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# STARTING CONVERSATIONS TO TACKLE SANITATION IN INDIA THROUGH TV DRAMA: EVALUATION OF *NAVRANGI RE!*

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## Abstract

There is a growing body of evidence from rigorous evaluations demonstrating the effectiveness of education entertainment – 'edutainment'– interventions in achieving development outcomes. Building on this research, this study presents the results of a pioneering quasi-experimental evaluation of *Navrangi Re*, a 26-episode television drama aired in India in 2019. The show was the first ever edutainment broadcast on commercial television in India. It aimed to influence sanitation behaviours through changing knowledge and attitudes, increasing risk perception, stimulating conversations, building collective efficacy, and creating social disapproval against poor faecal sludge management practices. The evaluation compared changes in outcomes of those exposed to the TV show with those unexposed, applying differences-in-differences estimation to a panel of 2,959 respondents. Baseline balance tests show high comparability between exposed and unexposed respondents. It found exposure to the drama led to significant changes in most outcomes with 37% of those who watched at least one episode showing behavioural intent to act, rising to 78% of those who had watched at least seven episodes. The show reached 59.6 million unique viewers, confirming drama as an effective, low cost and scalable tool to engage people around faecal sludge management – a critical and hard to address issue.

**Keywords:** edutainment, FSM, education entertainment, septic tank, faecal sludge management, television, social and behavioural change, evaluation, India

## Introduction

Entertainment education – 'edutainment' – interventions use the power of storytelling to achieve social and behaviour change. They seek to both 'entertain and educate, to increase audience members' knowledge about an educational issue, create favourable attitudes, shift social norms and change overt behaviour' (Singhal & Rogers, 1999:343). Mass media has large reach, making edutainment interventions potentially cost-effective at scale.

The design of edutainment interventions draws upon core communication theories, although there is recognition that more work must be done to fully translate these theories into practical advice to craft better interventions (Ophir, Sangalang & Cappella 2021). Initially, there was a focus on how edutainment interventions impact on individual attitudes, knowledge, and behaviour (Singhal & Rogers, 2002), drawing upon, for example, social learning theory where people learn by observing others and the consequences of their behaviour (Bandura 1977). Here, edutainment interventions rely on viewer engagement with narratives to drive changes in attitudes, norms and behaviour (Grace & Kaufman, 2013). The power of narratives, or storytelling, has been long recognised (Fisher, 1985). Humans are innate storytellers (Schank & Abelson, 1995). Through storytelling, people try to make sense of their experiences and the world. According to Green and Brock, stories can affect people's attitudes and beliefs by 'transporting' them into a narrative world where they are engrossed in the story and are less likely to critically assess, resist or counterargue 'messages' embedded in the story (Moyer-Gusé, 2008; Green & Brock, 2000). People can learn new things through vicariously experiencing others' social worlds (Mateas & Sengers, 2003) and through engagement with the storylines can become "lost" in a narrative (Green, Brock, & Kaufman, 2004).

Over time, there has been increased recognition that forces beyond the control of individuals have an impact on the behaviour change process (Goldstein et al. 2004). This has led to communication theories that incorporate the effect of social influences on individual behaviour, such as the Theory of Planned Behaviour (Ajzen, 1991) and the theory of normative social behaviour (Rimal & Lapinski 2015). In line with this, edutainment interventions are increasingly using desk and formative research to understand if behaviours are under normative influence and can be impacted through modelling alternative norms (Banerjee, La Ferrera, & Orozco-Olvera, 2019), influencing beliefs about the perceptions and behaviours of others, and stimulating collective efficacy (Goldstein et al. 2004).

There is a growing body of evidence evaluating the effectiveness of edutainment interventions in low resource settings that support the role of locally crafted and well-researched narratives in bringing about social and behaviour change. The ever-widening range of development issues include teen pregnancy (Wang & Singhal, 2016), HIV/AIDS (Banerjee, La Ferrera, & Orozco-Olvera, 2019), gender-based violence (Usdin, Scheepers, Goldstein, & Japhet, 2005), social cohesion (Kogen, 2014), gender norms (Wang & Singhal, 2018) and adolescent issues (Pasricha, Mitra, & Whitehead, 2018). Evaluations of these interventions prove that edutainment-based storytelling can bring about social and behavioural change. For example, the evaluation of MTV Shuga in Nigeria found positive impact on knowledge about sources of transmission of HIV and its treatment, attitudes towards HIV positive people and a range of behavioural outcomes, such as reported incidence of concurrent sexual partners and testing for HIV, though not other outcomes such as condom use (Banerjee, La Ferrera, & Orozco-Olvera, 2019). The evaluation of East Los High found positive impact on condom use, and 30% of participants searched online for more information and talked to people after the show (Wang & Singhal, 2016). A meta-analysis of ten studies found that edutainment interventions have small but significant effects on the number of sexual partners, the amount of unprotected sex, and the testing for and management of sexually transmitted diseases by viewers, along with medium size effects on knowledge outcomes (but not attitudes) (Orozco-Olvera, Shen, & Cluver, 2019).

