Research Article

Evaluation of Nyumba Ni Choo: A National Campaign to Promote Improved Sanitation in Tanzania Between 2016–2020

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This paper presents an evaluation of the means by which the Tanzanian government's most recent National Sanitation Campaign (2016–2020) achieved its outcomes with respect to increased coverage of improved sanitation facilities. (By the programme's end, awareness of the programme throughout the country was very high [97%], and there was a near doubling of coverage in only five years: from 43% in 2016 to 72% in 2020). The programme relied on multiple channels of dissemination, including mass and social media, roadshows and local events, but no government subsidies. It directly reached households with emotional appeals and approached sanitation-related government officials for stated commitments. Of particular interest is the fact that the causal routes postulated by the programme's theories of change, targeting households as the ultimate audience but government officials as a secondary audience, were probably all important in achieving the programme's objectives. The reasonably high fidelity of implementation, national reach and positive participant reactions to exposures were likely instrumental. The use of targeted emotional appeals may also have been important in driving the observed changes in improved sanitation coverage. Together, these features make this campaign an example of a large-scale project achieving significant household investments in sanitation based solely on persuasion.

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1. Introduction

Universal access to safe sanitation is now one of the Sustainable Development Goals. While the health benefits of improved sanitation have proven difficult to demonstrate, despite a number of large-scale, randomised control trials designed to identify these benefits [1][2], there is good evidence for other kinds of benefits, such as increased human dignity, privacy and safety, [3] improved cognitive performance, [4] and economic savings [5][6].

There has been a growing realisation of the importance of toilet quality to ensure effective containment of faeces, increase latrine longevity and encourage consistent use [7][8]. This has been reflected in the definitions used internationally to monitor sanitation coverage. Basic sanitation is now defined as single-household access to either a flush/pour-flush toilet or a pit latrine which is sealed effectively with a slab. Collectively these are classified as 'improved sanitation' (according to the WHO and UNICEF Joint Monitoring Programme; see Washdata.org).

How best to increase safe or improved sanitation coverage in the face of fast-approaching deadlines for universal access has become an issue. Community-Led Total Sanitation (CLTS) has been broadly used and is particularly effective in reducing open defecation [9]. This approach fosters a sense of community ownership and cooperation through emotional demonstrations of shared health consequences from poor sanitation [10]. Social marketing, which involves targeting consumer preferences, has shown promise in improving latrine use and reducing open defecation [11]. This approach leverages marketing principles to stimulate demand for sanitation options. Designing interventions that incorporate elements from psychosocial and behaviour change theories, such as the Behaviour Centred Design approach, has shown potential [12]. Highlighting the social and environmental consequences of poor sanitation and hygiene practices can also make these issues more salient and motivate behaviour change [13]. Finally, simply providing the necessary hardware, or financial incentives to purchase facilities, has been shown to be highly effective by making it easier for individuals to practise the desired behaviours [14]. Providing subsidies tends to lead to greater improvements in sanitation coverage [15][16], but how to design the subsidies (in terms of full/partial, timing, access to the programme, links to microfinancing programmes [17][18][19][20]) and their overall cost-effectiveness [21][22] remain uncertain.

As elements of an ongoing national effort to improve sanitation and hygiene since independence, Tanzania has seen a succession of campaigns promoting sanitation uptake. Cumulatively, these have

achieved some degree of success. Much of the focus has been on moving the population from open defecation to latrine use, more recently through a Community-Led Total Sanitation (CLTS) approach to drive rapid uptake of very low-cost latrines. However, three-quarters of the population still lacked access to adequate sanitation in 2010 [23]. Further, the household sanitation facilities constructed have often been of poor quality (e.g., [24]). The heavy reliance on local government implementation of CLTS did not result in significant improvements in improved sanitation coverage [25].

In 2017, the Tanzanian government launched a new phase of sanitation promotion (henceforth referred to as the National Sanitation Campaign, or NSC). Between 2017 and 2020, this national-scale multimedia campaign was implemented throughout Tanzania, promoting households to build – for themselves (without subsidy) – improved toilets. This campaign was designed by a consortium involving academics, creative professionals and implementing agencies, funded by FCDO, and sponsored by the Tanzanian government through its Ministry of Health. The programme comprised a national communication campaign which ran alongside ongoing efforts by local government to promote sanitation uptake through household visits and community meetings. The NSC did not make use of any subsidies, due to a lack of available government finance.

