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Assessing patterns and determinants of latrine use in rural settings: A longitudinal study in Odisha, India



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ABSTRACT

Introduction: Monitoring of sanitation programs is often limited to sanitation access and coverage, with little emphasis on use of the facilities despite increasing evidence of widespread non-use.

Objectives: We assessed patterns and determinants of individual latrine use over 12 months in a low-income rural study population that had recently received latrines as part of the Government of India's Total Sanitation Campaign (TSC) in coastal Puri district in Odisha, India.

Materials and methods: We surveyed 1938 individuals (>3 years) in 310 rural households with latrines from 25 villages over 12 months. Data collection rounds were timed to correspond with the seasons. The primary outcome was reported use by each member of the household over the prior 48 h. We classified use into three categories—"never", "sometimes" and "always/usually". We also assessed consistency of use over six days across the three seasons (dry cold, dry hot, rainy). We explored the association between individual and household-level variables and latrine use in any given season and longitudinally using multinomial logistic regression. We also inquired about reasons for non-use.

Results: Overall, latrine use was poor and inconsistent. The average response probability at any given round of never use was 43.5% (95% CI = 37.9, 49.1), sometimes use was 4.6% (95% CI = 3.8, 5.5), and always/usual use was 51.9% (95% CI = 46.2, 57.5). Only two-thirds of those who reported always/usually using a latrine in round one reported the same for all three rounds. Across all three rounds, the study population was about equally divided among those who reported never using the latrine (30.1%, 95% CI = 23.0, 37.2), sometimes using the latrine (33.2%, 95% CI = 28.3, 38.1) and always/usually using the latrine (36.8%, 95% CI = 31.8, 41.8). The reported likelihood of always/usually versus never using the latrine was significantly greater in the dry cold season (OR = 1.50, 95% CI = 1.18, 1.89, $p = 0.001$) and in the rainy season (OR = 1.34, 95% CI = 1.07, 1.69, $p = 0.012$), than in the dry hot season.

Across all three seasons, there was increased likelihood of always/usually and sometimes using the latrine versus never using it among females and where latrines had a door and roof. Older age groups, including those aged 41–59 years and 60+ years, and increase in household size were associated with a decreased likelihood of always/usually using the latrine versus never using it. The leading reason for non-use was a preference for open defecation.

Conclusion: Results highlight the low and inconsistent use of subsidized latrines built under the TSC in rural Odisha. This study identifies individual and household levels factors that may be used to target behavior change campaigns to drive consistent use of sanitation facilities by all.

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1. Introduction

Sanitation is considered to be fundamental to human health (WHO, 2014). Yet many people, especially those in low-resource

settings, have no access to sanitation. Among an estimated 946 million who practice open defecation, nine in ten of those reside in rural settings (WHO-UNICEF, 2015a,b). Almost 60% of the world's open defecators live in India, most in rural settings (Planning Commission, 2013; WHO-UNICEF, 2014a).

By 2016, the Central Indian government's sanitation programs have already been operational for more than three decades (Planning Commission, 2013). The Total Sanitation Campaign

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(TSC)—the version of the program which is investigated here—was launched in 1999 as part of a comprehensive program aimed to accelerate sanitation coverage in rural areas and make India open defecation free (ODF or ‘Nirmal Bharat’) by 2017. It focused primarily on the construction of individual household pit latrines. The TSC was designed as a “demand-driven, community-led”, “low to no subsidy” approach to total sanitation and was implemented by the state governments (DDWS, 2011).

In the decade of the TSC through March 2010, 64.3 million individual household latrines were reportedly constructed, including 34.8 million latrines in below poverty line households (WSP, 2011). However, a review of the TSC commissioned by the Government of India (GoI) suggested that as many as 72.63% households in rural India practice open defecation even though they have access to latrines (Planning Commission, 2013). This estimate, although higher than others (WHO-UNICEF, 2014a), reveals that latrine access does not always translate into use (National Sample Survey Office, December 2013; Sanan and Moulik, 2007; WSP, 2011). It offers insights into likely reasons for open defecation, even among households that have latrines, including that it is “an established age old practice” with little or no stigma attached to it (Coffey et al., 2014; Ghosh and Cairncross, 2014; Planning Commission, 2013), and generally low awareness of the benefits of hygiene (Banerjee and Mandal, 2011; Planning Commission, 2013). Finally, the scale of the problem reflects certain implementation and program service delivery issues that require strengthening (Ghosh and Cairncross, 2014; WSP, 2011). From a monitoring perspective, it implies that the focus should also be on latrine use rather than only on access and coverage.