However, this evidence base is slow to emerge due to a lack of investment in impact evaluation and inherent challenges in undertaking robust, real-world evaluations of mass media interventions, described in subsequent sections. Consequently, as outlined by a recent meta-analysis, 'the overall paucity of high-quality studies affirms the need for strengthening the evidence base of entertainment education' (Orozco-Olvera, Shen, & Cluver, 2019). There are, to our knowledge, no evaluations of edutainment interventions focused on faecal sludge management (FSM). The evaluation outlined in this article is therefore a major contribution to the edutainment evidence base, particularly in the sphere of sanitation.

FSM is emerging as a priority area for social and behavioural change. Nearly 60% of urban India relies on on-site sanitation systems, like septic tanks and leaching pits, for the management of faecal waste (National Statistical Office, Ministry of Statistics and Programme Implementation, 2018). Faecal sludge from septic tanks is specifically termed as septage. Ideally, a septic tank system should be cleaned every one and a half to three years depending on the size of the structure (Central Public Health and Environmental Engineering Organisation, Ministry of Housing and Urban Affairs, 2013). However, ignorance of maintenance and operational conditions often results in accumulation of organic sludge and reduction in effective volume and hydraulic overloading, which ultimately causes system failure and the release of partially treated or untreated septage from the septic tank, making faecal sludge the largest polluter of ground water in urban India. Furthermore, adequate facilities and services for collection, transportation, treatment and disposal of faecal sludge do not exist in most Indian cities and towns (WaterAid, 2019). Private operators removing faecal sludge – often using illegal, manual methods – frequently do not transport and dispose of septage far away from human settlements. Instead, they dump it in drains, waterways, open land and agricultural fields. The prevalence of untreated sewage contributes to high levels of diarrhoeal disease, which is responsible for 13% of infant deaths in India (Lakshminarayanan & Jayalakshmy 2015).

Since 2014, when the Government of India launched its large-scale initiative to improve sanitation through the Swachh Bharat (Clean India) Mission, great strides have been made in constructing toilets and rolling out large scale behaviour change campaigns on using toilets rather than open defecation. As multiple cities across India declare themselves open defecation free, the next major challenge in urban sanitation is the collection, treatment, disposal and finally reuse of faecal sludge. Ensuring these households have appropriate awareness about the importance of FSM is therefore a pressing policy issue. *Navrangi Re!* ("Nine to a shade") – a 26-episode edutainment television drama series – was developed in response to this pressing need. Produced by BBC Media Action in collaboration with the Centre for Social Behaviour Change (CSBC), Ashoka University, the Bill & Melinda Gates Foundation, and Viacom 18 – it is the first ever drama series on urban sanitation in India, and indeed the world. The television drama set out to make FSM an issue so that people could take personal responsibility for what happens after they pulled the chain. The objective was to make faecal sludge 'visible' to people who do not have toilets connected to modern sewage disposal facilities yet, who normally flush and forget. The drama intended to make the audience understand that what flows away is what returns to homes through vectors such as mosquitoes, vegetables grown on soil fertilised with untreated faeces, and contaminated water sources. The key idea was that the oral-faecal transmission link between pathogens from septage and food and water is not broken until the faecal matter is contained, emptied, treated and disposed of correctly.

Drawing on over a decade of experience in creating locally produced drama in India, *Navrangi Re!* was rooted in research and evidence. Core communication theories, formative research (BBC Media Action, 2018), audience segmentation and reading of two specific texts informed a theory of change (McFarlane & Desai, 2015; Koselleck, 1987). Outcome indicators were prioritised across the construction, containment and transportation dimensions of FSM. They included knowledge, attitude, interpersonal communication and behavioural intent. The drama's communication objectives were to:

a. increase awareness about correct FSM practices across the value chain,
b. heighten the sense of risk even though the risk is largely unseen,
c. build a sense of urgency by making the threat personal,
d. build individual efficacy – the ability of every individual or every household having a role to play and a personal responsibility, and
e. heighten the role of the collective community – building a sense of social disapproval for incorrect practices.

By aiming to stimulate conversations, build collective efficacy, and create social disapproval, *Navrangi Re* thus focused on the social influences that affect behaviour, alongside the individual influences of knowledge, attitudes, and risk perception – in line with the core communication theories that underpin modern edutainment theory outlined above.

