



News

What makes residents participate in the rural toilet revolution?

Recent data reveals a staggering reality: as of 2020, approximately 3.6 billion individuals across the globe remain devoid of proper sanitation services [1]. Worldwide governmental and non-governmental organisations are dedicatedly engaged in the arduous task of ameliorating living standards by providing secure sanitation facilities. Nevertheless, a recurring challenge persists, with these initiatives frequently encountering setbacks, especially in rural areas.

China has been actively promoting a Rural Toilet Revolution (RTR) nationwide since 2015. This initiative is rooted in the fundamental principles of disease prevention and the enhancement of rural living conditions, aligning with the United Nations' sustainable development goals (SDGs) [2]. Notably, the transformative efforts have yielded impressive results, with over 40 million rural toilets undergoing renovation since 2018. This endeavour has contributed to a commendable 70% adoption rate of hygienic toilets by the end of 2021. However, various challenges showed up in implementing RTR. Specifically, the selected toilet technologies and models may not cater to the local situation; for instance, the water-flushing toilet does not fit in arid areas. Furthermore, improper faecal sludge management can negate its benefits even if the appropriate toilet is selected and constructed. Lastly, the effectiveness of the RTR hinges on whether users embrace the upgraded toilets and are content with the sanitation services provided.

The success of RTR and any other rural sanitation improvement program is impossible without the active participation of rural residents. Understanding these underlying catalysts is paramount in shaping global policies for advancing sanitation to achieve the SDGs.

1. Motivation model development

We collected qualitative data from 12 provinces of China, encompassing the central, northern, eastern, southern, north-western, south-western, and north-eastern regions. Gathering insights from 258 rural residents who participated in the RTR initiative, we meticulously examined 40 select research cases by applying grounded theory. This established qualitative research method relies on empirical data to provide systemic and conceptual meaning [3]. A detailed description of the grounded theory and the sampling strategy can be found in the Supplementary Information.

Based on the survey findings, we constructed a motivation model to elucidate the factors driving Chinese rural residents' engagement in RTR initiatives (Fig. 1). Most studies focus on intrinsic and extrinsic factors that may stimulate participants'

motivation in a campaign. The elements that sway the motivational factors for rural residents include consciousness, technology, benefit, and policy. Our analysis identified that consciousness, technology, and benefit would initiate the initial intent to participate in RTR. Concurrently, policy regulations will affect the decision-making process of rural residents and further determine, ultimately determining their participation in RTR. This may be due to the potential cessation of incentives and financial subsidies (for example, financial shortfall or evolving political priorities), causing economically disadvantaged rural residents to discontinue their involvement [4].

2. The role of policies to motivate people to sanitation improvements

The primary purpose of the RTR in China centres around eradicating non-sanitary toilets and enhancing sanitation facilities. Poor environmental hygiene will trigger the rural residents' environmental awareness. Notably, the local government places significant emphasis on the RTR, aiming to elevate environmental sanitation through health education and the improvement of public infrastructure. These efforts serve to augment the environmental awareness of rural residents, thereby triggering the intention of participating in the RTR. Village leaders, driven by a sense of duty, devote more time to the RTR, instigating a shared collective consciousness. This collective consciousness, once established, serves as a driving factor motivating rural residents in the RTR. Interviews further substantiate that the active involvement of village leaders notably amplifies the effectiveness of the RTR [5].

A water-flushing toilet is a mainstream but not a panacea, despite its increasing adoption. We found that governments at all levels have a more rational, objective, and scientific attitude towards different RTR technologies. For instance, alternatives like urine diversion and biodegrading dry toilets are being considered instead of flushing toilets in regions with severe cold and water shortage conditions. An illustrative case can be found in a village in Handan, Hebei province, where a vacuum sewer system has been implemented. This system segregates greywater (domestic wastewater excluding toilet wastewater) and blackwater (toilet wastewater) and directs them towards separate decentralised treatment systems for resource utilisation.

