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## Research article

## Toilet revolution in China

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## ABSTRACT

The wide-spread prevalence of unimproved sanitation technologies has been a major cause of concern for the environment and public health, and China is no exception to this. Towards the sanitation issue, toilet revolution has become a buzzword in China recently. This paper elaborates the backgrounds, connotations, and actions of the toilet revolution in China. The toilet revolution aims to create sanitation infrastructure and public services that work for everyone and that turn waste into value. Opportunities for implementing the toilet revolution include: fulfilling Millennium Development Goals and new Sustainable Development Goals; government support at all levels for popularizing sanitary toilet; environmental protection to alleviate wastewater pollution; resource recovery from human waste and disease prevention for health and wellbeing improvement. Meanwhile, the challenges faced are: insufficient funding and policy support, regional imbalance and lagging approval processes, weak sanitary awareness and low acceptance of new toilets, lack of R&D and service system. The toilet revolution requires a concerted effort from many governmental departments. It needs to address not only technology implementation, but also social acceptance, economic affordability, maintenance issues and, increasingly, gender considerations. Aligned with the ecological sanitation principles, it calls for understanding issues across the entire sanitation service chain. Public-private partnership is also recommended to absorb private capital to make up the lack of funds, as well as arouse the enthusiasm of the public.

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## 1. Introduction – what's behind?

In 2015, one in three people (2.4 billion) in the world still used unimproved sanitation facilities, including 946 million people who still practised open defecation. Even in urban areas, where household and communal toilets are more prevalent, over 2 billion people use toilets connected to septic tanks that are not safely emptied or use other systems that discharge raw sewage into open drains or surface waters. Today over 880 million people are estimated to be living in slum-like conditions in the developing world's cities. About 50% of people living in rural areas lack improved sanitation facilities, compared to only 18% of people in urban areas. Poor sanitation around the world results in increased prevalence of

diseases and pollution of the environment (MFA and UN, 2015; UNICEF and WHO, 2015). The World Bank estimates that poor sanitation costs the world 260 billion USD annually (Hutton, 2012). Poor sanitation contributes to 1.5 million child deaths annually from diarrhoea (Prüss-Ustün et al., 2014), which is the second leading cause of morbidity and mortality among children under the age of five, and the leading cause of death in sub-Saharan Africa (Lim et al., 2012; Murray et al., 2015; Walker et al., 2013). Excreta, grey water and solid wastes are the major contributors to the pollution load into the environment and pose a risk to public health (Katukiza et al., 2012). Public agencies often grapple with the question why the adoption of improved sanitation technologies has been slow (Seleman and Bhat, 2016).

When it comes to China, the outlook is not optimistic either, although China had made great progress during the on-going toilet retrofitting action in rural areas. According to up-to-date official data (NHFP, 2016), the coverage of sanitary toilets in rural areas

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has increased from 7.5% in 1993 to 78.5% in 2015, while the coverage of harmless sanitary toilets reached 57.5% by end of 2015. Fig. 1 presents the yearly number of six different harmless sanitary toilets, targeted by the government and installed in Chinese rural areas from 2000 to 2015 (NHFPC, 2015, 2016). However, 57 million households do not have their own sanitary toilet, but 40 million of those households among can use a public sanitary toilet. There are 17 million remaining households that still have serious hygiene issues resulting from poor toilets.

In light of urban sanitation, in 2015, the collected amount of urban faecal sludge was 14.28 million tons. Among this, 6.76 million tons was treated, while the treatment ratio was 47.3%. Of all the provinces and municipalities, Beijing led the nation in that the treatment ratio of faecal sludge reached 92.3%. Fig. 2 shows the trend of collected faecal sludge and quantity of public toilets in urban China (MOHURD, 2016). It is observed that the amount of faecal sludge has decreased in the past decade. The reason may come down to the greater distribution of municipal pipelines which can collect more human faeces into wastewater treatment plants. Another reason would be that government contracts with private companies for collection and handling of faecal sludge are not under governmental responsibility and so are not taken into statistics. However, this doesn't mean that the actual faecal sludge amount and its potential damage to the environment is reducing.

## 2. What is going on? – toilet action

When foreigners visit China tourist areas, they complain about the issue of public toilets the most. Many foreigners said they will never forget the scary toilet experience. Given this fact, how could our tourism industry take big strides? (China Daily, 2015) Thus, the tourism sector has fired the first shots in the toilet revolution. The China National Tourism Administration (CNTA) set the target that from 2015 to 2017, 25,000 public toilets will be upgraded and another 33,500 will be newly built in tourist areas within 3 years. This is also known as the Three-year Toilet Plan (CNTA, 2015). Clean and standard toilets will be a key index for evaluating tourism areas. It was reported that 89.33% of the task had been finished by

Feb of 2017 (CPRI and CGPI, 2017).