The communication campaign used motivational messages informed by extensive formative research [26] and underpinned by Behaviour Centred Design, an explicit theory of behaviour change [27]. Messages sought to link sanitation to social status, symbols of modernity and affiliation with others following a modern lifestyle. These messages were developed around a central theme of households modernising through home improvements. The campaign was known in Swahili as "*Nyumba ni choo*" (which translates literally as "A house is its toilet" but which implies "a house is not complete or modern without an improved toilet"). Messaging was refreshed and updated periodically to maintain interest and to project a sense of national progress. Messages were delivered through multiple channels including television, radio, print and social media and live events (roadshows). Mass media and social media components were implemented nationally. Roadshows were conducted in a relatively small number of selected locations, due to their cost. Usually, these locations were ward-level commercial hubs or market towns in wards with notably poorer sanitation coverage. Target locations for roadshows were identified by local government officials at the district level. Roadshows were intended to be entertaining and to inspire commitment to sanitation improvement from local government officials and householders. Face-to-face meetings also took place with regional and local government officials to inspire programme

support. Table 1 summarises the campaign components. The result was a near doubling of improved sanitation coverage in only 5 years (from 43% in 2016 to 72% in 2020) [28].

Communication Channels/ Content type	Target Audience	Description of Content	Delivery Context
Radio spots/ mentions	Government officials and general populace	Programmed audio scripts were refreshed every six months to stay relevant; live content was ad-libbed within guidelines	During news shows, live and pre-recorded programming
TV spots	Government officials and general populace	Pre-programmed, locally produced video advertisements developed to be consistent with the messaging during that phase of the media campaign	On a schedule determined by a media monitoring-based plan
TV shows	Government officials and general populace	Quarter- to half-hour episodes with 'reality TV' content related to sanitation	During special 15- to 30-minute slots in national TV broadcasts
Social Media	Social media users (Facebook, Twitter, Instagram)	Photographed or videoed and edited content from roadshows; links to local print mentions; specialised messaging	Regular updates to dedicated social media accounts
Regional meetings with government officials	Regional government officials	Presentation of the programme activities, with an appeal that officials engage in supportive activities, including having their photo taken with the campaign logo	At regular Regional Government meetings
Local meeting with District Health Official and District Commissioners	Government officials	Prior to local roadshows, Project CLEAR team members met with local officials to ensure their presence at roadshows	Special 'meet and greet' meetings
Roadshows/*Furza* events	Government officials and local	Crowd-pulling activities (street parade, snake show, acrobats, traditional dances). A celebrity roadshow host (an established national celebrity) led	Roadshow event in a village

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Communication Channels/ Content type	Target Audience	Description of Content	Delivery Context
	community members/ Local business leaders	proceedings, including a dramatic ceremony in which a flag was raised to the top of a pole, but then lowered to a point representing the current level of sanitation coverage in the area. Commitments to increase coverage of improved latrines were then invited from local officials. Also included: sanitation-related sketches and songs, often inviting members of the community to provide personal testimonies. Roadshow participants were also led to visit nearby households known to have an improved toilet	

Table 1. Overview of intervention

In this paper, we present an evaluation of the means by which the NSC achieved its outcomes. Our objectives were to assess the plausibility of attributing the increased rate of change in sanitation coverage to the efforts of the NSC and to draw out lessons with respect to intervention design and implementation that could inform future efforts in Tanzania or elsewhere. To structure this evaluation, we utilise a combination of features of the original and updated Medical Research Council (MRC) Frameworks for Complex Interventions [29][30]; see also [31], including a focus on a Programme Theory of Change. The MRC framework was chosen over alternatives due to its ubiquity, the authority of its 'author', the Medical Research Council, and ease of comprehension and use.