*Navrangi Re!* is the story of a congested *mohalla* (a neighbourhood) in a town in Northern India full of real and quirky characters on different stages of a sanitation continuum. An event plays out each week linked to a particular FSM theme. The show's intended target audience was men and women aged 25-40, with a minimum of 5$^{th}$ grade education, monthly income of INR 15,000+, and residing in small

towns of Hindi-speaking states in India. The 26 episodes are available at https://www.voot.com/shows/navrangi-re/1/0/welcome-to-navrangi-mohalla/749485. Following pre-testing, the show launched in February 2019 in Hindi on Viacom 18's Free to Air channel Rishtey (9:00 pm on Saturdays and Sundays). It was dubbed in Odia and Gujrati and was launched on regional channels, Colors Odia and Colors Gujarati. It was also available on Viacom18's digital platform Voot. The television series was supported by a social media strategy to expand and amplify issues raised by the drama. The public-private partnership with Viacom 18, also leveraged the equivalent of $1 million investment in terms of airtime, marketing, on-air promotions, celebrity endorsements and cameos, and public relations. Over the series *Navrangi Re!* reached 59.6 million unique viewers according to data from India's Broadcast Audience Research Council (BARC). While initial episodes of the show had up to 15 million viewers per episode in Hindi speaking states, this fell to around two million per episode for the remaining weeks, primarily due to the change in status of the Rishtey channel from Free-to-Air to requiring a paid subscription and often, an upgraded set-top box due to revised Telecom Regulatory Authority of India rules, which impacted the entire television industry. This article presents the results from the external evaluation of the impact of *Navrangi Re!*, undertaken by Oxford Policy Management and CSBC in close collaboration with BBC Media Action.

## Methods

### The Evaluation Challenge

The nature of edutainment interventions – whereby people can choose whether to watch the show – makes it challenging to apply rigorous and robust evaluation methods in real world settings.

To estimate causal impact, an evaluation generally needs an appropriate control group that does not benefit from the programme to function as a counterfactual to a treatment group. This control group needs to be statistically identical to this treatment group on all parameters except for exposure to the intervention. Ideally, this requires randomisation of treatment. In the real world, this is not practically feasible since all individuals who have television sets would have been able to watch the TV show and we cannot control who 'self-selects' to watch the show. Other evaluations, such as that for MTV Shuga (Banerjee, La Ferrera, & Orozco-Olvera, 2019) have addressed this through artificial experiments: purposively screening TV shows and randomising whether viewers watched an edutainment show or an unrelated placebo. Whilst this rigorously identifies the impact on those who have seen the purposive screening, this evidence has limitations in its external interpretation. Firstly, these viewers may not consume the intervention in the same way – in a natural setting, they may be more likely to only watch part of an episode or pay partial attention. Secondly, the people who participated in the experiment may not have chosen to watch the show in real life and may not be representative of those who would have done, meaning that any measured average treatment effect would be misleading.

However, evaluations focusing only on those who have chosen to watch the show in a real world face the challenge of constructing a rigorous counterfactual. This introduces a self-selection bias, which occurs when there is some set of characteristics that are non-randomly different across treatment and control groups that both increase the likelihood of an individual being exposed to the TV programme and influences their outcomes against the key impact indicators. If this were to be the case, then the impact evaluation will not be able to discern the 'true' impact of exposure to the TV show from non-random characteristics that drive the probability of exposure to the TV show in the first place. For example, those inherently more interested in FSM may be more likely to watch the show and have better outcomes due to their initial disposition rather than watching the show. Previous research has shown impact on self-selected viewers measured through a viewer survey can be significantly higher than for a randomised group of participants in a laboratory style experiment (Wang & Singhal, 2016).

The risk of self-selection bias is exacerbated by the practical challenge that arises from not being able to predict in advance who will watch the show. Approaches that rely on surveying households who did and did not watch a TV show after it was aired and using matching methods such as propensity score matching to try and retrospectively create balanced treatment and control groups are unconvincing. This is because they preclude baseline data, and therefore there is inherently limited

confidence that estimates derived from this approach – which compare difference in ex post levels of key indicators - measure causal impact rather than baseline differences.

## The Evaluation Approach

To address these problems, the evaluation of *Navrangi Re!* used a novel and pioneering approach to estimate impact in a real-world setting. A listing exercise was undertaken to identify households who watched the TV channel (at any time or day) that the show was going to be aired on (Rishtey). This approach made assumptions that not all households who watched the channel would end up watching the show, but that there would be a high degree of similarity between households who watched the channel and the show, and those who watched the channel but not the show.

This approach allowed identified households to be interviewed before and after the show aired. They were retrospectively allocated into treatment and control groups, based on whether they were exposed to the intervention. Having baseline and end line data on a panel of households allowed changes in outcomes to be identified and compared between treatment and control groups. This quasi-experimental approach used a differences-in-differences (DID) model to identify causal impact.