Enhancing the comprehension of RTR advantages among rural residents can elevate their drive for engagement. The challenging circumstances of poverty, inadequate sanitation, open defecation, and water scarcity maintain pathogen transmission cycles. Insufficient knowledge and uninterrupted transmission vectors further

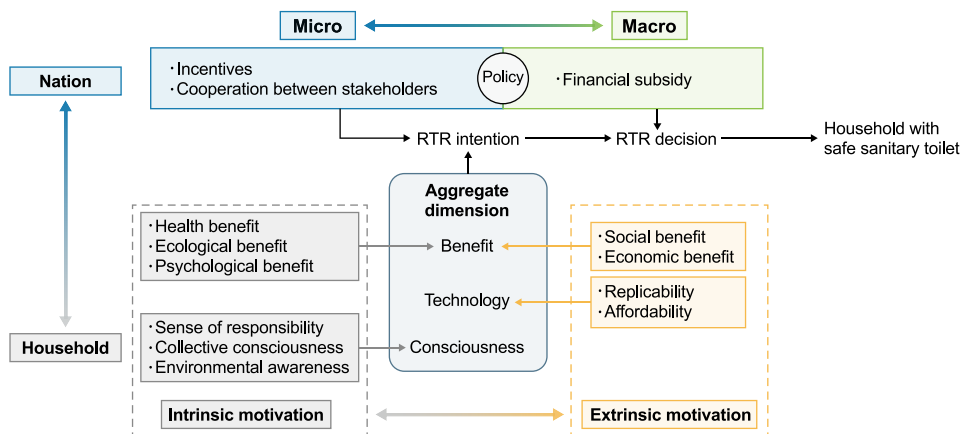


Fig. 1. Model of Chinese rural residents' motivation for participating in the RTR.

contribute to the persistent negative impact of zoonotic pathogens on human and animal communities. Alongside health considerations, the construction of toilets also serves the purpose of ameliorating a family's societal standing.

RTR-supporting policies could target both the micro (incentives and cooperation between stakeholders) and macro levels (financial subsidy). The national macro policy support and financial subsidy for RTR are considered indispensable initial steps [6]. Rural households are important participants and beneficiaries of improving the rural living environment. Awareness of their expectations for improving rural human settlement is essential for policy formulation and fundraising concerning rural human settlement [7]. Incentives can trigger the motivation of rural residents to participate in RTR, which might come in the form of recognition or tangible rewards. Nonfinancial incentives work better than financial incentives or voluntary efforts. Cooperation between stakeholders mitigates the risk of financial constraints preventing rural residents from retrofitting their toilets. This collaboration also enhances the chances for rural residents to access high-quality services, especially for low-income families. For example, we have found potential PPP (public-private partnership) models in RTR.

We brought up the subsidy issue in all interviews. Many rural residents (including low-income families) can use safe rural sanitary toilets while obtaining RTR subsidies [8]. However, we found that a few affluent residents had retrofitted their toilets before implementing RTR. This was driven by personal or external incentives rather than receiving RTR subsidies.

3. Steps to achieve RTR as a vast systemic project

The rural toilet revolution stands as a substantial and comprehensive endeavour. Each provincial government should formulate implementation policies for RTR based on current local conditions, including climate conditions, economic strength, and cultural customs. To alleviate the challenges of RTR and other programmes aiming at enhancing rural sanitation, the following steps are recommended.

First, a comprehensive approach to RTR implementation necessitates a thorough assessment of the overall situation and a clear delineation of responsibilities among relevant departments. In the past, the responsibility for implementing RTR in China rested primarily on the health department, which was later assigned to the agricultural department. However, biogas system construction by the rural energy sector, new rural construction and dilapidated

house retrofitting by the housing construction sector, and sewage treatment by the environmental protection sector also promote RTR through their distinct avenues.