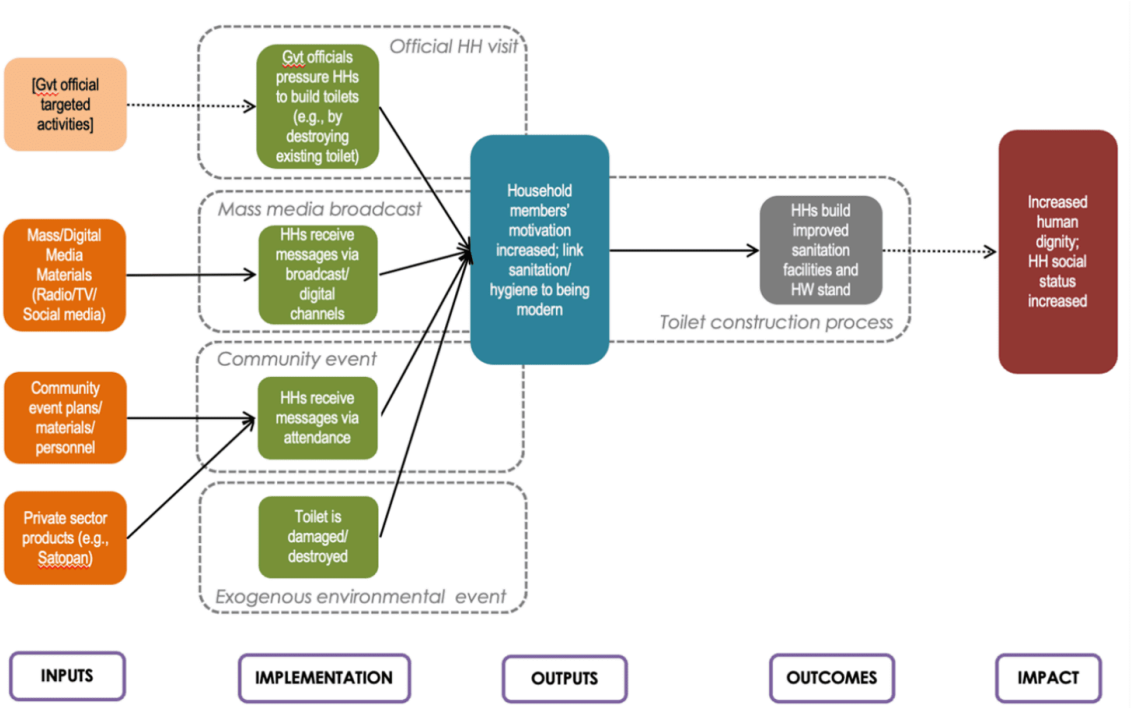

Figure 1. Household Theory of Change

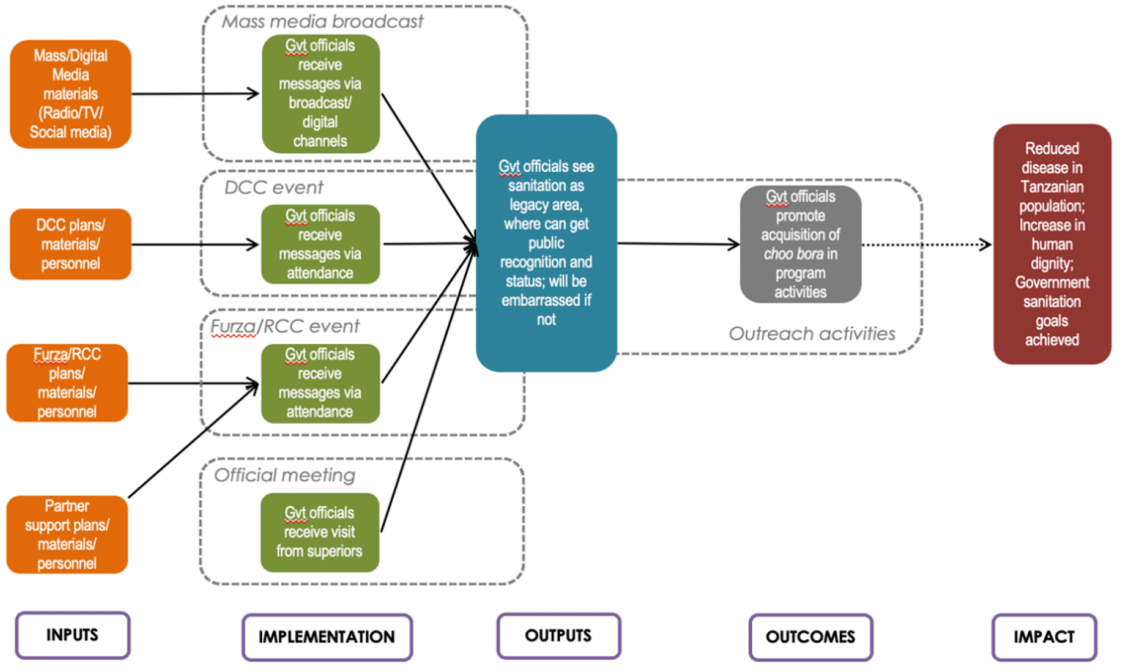

Figure 2. Government Official Theory of Change

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Our Theory of Change focused on two different target audiences (see Figures 1 and 2). First, the NSC was intended to encourage heads of households to improve their sanitation and to encourage local government officials to increase their sanitation promotion activities as proximal goals to increase human dignity and household social status. We hypothesised that households would improve their sanitation because of exposure to NSC messages through mass media and roadshows and/or as a result of communication from local government officials through household visits and/or community meetings. (A final reason might simply be that their existing toilet facility was damaged or destroyed by some exogenous environmental event like a flood.) The assumption was that these exposures would cause households to see self-financed improvement of their toilet as a means to improving their social status, because improved toilets are part of a 'modern' lifestyle (see [32][33] for details about messaging strategies and content).

Government officials themselves may also be mobilised to increase their sanitation promotion activities by the NSC campaign in a number of ways. We further hypothesised that local government officials would increase their sanitation promotion activities because of exposure to NSC messages through mass media and the consumer-oriented roadshows, through campaign promotions at Regional Commission Conferences or 'furza' meetings (campaign events for young business people), and/or because of increased top-down demand for this from their managers/superiors within the government hierarchy.

The remainder of the paper uses the hybrid MRC framework to evaluate the processes hypothesised to underlie the campaign activities. The multiple methods by which the team determined to monitor and evaluate this programme are first described below, followed by results, a discussion of the results, and some conclusions. More general lessons about implementing at-scale sanitation promotion programming in similar contexts, derived from the experience described here, are relegated to a separate paper [28].