Exposure is defined as individuals having watched more than *n* episodes, with n being the cut-off levels of 3, 4, 5, 7 and 10 episodes (different cut-offs are used to better understand the effect of exposure on impact). The size of the coefficient on this dummy variable is the effect size. It is calculated as follows:

$\boldsymbol{Y_{ict} = \alpha + \beta_1 TV_i + \beta_2 T + \beta_3 TV_i * T + \delta X'_{hct} + \varepsilon}$, where:

a. $Y_{ict}$ is the outcome of interest for individual $i$ in city $c$ at time $t$,
b. $TV_i$ is a binary treatment variable that equals 1 if the individual has been exposed to the TV show and 0 if they have not,
c. $T$ is a time dummy taking value 1 at endline (post-intervention period) and 0 at baseline (pre-intervention period),
d. $TV_i * T$ is the DID estimator,
e. $X'_{hct}$ refers to cluster and household-level controls, and
f. $\varepsilon$ is the error term.

## Balance Tests

The quasi-experimental approach is not as robust as a randomised control trial as the risk of self-selection bias remains: the treatment and control groups may not be exact clones of one another. To overcome this, the DID regressions included as many control factors as possible to minimise the degree of unobservable factors. Using a panel of households, allows for the comparison of changes in key indicators over time rather than just end line levels, which addresses any biasing effects of unobservable factors that are time invariant. However, there remains the risk of time variant unobservable factors biasing the estimates. This remains an evaluation limitation.

However, balance tests on key variables (sample characteristics and outcomes) show that at baseline, households who ended up watching the show and households who did not end up watching the show were well balanced in terms of sample characteristics, as presented in Table 1, as well as outcomes, as presented in Table 2. This provides confidence that the treatment and control groups are good matches, and that the evaluation is robust.

In terms of sample characteristics in Table 1, there were no significant differences between those who had watched at least three episodes and those who watched no episodes at the 5% level (the standard test for significance); at the 10% level, only the proportion of households whose income was between Rs 50,000 and Rs 100,00 and the proportion whose household head were male were different, with small absolute differences. For those who had watched at least seven episodes, there was a significant difference in the proportion of households who were general caste compared to those who watched no episodes at the 5% level of significance, and the mean respondent age was different at the 10% level. Overall, however, the treatment and control groups are well balanced.

In terms of outcomes in Table 2, there are also no significant differences for any indicators between those who watched at least three episodes and those who watched no episodes. The only difference

between those who watched at least seven episodes and those who watched no episodes was on conversations with family about making improvements to their septic tank, which is significant at the 5% level.

**Table 1:** Balance Tests on Socio-economic Indicators between Treatment and Control Groups at Baseline

| Indicator | Control mean (% of respondents) | 3+ Treatment mean (% of respondents) | 3+ Diff in means (% points) | 7+ Treatment mean (% of respondents) | 7+ Diff in means (% points) |
|---|---|---|---|---|---|
| Respondent Age (years) | 35.71 | 35.53 | 0.174 | 33.35 | 2.359* |
| | (1.89) | (0.26) | (0.26) | (1.86) | (1.86) |
| Respondent Education (years) | 8.971 | 8.982 | -0.0108 | 9.232 | -0.261 |
| | (-0.26) | (-0.03) | (-0.03) | (-0.43) | (-0.43) |
| Respondent Sex: Male (%) | 22.7 | 21.3 | 1.42 | 18.8 | 03.90 |
| | (1.35) | (0.53) | (0.53) | (0.76) | (0.76) |
| Income: 0-10,000 (%) | 23.3 | 22.8 | 0.460 | 27.5 | -4.28 |
| | (0.40) | (0.17) | (0.17) | (-0.83) | (-0.83) |
| Income: 10,000-15,000 (%) | 32.5 | 34.6 | -2.07 | 34.8 | -2.29 |
| | (-1.17) | (-0.68) | (-0.68) | (-0.40) | (-0.40) |
| Income: 15,000-25,000 (%) | 28.0 | 29.8 | -1.79 | 24.6 | 3.35 |
| | (-0.47) | (-0.62) | (-0.62) | (0.61) | (0.61) |
| Income: 25,000-50,000 (%) | 13.5 | 12.1 | 1.32 | 13.0 | 0.412 |
| | (0.78) | (0.60) | (0.60) | (0.10) | (0.10) |
| Income: 50,000-1,00,000 (%) | 2.63 | 0.735 | 1.89* | 0 | 2.63 |
| | (2.21) | (1.91) | (1.91) | (1.36) | (1.36) |
| Income: 1,00,000+ (%) | 0.188 | 0 | 0.188 | 0 | 0.188 |
| | (-0.16) | (0.71) | (0.71) | (0.36) | (0.36) |
| Wealth quintiles (mean) | 2.998 | 2.945 | 0.0533 | 2.928 | 0.0706 |
| | (-0.06) | (0.58) | (0.58) | (0.41) | (0.41) |
| Caste: ST (%) | 4.92 | 3.68 | 1.25 | 4.35 | 0.575 |
| | (0.81) | (0.91) | (0.91) | (0.22) | (0.22) |
| Caste: SC (%) | 20.7 | 16.9 | 3.76 | 15.9 | 4.73 |
| | (1.55) | (1.45) | (1.45) | (0.96) | (0.96) |
| Caste: OBC (%) | 44.3 | 45.2 | -0.917 | 34.8 | 9.52 |
| | (-0.52) | (-0.29) | (-0.29) | (1.57) | (1.57) |
| Caste: General (%) | 29.9 | 34.2 | -4.33 | 44.9 | -15.1*** |
| | (-1.26) | (-1.46) | (-1.46) | (-2.68) | (-2.68) |
| Religion: Hindu (%) | 84.3 | 84.9 | -0.585 | 85.5 | -1.17 |
| | (0.24) | (-0.25) | (-0.25) | (-0.26) | (-0.26) |
| Religion: Muslim (%) | 15.2 | 15.1 | 0.116 | 14.5 | 0.697 |
| | (-0.37) | (0.05) | (0.05) | (0.16) | (0.16) |
| Religion: Christian (%) | 0.188 | 0 | 0.188 | 0 | 0.188 |
| | (0.92) | (0.71) | (0.71) | (0.36) | (0.36) |
| Religion: Sikh (%) | 0.0938 | 0 | 0.0938 | 0 | 0.0938 |
| | (0.65) | (0.51) | (0.51) | (0.25) | (0.25) |
| Religion: Jain (%) | 0.141 | 0 | 0.141 | 0 | 0.141 |
| | (-0.41) | (0.62) | (0.62) | (0.31) | (0.31) |
| HH Head Sex: Male (%) | 85.6 | 89.7 | -4.11* | 87.0 | -1.40 |
| | (-1.52) | (-1.84) | (-1.84) | (-0.33) | (-0.33) |