Monitoring progress on sanitation has been greatly influenced by the approach adopted by the WHO-UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP). JMP sanitation monitoring elicits data on coverage and household-level use, to a limited extent (WHO-UNICEF, 2015a,b). It does not enable monitoring of individual latrine use. While suitable modifications to the monitoring parameters have been debated in connection with the development of the post-2015 Sustainable Development Goals (SDG), the SDG Target 6.2 remains largely unchanged in regard to latrine use monitoring (WHO-UNICEF, 2014b, October 2015).

Similarly, the Indian government’s routine monitoring system for the rural sanitation sector is limited to periodic tracking of inputs (budget spent) and outputs (latrines constructed). It does not track actual use of latrines (Ganguly, 2008; Planning Commission, 2013; WSP, 2013). Outcomes such as ODF communities are monitored to a limited extent through the “Nirmal Gram Puraskar” (NGP or Clean Village Prize) verification process but latrine use data is not available in the public domain and there is little effort to track sustainability in NGP-winning local governments (WSP, 2013). As a result, implementers are incentivized to prioritize latrine construction over use or sustainable behavior change (Wicken, 2008; WSP, 2013). The consequence, according to some experts, is that the program has been reduced to “a no-gain toilet construction scheme. . . where India built millions of toilets but people (did) not use them” (Jitendra et al., 16–31 January 2014).

Ensuring that populations with access to latrines actually use them requires an insight into the determinants of use (O’Reilly and Louis, 2014; Pattanayak et al., 2009). Research into the successful adoption and sustained use of latrines has revealed a range of factors that may potentially influence use, with health considerations only playing a minor role (Jenkins and Cairncross, 2010; Mara et al., 2010). Research suggests that latrine adoption may be motivated by a “prestige, well-being or situational drive” and that it may vary with gender, age, occupation, life-stage, travel experience, education, wealth and income, and the physical and social geography of the village environment with reference to the availability of good defecation sites around the home and/or villages

(Jenkins and Cairncross, 2010; Jenkins and Curtis, 2005). Factors such as family size (O’Loughlin et al., 2006), privacy and safety for women and girls (Arnold et al., 2010), socio-economic status of the household and female literacy rates (Ghosh and Cairncross, 2014) may be associated with latrine use. Evidence also suggests that a preference for open defecation even among latrine owning households, especially those that received government subsidies for latrine construction versus those that did not (Coffey et al., 2014; Routray et al., 2015), may be a determinant of latrine use. Additional determinants of use may include social cohesion and peer influence (Crocker et al., 2016; Shakya et al., 2014) and access to water, supply-related and structural issues related to latrine construction (Barnard et al., 2013; ICRA, April 2011; Jenkins et al., 2014).

Measuring latrine use, at both household and individual levels, is challenging and a robust indicator for the same is not yet readily available for integration into large-scale household surveys (Bartram et al., 2014; Coffey and Spears, 2014). Despite certain limitations (Curtis et al., 1993; Schmidt and Cairncross, 2009; Zwane et al., 2011), self-report measures, such as a diary or survey, are popular measures of behavior assessment at both household and individual levels. Based on the results of a previously published study (Sinha et al., 2016), which compared various categories of reported latrine use and corresponding sensor-based latrine events, a reported latrine use measure of recall over the previous 48 h has been considered in this study.

The aim of this research is to assess patterns and determinants of individual latrine use over 12 months in a low income rural study population that had recently received latrines as part of the TSC in coastal Puri district in Odisha, India.

2. Materials and methods

2.1. Study context

We conducted the study among 25 villages in rural Puri, a coastal district of Odisha, India, that comprised part of the intervention arm of a randomized, controlled trial (the “Sanitation Trial”) to assess the health impact of rural sanitation under the Indian TSC (Clasen et al., 2012; Clasen et al., 2014). WaterAid and its partner NGOs conducted community mobilization and constructed pour-flush latrines among eligible “below the poverty line” households between January 2010 and March 2011.

2.2. Study design

The study followed a longitudinal design, with repeated follow up of the same population over a period of 12 months. This study design allowed us to explore the patterns of latrine use – the extent to which latrine use varied over seasons (dry hot, dry cold and rainy season), whether use was consistent – and the determinants of use.

2.3. Village and household selection

The sampling frame comprised 50 villages, spread across seven Blocks (district sub-divisions comprising several villages), which were part of the intervention arm in the Sanitation Trial. Villages were eligible for inclusion if they had at least one household that was enrolled in the Sanitation Trial surveillance (had a child under four years and/or a pregnant woman at baseline) with a constructed latrine as a result of the intervention. Of the 46 villages that were found to be eligible, 25 were randomly selected for this latrine use study using Block-level stratification and a computer-generated sequence. All surveillance households in the selected villages were eligible for inclusion in the study provided they had latrines. Eli-

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