2. Methods

2.1. Data collection methods

This mixed-methods study used a questionnaire survey and implementation monitoring logs to collect data on the reach of the NSC and exposure to its different components, and semi-structured interviews to collect more in-depth information about the activities and perceptions of householders and government officials.

Quantitative data

A questionnaire was used to collect data on the social and demographic characteristics of respondents, household sanitation and hygiene facilities including construction date and any improvements made, and exposure to components of the NSC (see Supplementary Material). The questionnaire was implemented through mobile phone messaging (Short Message Service). The survey responses were used to measure participant exposures and responses, often using closed sets of possible answers.

Respondents were a self-selected, national sample drawn from the respondent bank of a commercial survey company (GeoPoll). All members of the respondent bank were invited to participate via SMS message to their registered phone between May and July 2021. If consent was provided, SMS survey questions were sent in subsequent messages.

GeoPoll continued inviting respondents randomly from their national database until the desired quotas (based on the power analysis following) from each of the three categories below were fulfilled:

- Group 1: Residents of a ward that received a roadshow
- Group 2: Residents of a district that received roadshows but not in a ward that received a roadshow
- Group 3: Residents of a district that had not received roadshows (mass media only)

Roadshows took place in 10 out of the 26 mainland Tanzanian regions between 2018 and 2020: Dodoma, Geita, Kagera, Mara, Mbeya, Songwe, Mwanza, Shinyanga, Simiyu, and Tanga. We wished to compare these three groups pairwise, detecting a difference of 10 percentage points within each pair. To be conservative, we assumed a baseline 50% proportion of households with an improved toilet since the campaign started. Assuming 80% power and an alpha of 0.05, the crude sample size per group would be 408 households. As roadshows were delivered at the community level, there may be clustering effects in the outcomes. These are difficult to anticipate. Here we assumed a design effect of 2, resulting in a sample size of 816 per group. The sample size to be collected in Groups 2 and 3 was doubled to ensure multiple comparisons could be made (small ward sizes precluded the ability to double the sample size for Group 1).

Records of attendance and details of activities performed at the roadshows were also kept by Project CLEAR staff. Quarterly media monitoring reports by professional consumer agencies (GeoPoll and Ipsos), as well as other internal project reports, were all collected and analysed. Data to measure the fidelity of implementation and reach of roadshow events were extracted from these records.

Qualitative data

Qualitative data were collected using semi-structured interviews in Swahili. We selectively sampled areas from one region in which roadshows had been recently implemented and for which the Tanzanian government's National Sanitation Monitoring (NSMIS) data [https://nsmis.moh.go.tz/nsmisportal]) indicated an increase in improved sanitation coverage since the start of the NSC. This was to allow learning about the intervention process associated with positive outcomes. The selection of districts and wards was based on the general representativeness of Tanzanian economic and social conditions, and logistical considerations. Households were randomly selected from the ward's register of households that had an improved toilet (typically compiled by neighbourhood volunteers), and interviews were conducted with the head of the household or another adult member present at the time of a researcher visit. Details of toilet qualities and condition were recorded by the research team when they visited households to conduct interviews.

Officials who were the most involved in sanitation promotion in the local area (near where roadshows had occurred) were purposively selected to participate in interviews as well (typically a Ward Health Officer or Community Health Worker). The number of relevant officials and household heads available and willing to be interviewed during Project members' visits to their area of the country determined the eventual samples and their sizes. Interview guides were developed for the two target groups (see Supplementary Materials). Qualitative data collection was conducted from May to July 2021, typically over six months after roadshows had occurred in the area.

The hybrid MRC Framework required describing a variety of aspects of project delivery and its consequences, as outlined in Table 2 below.

Variable	Definition	Data sources
Fidelity of Implementation	The degree to which the intervention was delivered as intended (a function of adherence to the intervention protocol)	Roadshows: Project records about event content; Mass media: Media monitoring reports about the content of mentions/broadcast times/places
Reach	The proportion and characteristics of individuals or groups who were exposed to an intervention component	Roadshows: Project records about time/place/attendance by group; Mass media: Media monitoring reports about broadcast audiences; quantitative survey for exposure channels
Participant Reactions	Participants' perceptions of and attitudes toward the intervention, as well as the degree of activation or engagement with it after exposure	Households: Household interview responses about likeability, believability, motivation; Government officials: Official interviews
Outcomes	The degree to which the primary programme goal of increased coverage of improved sanitation and the secondary goal of increased government involvement in sanitation support were achieved	Sanitation coverage: Quantitative survey (also national GeoPoll survey); Increased government involvement: Official interviews

Table 2. MRC Framework variables, with definitions and data sources

2.2. Data management and analysis

Interviews were audio-recorded, transcribed, translated into English and reviewed for accuracy of content by one of the authors (WE). Data were analysed using framework analysis [34] by another of the authors (RA), together with a research assistant. A coding framework was developed, informed by the MRC evaluation framework, with codes categorised into descriptive themes that were discussed with the wider team, and new themes were added or adapted as deemed useful. The data were analysed using NVivo12 (NVivo qualitative data analysis software; QSR International Pty Ltd, Version 12, 2018).