| Indicator | Control mean (% of respondents) | 3+ Treatment mean (% of respondents) | 3+ Diff in means (% points) | 7+ Treatment mean (% of respondents) | 7+ Diff in means (% points) |
|---|---|---|---|---|---|
| *N* | 2133 | 272 | 2405 | 69 | 2202 |

*t* statistics in parentheses
$^{*}$ $p < 0.1$, $^{**}$ $p < .05$, $^{***}$ $p < 0.01$

**Table 2:** Balance Tests on Outcome Indicators between Treatment and Control Groups at Baseline

| Outcome type | Indicator | Control mean (% of respondents) | 3+ Treatment mean (% of respondents) | 3+ Diff in means (% points) | 7+ Treatment mean (% of respondents) | 7+ Diff in means (% points) |
|---|---|---|---|---|---|---|
| Knowledge | Believe there is a relationship between faecal sludge disposal and health | 88.5 | 86.2 | 2.35 | 81.8 | 6.72 |
| | | (0.85) | (0.85) | (0.85) | (1.19) | (1.19) |
| | Believe that a septic tank should be as big as possible | 53.0 | 53.9 | -0.851 | 51.5 | 1.55 |
| | | (-0.91) | (-0.26) | (-0.26) | (0.25) | (0.25) |
| Attitudes | Should desludge every 1-3 years | 5.87 | 7.86 | -1.99 | 8.62 | -2.75 |
| | | (-1.19) | (-1.19) | (-1.19) | (-0.87) | (-0.87) |
| | Willing to save money for regular desludging | 32.2 | 37.6 | -5.33 | 32.8 | -0.530 |
| | | (-1.62) | (-1.62) | (-1.62) | (-0.09) | (-0.09) |
| | Want to make improvements to my septic tank | 6.74 | 4.80 | 1.93 | 6.90 | -0.161 |
| | | (1.12) | (1.12) | (1.12) | (-0.05) | (-0.05) |
| | Would ask a desludger where faecal sludge would be disposed | 71.6 | 75.0 | -3.38 | 69.7 | 1.92 |
| | | (-0.88) | (-0.88) | (-0.88) | (0.24) | (0.24) |
| Social disapproval | Would discuss the need to build septic tanks with households who do not have one | 11.6 | 14.0 | -2.44 | 16.2 | -4.60 |
| | | (-1.17) | (-1.17) | (-1.17) | (-1.16) | (-1.16) |
| | Nothing will happen if my septic tank overflows | 5.16 | 4.37 | 0.793 | 6.90 | -1.74 |
| | | (0.52) | (0.52) | (0.52) | (-0.59) | (-0.59) |
| Conversations | Have discussed making improvements to their septic tank with their family | 12.0 | 14.8 | -2.90 | 22.4 | -10.5$^{**}$ |
| | | (-1.33) | (-1.26) | (-1.26) | (-2.39) | (-2.39) |
| | Have discussed making improvements | 3.15 | 3.06 | 0.0937 | 5.17 | -2.02 |
| | | (-0.06) | (0.08) | (0.08) | (-0.86) | (-0.86) |