Second, the selection of the RTR approach should be tailored to local conditions. Governmental departments are tasked with devising RTR models for different regions based on factors such as local climate, geography, social economy, ethnic customs, and insights garnered from the effective practices and setbacks encountered during the execution of the 'Three-Year Action Plan for Rural Human Settlement Environment Improvement'. In particular, the geomorphic characteristics of mountainous, hilly, and plain areas, as well as the socioeconomic conditions and residential characteristics in rural areas, urban suburbs, and remote areas, should be fully considered.

Third, strengthen professional technical guidance and support, and retrofit toilets under established standards to uphold the upgraded toilet's quality. To avoid problems such as water leakage, blockage, and stink, it is necessary to provide professional and systematic training for toilet construction staff. Toilet retrofitting should be undertaken by certified construction teams. Alternatively, professional toilet construction teams can be selected through transparent public bidding.

Fourth, establish a routine operation and maintenance mechanism for retrofitted toilets. Toilet wastewater management should be integrated into RTR to form a complete ecological chain project. This can be facilitated by promoting government procurement services and establishing a follow-up management and protection mechanism that combines government guidance and market operation. The toilet management and maintenance standards need to be clarified to establish a methodical approach, covering the allocation of maintenance funds and the deployment of staff responsible for toilet care, thus shaping a standardised operating mechanism.

Fifth, encourage and support the whole village to promote the demonstration construction of the 'toilet revolution' in rural areas. This progression should adhere to the principle of 'promoting the whole village, classifying demonstrations' voluntary declaration, building first and testing later, substituting rewards for subsidies'. The progress should be methodical, commencing with several demonstration counties and villages to elevate the standards of rural sanitary toilets. Insights drawn from the success of these pilot initiatives will subsequently be formulated into standardised practices, which will be gradually applied to other rural regions.

Sixth, ensure the transparency of RTR information and proactively disseminate details about RTR policies and advantages to

rural residents. Government departments can synergise efforts such as the village cleaning action of rural living environment improvement and the creation of sanitary county/town/village. This multifaceted approach will effectively publicise the significance of RTR across various levels.

Seventh, bolster financial support and implement a reward mechanism to draw in societal investments while adhering to established laws and regulations. Enhance assistance for challenging areas, such as central and western regions. Provide preferential policy support covering water, land, electricity, or energy use and operational and maintenance aspects.

Following the introduction of the 'Guiding Opinions on Promoting the Special Action of Rural Toilet Revolution', all provinces in China have issued relevant policies tailored to their specific conditions. These strategies necessitate the provincial government to provide financial subsidies, compile a scientific plan, and adhere to guidelines and standards such as the 'GB 19379-2012 Hygienic Specification for Rural Household Latrine' for RTR. The faecal sludge and toilet wastewater should be managed simultaneously. Human excreta should be integrated into rural domestic waste and wastewater management.

The effectiveness of RTR's execution depends on the township governments. Beyond providing necessary financial subsidies for RTR, these local governments should engage in subsequent endeavours. Primarily, they should vigorously disseminate hygiene education among rural residents, igniting their enthusiasm for RTR involvement. Secondly, the township officials should carefully craft RTR execution strategies, actively participate in its implementation, and supervise the entire process. Lastly, township governments should require toilet construction workers to implement RTR under relevant toilet construction standards.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This study was supported by the National Key Research and Development Plan (2018YFC1903206), Youth Teacher International Exchange & Growth Program of USTB (QNXM20210029), Bill and Melinda Gates Foundation (OPP1157726). The authors would like to take this opportunity to express their sincere appreciation for the support of the National Environmental and Energy Science and Technology International Cooperation Base. The authors would like to thank the interviewers Shaomin Guo, Peng Yu, Jian Wang, Wenjun Bao, Huihui Wang, Jiajun Wu, Siqi Zuo, Rui Weng, and Yanzhao Han for their contributions to this work. The authors

also appreciate the support from the Brook Byers Institute for Sustainable Systems and the Hightower Chair and Georgia Research Alliance at the Georgia Institute of Technology.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ese.2023.100343>.

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28 September 2023