Data from the household survey were analysed using Stata 16.0 (StataCorp, 2019, Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC). Survey data were summarised to describe the demographic characteristics of the sample, household toilet characteristics, exposure to campaign materials and roadshows, and reasons for improving toilets. Proportions and categorical variables were compared between the three sample groups using the chi-square test. Ordered categorical variables were compared between the three sampling groups using the Kruskal-Wallis test. Continuous variables were compared using linear regression analysis.

Participation was based on informed, written consent. This was provided by participants immediately prior to data collection. For the survey, consent was provided via SMS response. In reporting this evaluation, we have striven to comply as closely as possible with the STROBE standard for observational studies (www.strobe-statement.org).

2.3. Limitations

This study has some significant limitations. A major limitation is the use of a self-selected sample from the GeoPoll phone bank for the survey. This was a good way to achieve a large sample, but it leaves us uncertain as to what population it represents (though it is probably a wealthier, more educated and more urban population than the country as a whole).

The purposive sampling frame for the SMS survey also means that it is not representative of the national population as a whole. Non-random data collection was necessary to include sufficient information about all the causal routes in the Theories of Change (especially attendance at roadshows, to which only about 5% of the country's total population had easy access). For this reason, the NSMIS data reported earlier are national and should be preferred as an overall indicator of outcome success.

The reliance on SMS for the survey data collection could also have compromised the quality of that data, as if participants did not understand a question, they did not have an opportunity to ask, and the answer may not be a true reflection of their views.

Some household interviews were conducted with the assistance of interpreters in local languages. The quality of the interview may therefore have suffered due to a reduced flow of conversation, an inability to build rapport with the interviewer, or responder fatigue from interviews taking a long time due to the back-and-forth translation, or as the research team was not able to engage in deeper discussions with the interview subjects in such cases.

Finally, there was a large lag between the implementation of the NSC campaign and its evaluation (more than 15 months), as a result of the COVID-19 pandemic, which could have resulted in people forgetting aspects of the campaign, diluted its effects, or allowed for the confounding effect of other sanitation programmes contributing to the progress made (although this latter possibility is unlikely, given the low number and small scale of such efforts by NGOs).

While the NSC was likely successful in helping to improve sanitation coverage nationally (NSMIS data; [28]) and increasing awareness, there are certain aspects that could be improved for future sanitation promotion programmes. First, it would be worth emphasising *using* the improved toilets rather than just *having* them during all discussions, to ensure structures are not just being built to pass official inspections or avoid fines (although none of our data shows that toilets in which households necessarily invested were not used). Second, low-cost options for improving toilets were seen to be very useful (particularly the novel hygienic pan from LIXIL's Sato brand) and could be included in other promotions.

3. Results

3.1. Sample Characteristics

Characteristics of household survey participants

In total, 4537 individuals completed the survey (Table 3). Five per cent of potential informants indicated their interest by responding positively to the first SMS they were sent. Two per cent of all possible informants completed the survey, with one per cent having dropped off before completing all 118 questions. Two per cent of the opt-ins proved ineligible for failing one or another of the eligibility criteria.

	Count	Percent
Surveys Sent	247,202	100%
Opt-ins	11,766	5%
Completes	4082	2%
Dropoffs	2806	1%
Refusals	241	0%
Ineligible	4878	2%

Table 3. Online survey completion characteristics

Participants ranged in age from 18 to 96 years (Table 4). Over half (61%) of participants were resident in an urban area; however, this varied between sample groups. Two-thirds of the participants (64%) were male. Almost all (96%) household heads had some level of education. Sales and services was the most frequently reported occupation category (35%).

	Roadshow wards (n= 1240)	Roadshow regions (n= 1674)	No roadshow regions (n= 1650)	Total (n= 4537)	P value	
Mean age (range)	29 (18-69)	30 (18-96)	29 (18-64)	29 (18-96)	<0.001*	
% Urban dwelling	68	47	59	56	<0.001§	
Gender					<0.001§	
% Female	38	25	43	32		
% Male	61	73	55	66		
% Prefer not to say	1	2	2	2		
Educational attainment of HH head (%)					<0.001ǂ	
No school	4	3	3	3		
Primary school	24	36	27	30		
Secondary school	37	34	35	35		
More than secondary	36	27	35	31		
Occupation (%)					<0.001ǂ	
Salaried professional	22	19	21	20		
Sales and services	39	31	35	34		
Skilled labourer	16	17	21	17		
Unskilled labourer	12	16	10	14		
Other	10	18	13	14		
Home ownership (%)					0.001§	
Own	45	51	43	48		
Rented	51	44	53	48		
Other	4	4	3	4		

Table 4. Social and demographic characteristics of survey respondents

[*]Linear regression; [§]chi-square test; [ł]Kruskal-Wallis test

Table 4 chi-square values show the samples were not balanced across all variables. Regions selected for roadshow implementation had lower sanitation coverage and were less educated, less urban, and with fewer professional occupations.