| Outcome type | Indicator | Control mean (% of respondents) | 3+ Treatment mean (% of respondents) | 3+ Diff in means (% points) | 7+ Treatment mean (% of respondents) | 7+ Diff in means (% points) |
|---|---|---|---|---|---|---|
| | to their septic tank with their friends | | | | | |
| | Have discussed the need to desludge with family | 21.6 | 25.8 | -4.15 | 24.1 | -2.52 |
| | | (-1.38) | (-1.43) | (-1.43) | (-0.46) | (-0.46) |
| | Have discussed the need to desludge with friends | 4.89 | 3.93 | 0.959 | 5.17 | -0.284 |
| | | (0.28) | (0.64) | (0.64) | (-0.10) | (-0.10) |
| | Have discussed faecal sludge disposal with family | 16.0 | 19.7 | -3.74 | 18.2 | -2.18 |
| | | (-2.07) | (-1.18) | (-1.18) | (-0.34) | (-0.34) |
| | Have discussed faecal sludge disposal with friends | 8.85 | 5.92 | 2.93 | 3.03 | 5.82 |
| | | (0.40) | (1.22) | (1.22) | (1.17) | (1.17) |
| | *N* | 2133 | 272 | 2405 | 69 | 2202 |

*t* statistics in parentheses
$^{*}$ $p < 0.1$, $^{**}$ $p < .05$, $^{***}$ $p < 0.01$

## Sampling

The evaluation focused on the three states of Uttar Pradesh, Madhya Pradesh and Rajasthan as they had the highest viewership of the Rishtey channel. Three cities within each state were purposively selected (Mathura, Bareilly, Gorakhpur in Uttar Pradesh, Morena, Ujjain and Jabalpur in Madhya Pradesh, and Bikaner, Ajmer and Udaipur in Rajasthan) that met criteria related to programme targeting (population of less than one million, large dependence on septic tanks and low sewerage network coverage). Wards were purposively selected within the cities using data from the 2011 census to identify those with high septic tank usage (>50%). Because of this purposive selection, the evaluation sample is not representative of the overall viewership. This remains an evaluation limitation, and limits triangulation with viewership figures from BARC.

In these wards, 75,790 households were listed. 3,407 households were identified that had at least one adult member who watched Rishtey and who had either a septic tank or an insanitary toilet. These households were surveyed for a baseline in December 2018 and January 2019. Baseline interviews were completed with 2,959 households. One adult who watched Rishtey was interviewed from each household based on availability and these were disproportionately female (80%). This gender balance was not fully reflective of the show's audience as measured by BARC, which was more balanced, and this remains an evaluation limitation.

There was 13% attrition between the baseline and end line which was completed in June-August 2019, giving a panel sample of 2,581. 447 households were exposed to at least one episode, 272 at least three episodes, 201 at least four episodes and 69 households at least seven episodes. This was lower than expected, driven by the change in channel availability outlined in the introduction. This gave a minimum detectable effect of 6.6 percentage points (when treatment is defined as exposure to at least three episodes) and 7.7 percentage points (four episodes). The sample was not sufficient to undertake sub-group analysis (e.g., by gender, age or income status).

## Ethics

Ethical consent for conducting data collection for this study was received from the Sigma Institutional Review Board (IRB), IRB number 10055/IRB/D/18-19. Consent procedures were in line with those

laid out by the IRB. Consent forms informed survey respondents of the expected time of participation, and the benefits, risks, and discomforts associated with the participation. The respondents were informed that participation in the survey was voluntary and that they were free to stop answering the questions at any time. After a full-informed consent was read to the respondents, oral consent to proceed with the interviews was obtained and documented by the enumerator.

## Results and Discussion

The evaluation looked at proximal indicators related to narrative engagement of viewers with the show, intermediate indicators related to its effects on knowledge, attitudes, social disapproval and interpersonal communication, and distal indicators related to behavioural intent. The broader evaluation included a large number of indicators against the comprehensive theory of change developed by BBC Media Action and finalised with key stakeholders, as outlined in the introduction. This paper reports on key indicators – for a fuller list please refer to the evaluation report (Oxford Policy Management, 2020).

### Narrative Engagement

Narrative engagement is understood as a multidimensional construct (Busselle & Bilandzic, 2008) (Busselle & Bilandzic, 2009) involving both cognitive and affective responses. Adapting the work of Quintero Johnson (Quintero Johnson, 2011) (Quintero Johnson, Harrison, & Quick, 2013), Sood (Sood, 2002) and others, the following components were assessed during the evaluation:

a. narrative understanding (assessed through questions on message recall),
b. attentional focus (assessed through time undistracted spent watching the show),
c. emotional engagement (assessed through questions on feelings invoked when watching the show),
d. cognitive elaboration (assessed through questions on new facts learned),
e. perceived relevance (assessed through questions on relevance to respondent's lives),
f. reactance (assessed through questions on whether viewers appreciated that the show was about sanitation and would watch more episodes), and
g. enjoyment (assessed through questions on general enjoyability).

