



## Understanding Determinants of Inequality in Sanitation Improvement in Rural China

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(Received 15 June 2014; accepted 12 July 2014)

### Dear Editor-in-Chief

Accessible improved sanitation is critical to health, and inequities in improved sanitation can be interpreted as health inequities across socio-economic groups (1). In China, sanitation improvement in rural areas has made great progress in recent years. However, China still has a disparity in coverage rates of improved sanitation among 30 provinces. Aiming to identify the determinants that lead to this inequality, we used the data from the China Health Statistics Yearbooks, China Statistical Yearbook, and China Meteorological Administration to calculate the concentration index (CI) of improved sanitation in China from 2003 to 2011. We established a linear regression model to reveal potential influencing factors for coverage rate of improved sanitation and using the method of decomposition of the CI proposed by Wagstaff et al. (2), we used the linear model to decompose the concentration index of improved sanitation.

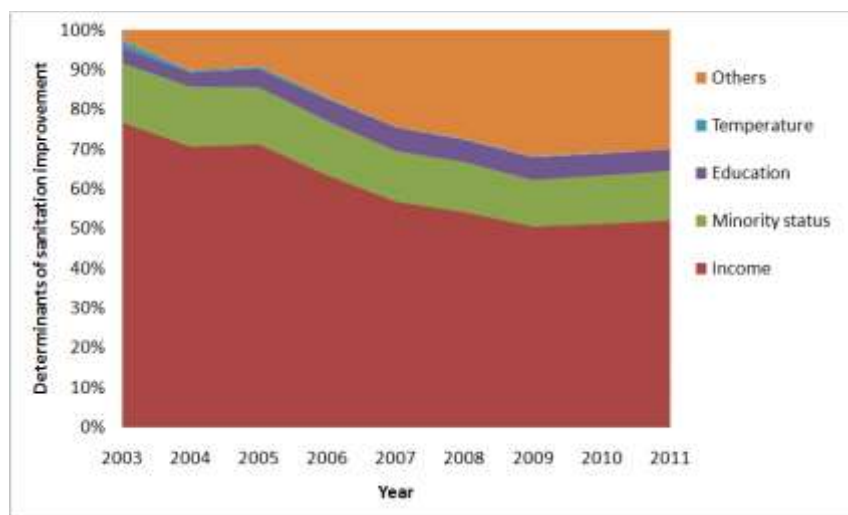
The results from linear regression showed that income ( $P=0.000$ ), education ( $P=0.009$ ), minority status ( $P=0.000$ ), and temperature ( $P=0.000$ ) have a remarkable impact on coverage rate of improved sanitation. While some scholars had indicated that income, education and minority status could influence sanitation improvement (3-5), the conclusion that temperature is a determinant of sanitation improvement is presented for first time, and we

explain it in two ways. First, in our previous field investigation, we noticed that water freezes easily in the north region of China, especially during winter. Therefore, it is relatively difficult to build or maintain a flushing-type latrine and there is a risk that water pipes may burst due to the frosty temperature. This means the cost of improved sanitation is higher for residents in regions with low temperatures than for residents in regions with high temperatures. Second, several studies have shown the important role of inadequate sanitation in the occurrence of diarrheal diseases (6) and that improved sanitation prevents such diseases (7). However, the morbidity of diarrheal diseases usually correlates positively with temperature (8). Therefore, the harm of being without improved sanitation is clearly less for people who live in regions with low temperatures than for people who live in regions with high temperatures because people in regions with high temperatures have a greater need for improved sanitation to prevent diarrheal diseases. These two reasons illustrate how temperature influences motivation with regard to sanitation improvement.

Figure 1 show the decompositions of CI of improved sanitation in rural China from 2003 to 2011. The results revealed that income made the largest contribution (more than 50%) to socioeco-

conomic inequality in sanitation improvement every year from 2003 to 2011. Minority status (~13%) and education level (~5%) were also important contributors to the inequality. However, temperature made almost no contribution to the inequality. By adopting a CI decomposition approach, we determined how each main determinant relates to

the gap in sanitation improvement among the provinces in China. We hope that our study will contribute to a more targeted policy for sanitation improvement in rural China to increase the coverage rate of improved sanitation and improve equity further.



**Fig. 1:** Contributions of determinants to inequality in sanitation improvement from 2003 to 2011

## Acknowledgements

The authors acknowledge financial support from the program “Inequity of Access to Sanitary Latrines in Rural China” of UNICEF and the National Development and Reform Commission. The authors declare that there is no conflict of interest.

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