Composition of Interview Sample

A total of 37 semi-structured interviews were held with local government officials (ranging from Regional Commissioners to Village Chairperson) and 21 with household members.

3.2. Implementation: Exposure to intervention components

Fidelity and dose

In total, 340 roadshow events were implemented in the 10 regions. Project reports indicate the events had on average 1,103 participants. Ninety-five per cent of the events included the primary intended activities: crowd-pulling activities (snake show, acrobats, theme song, live band) and a flag ceremony.

The project distributed over 20,000 communication materials across all channels, including numerous TV ads, 7,900 radio airings, 8,000 display pieces, and 2,000 digital media posts across different platforms between 2017 and 2020, when the project switched to COVID messaging at the government's request (Ipsos and GeoPoll reports). Fidelity of content to project objectives from all produced media was high, due to its being produced under the supervision of project management, with the fidelity to planned broadcast timing being monitored monthly by a media company (Ipsos). Unscripted materials (radio mentions and testimonials) were also gauged by quarterly mass media monitoring surveys to have been delivered with a relatively good match to the campaign scripts (Ipsos reports, as summarised in [35]). Deviations from planned timings and content of broadcasts or media mentions noted in media reports were the subject of complaints or switching to other broadcast channels by project management.

	Roadshow wards (n= 1240)	*Roadshow regions (n= 1674)*	*No roadshow regions (n= 1650)*	*Total (n= 4537)*	*P value§*
Any awareness of the intervention (% of sample)	97	96	96	97	0.748
Primary source of awareness of the intervention (% of sample)					
Radio	38	40	39	39	0.744
TV	30	30	29	30	0.788
Friend/Neighbour/family member	5	5	6	6	0.237
Social media	11	9	10	10	0.096
Newspaper	1	1	1	1	0.426
Local official	9	10	9	9	0.308
Roadshow event	5	5	5	5	0.773
Other	1	1	1	1	0.591
Attended a Nyumba ni choo campaign roadshow event (% of sample)	36	23	24	27	<0.001
Government official visited house to talk about toilets (% of sample)	61	57	53	57	<0.001
Activities during visit (% of sample)					
Just talked	38	34	38	36	0.100
Encouraged you to improve your toilet	49	53	49	51	0.141
Threatened with fine	6	8	5	7	0.110
Asked to attend meeting	7	5	8	6	0.173
Had toilet destroyed	0.4	0.2	0.0	0.2	0.193

Table 5. Exposure to the intervention

§ based on chi-square test

Based on survey sample

Reach: Households

The project reached at least 18 million people directly, or 50% of the media-consuming public in Tanzania (GeoPoll national survey from 2021). Ninety-six per cent of the respondents to the process evaluation survey reported having heard of the NSC (Table 5). The most common channels through which respondents reported primarily learning about the programme were radio (39%) and TV (30%). The roadshow was attended by on average 36% of respondents from wards that had received the roadshow. Significantly fewer respondents reported attending a roadshow (23% and 24% respectively) if they lived in a roadshow region but not a roadshow ward, or in a region where there was no roadshow. Despite these attendance levels, only 5% of participants reported primarily hearing about the NSC campaign through a roadshow, suggesting that most people who attended a roadshow already knew about the campaign from other sources.

Similarly, during interviews, householders reported radio, TV and roadshows as the most common form of exposure to the campaign. There was an even distribution among these three sources of exposure. Very few (two) mentioned being exposed through social media platforms.

Sixty-one per cent of survey participants residing in a ward that received a roadshow said they had a visit from a government official talking about sanitation, while those living only in the region which had a roadshow or without a roadshow at all had significantly lower reports of government official visits (57% and 53% respectively). Despite the different frequency of visits reported, the purpose of visits was largely the same in all groups (Table 5). Only 9% reported local government officials as their source of knowledge of the NSC campaign.

Reach: Government officials

Knowledge of the NSC campaign among interviewed officials was very high (34/37). (Note this is a small sample biased towards locations where the roadshows had occurred, and so is not nationally representative.) Local government officials' exposure to the campaign through roadshow events was also high; 23 of 37 officials interviewed reported they attended at least one roadshow in their area. This could be because the celebrity roadshow host told them he was being sent on behalf of the Tanzanian President, meaning officials felt obliged to attend the event. Some officials were also involved in the

preparation for the event, attending meetings at the District Offices with the celebrity roadshow host or mobilising the community to attend the event. The most mentioned sources of hearing about the campaign among officials were radio (20/37), with TV at a similar level and social media at 5/37, proportions that are similar to households, and also suggesting that most had some knowledge of the campaign prior to attending the roadshow.