Table 3 (for all exposed households) and Table 4 (broken down by level of exposure) present some of the key findings on narrative engagement. As outlined in the methods section, these findings are from the purposive evaluation sample and are not representative of all viewers. Table 3 shows that the show was well received by viewers even at low levels of exposure (1+ episodes); they watched nearly complete episodes, and the vast majority reporting high levels of enjoyment, reactance and emotional engagement. Narrative understanding, as measured by recall of episodic specific content, was high for early episodes, but fell for later episodes, perhaps driven by the fall in viewership that occurred after the change in channel availability.

The high levels of narrative engagement are similar to those observed for other edutainment interventions. For example, viewers of East Los High 'consistently demonstrated high levels of narrative engagement, carefully attended to the show, understood the nuances of the characters and their stories, felt immersed in the story world of East Los High, related content to their real-life experiences, actively reflected on the plotlines, and were emotionally engaged' (Wang & Singhal, 2016:e7).

**Table 3:** Narrative Engagement (Whole Sample)

| Construct | Indicator | % of respondents |
|---|---|---|
| Narrative understanding | Proportion of respondents who recall content from week 1 | 73.60% |
| | Proportion of respondents who recall content from week 13 | 12.98% |
| Attentional focus | Average minutes watched per episode | 22.47 minutes (show duration: 30 minutes) |
| Emotional engagement | Proportion of respondents who report feeling happy after watching the show | 78.08% |

| Construct | Indicator | % of respondents |
|---|---|---|
| Reactance | Proportion of respondents who appreciate that the show is talking about sanitation | 89.04% |
| | Proportion of respondents who would watch other shows on sanitation | 92.97% |
| Enjoyment | Proportion of respondents who would like to watch more episodes | 69.13% |

Table 4 shows how some of the parameters of narrative engagement depended on the number of episodes viewed. Whilst simple messages (like the show is about sanitation) were recalled by those who had viewed only one episode, more complex messages (such as about the importance of a septic tank) and the resultant learning of new facts were reported in a much higher proportion of respondents who had viewed more episodes. More specific messages (such as the need to regularly desludge septic tanks) remained relatively low even amongst respondents with a relatively high level of exposure. Higher levels of exposure led to higher cognitive elaboration with 31% of all viewers mentioning that they learnt new facts about septic tank desludging, rising to 59% of those who had watched at least seven episodes. Belief in the relevance of the issues and solutions from the show was also much higher for those who watched more episodes.

**Table 4:** Narrative Engagement (by Level of Exposure)

| Construct | Indicator | % of respondents exposed to 1+ episode | % of respondents exposed to 3+ episodes | % of respondents exposed to 7+ episodes |
|---|---|---|---|---|
| Narrative understanding | Recall that the show is about sanitation | 68.23 | 71.69 | 69.57 |
| | Recall that the show is about the importance of a septic tank | 35.57 | 44.49 | 72.46 |
| | Recall that the show is about risks posed by open faecal sludge | 22.82 | 28.36 | 31.88 |
| | Recall that the show is about importance of regularly desludging | 18.12 | 18.91 | 21.74 |
| Cognitive elaboration | Learned new facts about septic tank desludging | 30.65 | 41.18 | 59.42 |
| | Learned new facts about faecal sludge disposal | 26.62 | 35.66 | 59.42 |
| Perceived relevance | Issues and solutions from the show can exist in reality | 53.47 | 65.07 | 76.81 |

## Intermediate Outcomes

Table 5 shows the effect of exposure to *Navrangi Re!* on some key intermediate outcome indicators. The vast majority showed statistically significant improvement for those who watched at least seven episodes of the show. Some of the indicators also saw an improvement at relatively low levels of viewership (at least three episodes).

Knowledge about the health impacts of faecal sludge improved, although the pervasive beliefs that bigger septic tanks are better (so that they are unlikely to overflow during the tenancy or lifetime of the respondent) did not see a significant change. Attitudes towards regular desludging, willingness to save to pay for this, and a desire to improve the quality of existing septic tanks saw significant improvements. This advances the evidence base on edutainment interventions where meta-analysis has generally found impact on knowledge but not attitudes (Orozco-Olvera, Shen, & Cluver, 2019).

There is some evidence that the show increased how worried respondents were about repercussions if their septic tank overflowed, and gave respondents increased confidence to talk to insanitary toilet-owning neighbours about their need to build a septic tank.

The show was particularly effective at stimulating conversations between respondents and their family and friends on key issues (with a different balance across different issues). This mirrors findings from other evaluations – in East Los High, 30% of viewers discussed the show with others (Wang & Singhal, 2016), with interpersonal communication hypothesised as a key step in the behavioural change continuum.

