earlier, where the attitudes of South Indian farmers to new crop fertilisation practices was investigated (Simha et al., 2017). Since this study was performed in a university setting, the results do not represent the urine recycling intentions of all Indian consumers but may be indicative of intentions at other university communities in India. Findings from this study add to the existing literature on socio-cultural aspects of new sanitation systems and also, the socio-technical discourse surrounding environmental technologies in emerging economies.

2. Methodology

2.1. Survey instrument

The survey was conducted at the VIT University campus located in Vellore, South India. All 28,000 people at the university – staff, students, researchers, and faculty were invited to voluntarily respond to an online questionnaire that collected anonymous responses using *Google Forms*. An email with a link to the survey (www.goo.gl/forms/H02ivnYIP5A7XsPn2) was sent using the university’s electronic mailing list and made available for a period of four weeks. Reminder emails were sent at the beginning of weeks 2, 3, and 4. The survey instrument and the study methodology were approved by the university’s research committee.

The survey requested single responses to closed-ended questions that were either binary (yes/no) or multiple choice type. The questionnaire comprised of three sections (Supplementary Information). After seeking participant consent, demographic information including age, gender, affiliation, religion and caste was requested. The next section sought respondent perceptions of urine (cow/human) as a fertiliser (5 questions), their willingness to consume food grown using urine (4 questions), and whether they perceived any risks associated with the use of urine as fertiliser (4 questions). The revised New Ecological Paradigm (NEP) scale was

Download English Version:

<https://daneshyari.com/en/article/8873580>

Download Persian Version:

<https://daneshyari.com/article/8873580>

[Daneshyari.com](https://daneshyari.com)