3.3. Participant reactions

Households

Overall, household interviews suggested that people liked the campaign and were positively inclined towards its perceived messages about the importance of good sanitation. It was also seen as a motivating factor for some.

Government officials

Local government officials had varying impressions of the NSC campaign. Most of those interviewed said in their interviews they liked the campaign and believed it was effective.

However, there were also some who reported not liking the campaign, because they felt it was too much of a top-down approach, targeting higher-level politicians and officials, rather than grassroots officials. As a result, these implementers could feel undervalued, or left out.

Some government officials felt that the campaign should have focused more on disgust as a motive to change behaviour, as was the case with the previous promotional strategy used by the government, based on the Community-led Total Sanitation (CLTS) approach [10].

Participant engagement - Households

The reason most frequently reported by survey respondents for constructing a toilet was being modern (34%) (the sentiment promoted by the campaign's roadshows and media messaging). Although not so often reported in the survey data, pressure from government officials was well-recognised in household interviews. Some participants reported that officials speaking at public meetings in the village or visiting households to talk to the head of household about sanitation was the most important influence leading to improving their toilet. Survey data suggested that 10% of participants constructed toilets because officials told them to.

Among interviewed households, the example of sanitation improvements by neighbours was another reported reason for changing toilets. Many people felt that if one house in the area was to improve its toilets, others would follow. This was reported to be because they talk to each other and get a better understanding of why the improved toilet is important, or it can act as a source of status pressure.

Some household heads reported annoyance with their frequently collapsing toilet pit and superstructure due to heavy rains as a reason for improving their toilet. This was supported by the survey results, showing damaged toilets as the third most frequently reported reason for constructing toilets; 23% of survey respondents reported this as the reason they constructed a toilet. Twelve per cent of respondents said some other reason inspired them.

Some community members reported that after the NSC roadshow visit, action by local government officials to extend coverage with improved sanitation increased. In the past, the officials would come and talk about having a good toilet, but there would rarely be a follow-up, and not much enforcing. However, after the campaign, multiple different officials would visit and there would be several visits to encourage and enforce improvement of sanitation facilities, resulting in households improving their facilities.

Participant engagement – Government officials

The NSC inspired some officials to work harder to improve sanitation in their districts. This usually meant gathering community leaders to develop strategies and plans for improving sanitation in their village.

Some officials reported a change in their pattern of household visits. Some said that the number of visits increased as there was more motivation and more support from laws and regulations, while others said that their household visits decreased as more people became educated about the importance of improved sanitation and started changing their toilets without pressure from the officials.

3.4. Outcomes

For households, the primary outcome of involvement with the NSC campaign was investing in an improved-quality toilet, while for government officials it was more active engagement in sanitation-related activities. Each will be discussed in turn.

Household toilet construction and improvement

More than half of the population surveyed reported the year their current toilet was constructed (whether improved or not) as being after the NSC began, with a slightly higher percentage reporting this in the wards or regions that received the roadshows, though without strong statistical support for a difference (Kruskal-Wallace = 0.001). Further, all groups show that the rate of toilet improvement gradually increased throughout NSC implementation. Self-reported toilet improvement – that is, improving the quality of some element of their toilet (such as a roof or pan) or construction of an altogether new one – also increased significantly (measured simply as a trend) over the span of the programme (Kruskal-Wallace = 0.056).

Government activity increase

The NSC also inspired officials to take charge and work to improve sanitation in their districts. This usually meant gathering community leaders to develop strategies and plans for improving sanitation in their village.

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The survey also showed there were significantly more local government visits to households in the group that had a roadshow in their ward (61%) compared with those residing in a region that had no roadshow (53%).

Officials reflected on the progress that had been made since NSC activation in their region. Overall, they reported in interviews that improving sanitation will continue to be a slow and steady process over many years and not something that happens overnight without substantial support in terms of follow-up visits by the government or increased financial support for their activities. When discussing sanitation budgets, all officials listed lack of adequate funding as a reason why coverage of improved sanitation is increasing slowly. The main consequences of lack of funds were 1) lack of transport for district officials to maintain regular supervision of sanitation progress in the wards, and 2) lack of funds to employ at least one health worker in each ward. (In one district, 22 wards did not have a health worker, with a consequent inability to monitor health trends or conduct regular health checks.)

Where activity increased, it was often achieved without an increase in the budget devoted to sanitation (a common complaint). Many interview respondents mentioned that there was more support from superiors after the NSC visit.