“Toilet Revolution” became a hot word in 2015 in China. On 1st of April 2015, President Xi Jinping made important comments on toilet revolution and civilized tourism. In addition, when he visited in Jilin Province on 16th of July 2016, he saw that some farmers still used traditional latrine pits. He said China's rural areas would also launch a “toilet revolution” to let farmers use sanitary toilets. When talking about toilets in rural China, there would be two barriers, one is bad odour, the other is hidden sanitary trouble. Actually, the toilet revolution is tightly associated with the patriotic health campaign, which first started in the 1950s and aimed to improve sanitation and hygiene, as well as attack diseases (Yang, 2004). Since 2004, the central government has earmarked RMB 8.64 billion which has renovated 21.03 million rural toilets. The scenarios of six different harmless sanitary toilets are depicted in Table 1. The goal for rural toilet retrofitting in China is to reach the 85% popularizing rate of sanitary toilets by 2020 (NPHCC, 2015) and 100% by 2030 (State Council, 2016). Chronology of toilet plans and actions is presented in Table 2.

Internationally, in 2011, the Bill & Melinda Gates Foundation (BMGF) initiated the Reinvent The Toilet Challenge (RTTC) to bring sustainable sanitation solutions to the 2.4 billion people worldwide who do not have access to safe, affordable sanitation. Grants have been awarded to sixteen researchers around the world who are using innovative approaches—based on fundamental engineering processes—for the safe and sustainable management of human waste. In addition to these RTTC grants, BMGF has made a range of other investments that are aligned with reinventing the toilet, and we are continuously seeking to expand our partnerships on this challenge. In August 2013, the foundation announced the Reinvent The Toilet Challenge – China (BMGF, 2013). The foundation would invest US\$5 million to support Chinese investigators to drive research, development, and production of the “next generation toilet” (BMGF, 2013). This China toilet challenge is an effort targeted to a specific country after India and is a testament to the research and development capabilities in China. After two-round selections, nine proposals have been funded finally (RTTC-China, 2017). Domestically, CNTA, BMGF and University of Science and

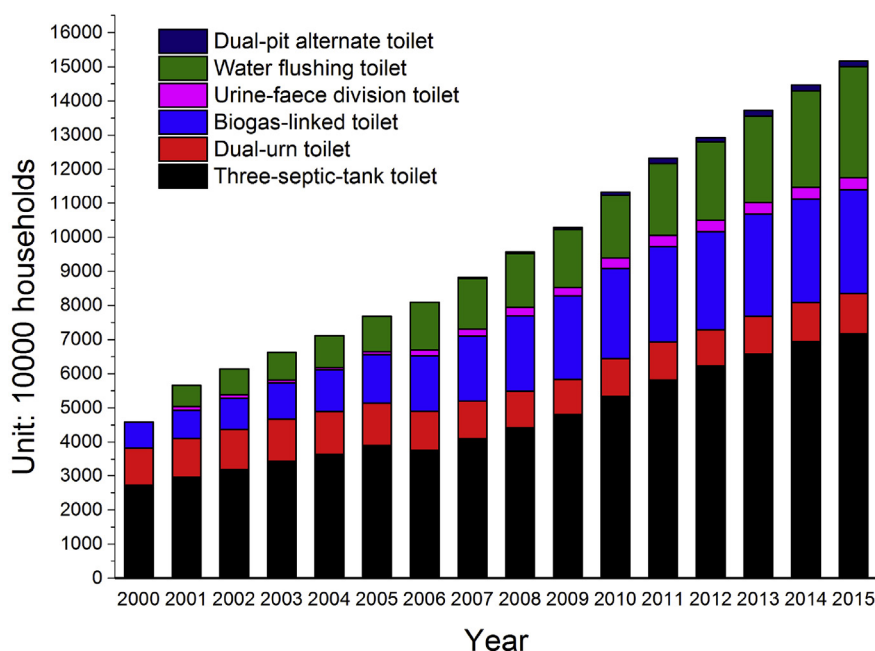


Fig. 1. Yearly number of six different harmless sanitary toilets installed in Chinese rural areas from 2000 to 2015.

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