**Table 5:** Intermediate Outcomes

| **Outcome type** | **Indicator** | **Baseline value % of respondents (whole sample)** | **Impact estimate 3+ episodes (% points) (p value)** | **Impact estimate 7+ episodes (% points) (p value)** |
|---|---|---|---|---|
| Knowledge | Believe there is a relationship between faecal sludge disposal and health | 88.41 | 3.62 (0.43) | 21.00** (0.02) |
| | Believe that a septic tank should be as big as possible | 54.93 | -3.91 (0.41) | -1.77 (0.84) |
| Attitudes | Should desludge every 1-3 years | 6.32 | 1.96 (0.40) | 12.94*** (0.00) |
| | Willing to save money for regular desludging | 32.20 | 3.62 (0.43) | 21.00** (0.02) |
| | Want to make improvements to my septic tank | 6.69 | 5.47** (0.03) | 11.39** (0.02) |
| | Would ask a desludger where faecal sludge would be disposed | 76.49 | 6.55 (0.29) | 20.56* (0.07) |
| Social disapproval | Would discuss the need to build septic tanks with households who do not have one | 11.78 | 2.19 (0.52) | 15.41** (0.02) |
| | Nothing will happen if my septic tank overflows | 5.20 | -12.60*** (0.00) | -18.05** (0.01) |
| Conversations | Have discussed making improvements to their septic tank with their family | 12.51 | 8.43*** (0.01) | 11.86** (0.04) |
| | Have discussed making improvements to their septic tank with their friends | 3.21 | -0.01 (1.00) | -1.79 (0.52) |
| | Have discussed the need to desludge with family | 22.17 | 7.29* (0.05) | 22.20*** (0.00) |
| | Have discussed the need to desludge with friends | 4.83 | 3.08* (0.08) | 14.16*** (0.00) |
| | Have discussed faecal sludge disposal with family | 16.86 | -2.66 (0.61) | 14.91 (0.12) |
| | Have discussed faecal sludge disposal with friends | 8.72 | 11.20*** (0.01) | 29.01*** (0.00) |

** p<0.10, ** p<0.05, *** p<0.01*

### Behavioural Intent

Because the evaluation end line was conducted soon after the end of the show, there was not enough time for people to act in terms of desludging. Therefore, as shown in Table 6, the evaluation could only measure behavioural intent (primarily to get their septic tank desludge or improved). This shows that behavioural intent levels were high amongst those with high exposure, but lower for those with low exposure. This is unsurprising given how some aspects of narrative engagement, particularly cognitive elaboration, depended on the number of episodes viewed.

**Table 6:** Behavioural Intent

| Construct | Indicator | % of respondents exposed to 1+ episode | % of respondents exposed to 3+ episodes | % of respondents exposed to 7+ episodes |
|---|---|---|---|---|
| Behavioural intent | Intend to do something about their FSM | 36.69 | 50.00 | 78.26 |

## Conclusion

Overall, at exposure to over a quarter of episodes (7+) the intervention had a significant and positive effect on most outcome indicators. This shows that an edutainment intervention of this type can be successful in bringing about social and behavioural change on an invisible and a hard-to-address topic like FSM.

Impact was underpinned by high levels of narrative engagement and strong cognitive and affective responses to this engagement. The evaluation detected strong changes in attitudes, conversations and behavioural intent across the FSM continuum. These findings are in line with evaluations of edutainment interventions in other behavioural areas. The impact of MTV Shuga, for example, was driven by how immersed in the story the respondent was whilst watching the show ('transportation'), and how much he or she identified with the characters (Banerjee, La Ferrera, & Orozco-Olvera, 2019).

At lower levels of viewership, understanding of key messages and content was lower, and as a result only a few of the outcome indicators saw a significant improvement. This is in line with the general view in the literature that edutainment interventions have the 'potential to be a cost-effective tool above an audience threshold' (Orozco-Olvera, Shen, & Cluver, 2019). *Navrangi Re!* suffered a severe drop in viewership after the first few episodic arcs, driven by the change in status of the channel upon which *Navrangi Re!* was aired from free-to-air to requiring a paid subscription and upgraded set-top box. Given the importance of viewers being exposed to a substantive number of episodes, it will be important to reflect on how to ensure high coverage and sustained viewing of future and similar interventions to ensure impact can be achieved at scale.

Whilst the significant and positive impacts on many of indicators validates the intervention logic, it should be acknowledged that absolute levels of some indicators remain low even after this positive change, and there is much scope for further improvement, which is to be expected after a relatively short duration show with constraints to viewership. There remain considerable misconceptions such as the distinction between a pit and a septic tank (its physical attributes, function and how it is different from other containment structures) and the correct size of a septic tank. This may be a worthy area of focus for future seasons.

Finally, the evaluation shows that it is possible to apply rigorous evaluation methods to an edutainment intervention despite the methodological and practical challenges involved, which have limited the rigour and breadth of the existing evidence base. This evaluation was able to use a prospectively created panel of households and quasi-experimental quantitative estimation to robustly estimate causal effects.

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