4. Discussion

This project achieved an increase in the rate at which households improved their sanitation facilities without government subsidy, using only a messaging campaign, through behaviour change. The knowledge gap in sanitation promotion has been about how to make this happen in countries which cannot afford to subsidise infrastructure improvements at a national scale. We used an appeal that associated having hygienic faeces disposal in your household with living a fully 'modern' lifestyle, based on an insight derived from in-field research that toilets were not considered part of the household [26][36]. Implementation of the National Sanitation Campaign, characterised by both intensive media and on-ground activity, displayed both high fidelity and extensive reach. Overall, the NSC messaging was liked (according to periodic media reports). Even though there was a large lag between implementation and evaluation, many people remembered the slogan of the NSC campaign, suggesting that it had long-lasting effects, at least on memory. Earlier national polling, carried out in June 2019, also suggested that 92% of heads of households agreed or strongly agreed that a *choo bora* and handwashing with soap makes one a modern person – the brand message of the programme (GeoPoll, unpublished).

Results from the survey and interview data suggest that the consequences of this exposure were changes both with respect to households, in terms of an increase in the rate at which households improved their sanitation facilities, and with respect to the local government, in terms of increased motivation, time and commitment given to sanitation promotion. From the officials' own perspective, they saw their role primarily as educators and model examples, de-emphasising their ability to play the punishment card (consistent with an expectation that individuals will emphasise their positive, not negative, influence on others).

Radio was the most commonly reported source of learning about the campaign. This is consistent with data that suggest 40% of respondents listen to the radio every day (GeoPoll, unpublished data). Future outreach campaigns in Tanzania may also want to rely on radio as the best channel to increase reach. However, televised and social media may have also played important roles, given how accessible these channels are in Tanzania.

Although nothing definitive can be said about the nation as a whole (given the selective nature of the sampling regimes used in this study), it appears that the intended causal mechanisms – including the use of creative media and activating the government to put additional pressure on households – were among the actual causes of the uptick in the building of improved toilets in recent years. This trend is not likely due to other sanitation promotion efforts (which were relegated to small, localised NGO programmes), nor improvements in economic circumstances (there has been steady growth in GDP per capita since long before the campaign started: https://data.worldbank.org/indicator /NY.GDP.PCAP.CN?locations=TZ) [28].

5. Conclusion

A central question motivating this evaluation of Tanzania's National Sanitation Campaign (between 2017 and 2020) was *how* and *why* toilets were improved. Candidate causes (from our Theory of Change) included government influence directly on the household (through visits and potential punishments), attendance at NSC roadshow events, a response to persuasive media content, or a consequence of some environmental degradation of their existing toilet. The nearly universal awareness of the campaign in the regions sampled suggests extensive reach by mass media – although obviously this is insufficient to indicate this was the source of behaviour change. Both households and officials also agreed (but to differing extents) that officials played an important role in getting households to improve their toilets. Further, wards where a roadshow event was carried out showed an increased rate of coverage in improved toilets post-event [37], suggesting that roadshows had an independent effect on outcomes as well. These findings support (but do not prove) the study's hypothesis that all the causal routes hypothesised in the Theory of Change contributed to the improvement of toilets.

These results also endorse the reasonableness of the project's emphasis on government officials as the most important secondary targets for messaging (after households themselves). For households, the role of these officials was not the most important reported cause, but when it was mentioned, it was often the fear of fines that induced them to invest in sanitation. Likely, the combination of government involvement, roadshows and mass media made it possible for the campaign to have a significant impact on coverage at a national scale, and without subsidy – an unusual outcome for campaigns of this kind in the WASH sector.

The campaign's central message, that an improved toilet is necessary for a 'modern lifestyle', seemed to be an effective driving factor for households to improve their toilets. Similar rationales were seen in a

study in rural Benin on the motives linked to sanitation demand generation, which showed that factors such as prestige or good social relations are likely to underlie households' demand for sanitation [38]. This suggests that social motives can be emphasised in future behaviour change campaigns linked to improving sanitation.

Statements and Declarations

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Conflicts of interest

We declare no competing interests.

Ethics

Ethical approval for the study was provided by the London School of Hygiene and Tropical Medicine (Ref: 17832) and the National Institute of Medical Research Tanzania (Ref: NIMR/HQ/R.8c/Vol I/1719). All data were collected in accordance with all relevant standards and guidelines. Informed consent was obtained either by verbal and written confirmation (in the case of interviews) or SMS button push for the online survey. Anonymity was ensured at source through lack of recorded identifiers in all cases.

CREDIT statement

Aunger: Conceptualisation; Methodology; Formal analysis; Writing (original draft); Funding acquisition; Project administration. Biran: Conceptualisation; Writing (review & editing). Shah: Writing (review & editing); Project Administration. Schmidt: Methodology; Data analysis and curation; Writing (review & editing). Etami: Data collection. Mwangi: Methodology; Data collection; Writing (review & editing). Mwakitalima: Writing (review & editing). Massa: Writing (review & editing).

Data availability

Survey tabulations, roadshow records and interview transcripts are available from the Open Science Foundation project page: https://osf.io/g65xh/. The authors had access to individualised information at

the time of data collection, which was subsequently anonymised by the authors prior to uploading for public access.

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