

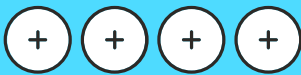
Healthy Cities Toolkit

Last updated 12/04/22

Sanitation

Significant positive impact based on low-quality evidence with uncertain resource implications

Impact



Resources



Evidence



Studies



Cite as Feher N. and Richards GC. 2022. Sanitation. Oxford Healthy Cities Toolkit
<https://www.healthycitiescommission.org/toolkit/sanitation/>

[Access data](#)

Description

Sanitation refers to systems and infrastructure designed to remove faecal matter and waste to reduce the transmission of diseases ([Jung 2017](#)). The [WHO](#) and [UNICEF](#) define sanitation services as “*the management of excreta from the facilities used by individuals, through emptying and transport of excreta for treatment and eventual discharge or reuse.*” (2020) In the literature, sanitation interventions mainly included the installation of household or communal latrines (i.e. a simple toilet facility), stool analyses, or the self-reported use of services or exposure

to sewage.

Findings

Eight reviews examined the impact of sanitation on health outcomes involving over 400 primary studies. Three reviews conducted meta-analyses, and overall they found that improved waste disposal (e.g. sewerage) reduced the risk of diarrhoeal illnesses, and both shared and domestic facilities were effective in improving health, but shared facilities posed a higher risk of communicable diseases ([Heijnen 2014](#); [Jung 2017](#); [Norman 2010](#)).

Most (75%) reviews focused on the general population, and two focused on infants and children. The majority of reviews represented studies conducted in low- or lower-middle-income countries in Africa, Southeast Asia, and South America, with some three reviews examining sanitation improvements in slums ([Alaazi 2020](#); [Henson 2020](#); [Turley 2013](#)) and people in protracted displacement ([Behnke 2020](#)).

The incidence of diarrhoea and enteric disease burden was reduced by 30% in 25 studies that replaced urban onsite waste disposal with sewerage systems that piped waste material out of the populated area ([Norman 2010](#)).

Household and neighbourhood sanitation improvements were both associated with a substantial decrease in diarrhoeal morbidity. However, there was high heterogeneity across the pooled analyses ([Jung 2017](#)).

Shared sanitation facilities, excluding public facilities, posed a significantly increased risk of adverse health outcomes, including diarrhoeal disease, helminth infection, poliomyelitis, as well as prematurity, antepartum fetal death and perinatal death, when compared to individual household latrines ([Heijnen 2014](#)). However, studies found no increased risk of trachoma associated with reliance on shared sanitation.

In urban settings, sanitation improvements were associated with improvements in birth outcomes, mental disorders, and obesity ([Salgado 2020](#)).

In slums, poor sanitation was linked to diarrheal diseases and malaria-related mortality, which were more prevalent in urban slums than in other urban settlements ([Alaazi 2020](#)). Slum upgrades were found to reduce the incidence of diarrhoeal diseases and water-related expenditure ([Turley 2013](#)).

For people who experience protracted displacement, poor sanitation was associated with cholera, E. coli, shigella, giardia, rotavirus and malaria ([Behnke 2020](#)).

Impact

Determining the overall impact of sanitation was difficult since reviews varied in their aims. Some assessed the effectiveness of sanitation interventions on health, and others examined health outcomes of poor sanitation. Overall, improvements in sanitation had a strong positive impact on health, behaviour, and quality of life.

For people living in slums, water, drainage and sanitation infrastructure were perceived as the most important needs in preference to health, education, and employment ([Turley 2013](#)).

Evidence to date does not support a change in the existing policy of excluding shared sanitation. Yet, more research is needed to identify the circumstances in which shared sanitation might be a safe and effective alternative for populations that do not have access to individual household latrines or where household-level sanitation solutions are not possible or appropriate ([Heijnen 2014](#)).

To better inform sanitation interventions strategies and regulatory decisions, the design, conduct, and reporting of studies need to be improved, including the standardisation of methods and the establishment of a registry of evaluations ([Heijnen 2014](#); [Henson 2020](#); [Jung 2017](#); [Norman 2010](#); [Salgado 2020](#)).

Resources

Most (88%) reviews did not report direct information on cost or the resource implications of sanitation projects. One review discussed the cost of sanitation infrastructure and the financial obstacles at the local level, including high prices for essential commodities and low incomes ([Behnke 2020](#)).

Overall, the included reviews suggest that sanitation facilities require substantial investment. The different range of sanitation solutions and contexts should be considered when planning such an investment. For example, the cost of a flush toilet and sewage connection will require more investment than an onsite well ([Norman 2010](#)). Similarly, shared sanitation may be more costly and poorly maintained than individual household latrines ([Heijnen 2014](#)). With the potential for high costs, upgrading existing sanitation infrastructure should be considered before investing in new infrastructure.

Quality of the evidence

There were six formal systematic reviews (three with meta-analyses and one [Cochrane](#)

[review](#)), one narrative and one scoping review. Most reviews included primary observational studies and few included randomised trials. Searches for evidence were conducted between 2010 and 2018 in a median of 5 databases. The majority (75%) of included reviews used a tool to conduct a risk of bias or quality assessment with three reviews of moderate quality, two reviews of low quality, and three of uncertain quality, giving the overall score of low-quality evidence.

Overall, primary studies included in the reviews had logistic challenges in eliminating biases and confounding factors. Studies were also limited by geographical and socioeconomic heterogeneity. The lack of consensus definitions and poor reporting of waste levels, duration of exposure, and other quantitative descriptors make it difficult to combine and compare studies.

External links to related sources

- WHO: [Sanitation fact sheets](#)
- WHO: [Water, sanitation and hygiene resources](#)
- WHO & Unicef: [Sanitation](#)
- Water Aid: [Technical guidelines for construction of institutional and public toilets](#)
- UN Sustainable Development Goals: [Ensure access to water and sanitation for all](#)
- UN-Habitat: [Water and Sanitation](#)
- Bill & Melinda Gates Foundation: [Reinvent the Toilet Challenge](#)
- World Bank Group: [Open Knowledge Repository](#)
- CDC: [Sanitation and hygiene](#)
- McKinsey Global Institute (2020): [Prioritizing health – A prescription for prosperity](#)
- [Sanitation and Water for All](#)
- [SaniUP project](#)
- [Toilet Board Coalition](#)

References of included reviews

Alaazi DA and Aganah GAM (2020) Understanding the slum-health conundrum in sub-Saharan Africa: a proposal for a rights-based approach to health promotion in slums. *Global health promotion* 27(3): 65–72.

Behnke NL, Cronk R, Shackelford BB, et al. (2020) Environmental health conditions in protracted displacement: A systematic scoping review. *The Science of the total environment* 726: 138234.

Heijnen M, Cumming O, Peletz R, et al. (2014) Shared sanitation versus individual household latrines: a systematic review of health outcomes. *PloS one* 9(4): e93300.

Henson RM, Ortigoza A, Martinez-Folgar K, et al. (2020) Evaluating the health effects of place-based slum upgrading physical environment interventions: A systematic review (2012-2018). *Social science & medicine* 261: 113102.

Jung YT, Hum RJ, Lou W, et al. (2017) Effects of neighbourhood and household sanitation conditions on diarrhea morbidity: Systematic review and meta-analysis. *PloS one* 12(3): e0173808.

Norman G, Pedley S and Takkouche B (2010) Effects of sewerage on diarrhoea and enteric infections: a systematic review and meta-analysis. *The Lancet infectious diseases* 10(8): 536–544.

Salgado M, Madureira J, Mendes AS, et al. (2020) Environmental determinants of population health in urban settings. A systematic review. *BMC public health* 20(1): 853.

Turley R, Saith R, Bhan N, et al. (2013) Slum upgrading strategies involving physical environment and infrastructure interventions and their effects on health and socio-economic outcomes. *Cochrane database of systematic reviews* (1): CD010067.



Kellogg College
University of Oxford



Global Centre on
Healthcare & Urbanisation



Cite as: Richards GC. Carpenter J. Heneghan C. Howard D. Healthy Cities Toolkit.
2022 <https://www.healthycitiescommission.org/>