

# Burden of disease attributable to unsafe drinking-water, sanitation and hygiene

2019 Update

## *Executive Summary*



World Health  
Organization

## Introduction

Safe drinking water, sanitation and hygiene (WASH) services are critical prerequisites to health and well-being and central to sustainable development. Government commitments to provide universal access to safe WASH by 2030 and substantially reduce the number of associated deaths and illnesses are enshrined in Sustainable Development Goal (SDG) targets 6.1, 6.2 and 3.9, respectively.

WHO is the custodian agency for reporting on SDG indicator 3.9.2 on mortality attributed to unsafe WASH.

## Key Estimates and Findings

The estimated disease burden attributable to unsafe WASH is significant. In 2019, use of safe WASH services could have prevented at least 1.4 million deaths and 74 million disability-adjusted life years (DALYs) (1). This represents 2.5% of all deaths and 2.9% of all DALYs globally.

Diarrhoeal disease accounted for over two-thirds of the total WASH-attributable burden, with over one million deaths and 55 million DALYs. This comprised 505 000 diarrhoea deaths from unsafe drinking water, 564 000 from unsafe sanitation and 384 000 from unsafe hand

The latest report, summarised here, presents estimates of the burden of disease attributable to unsafe WASH for 183 WHO Member States, disaggregated by region, age and sex for the year 2019. The estimates are based on four health outcomes – diarrhoea, acute respiratory infections, undernutrition (protein-energy malnutrition), and soil-transmitted helminthiasis – included in the reporting of SDG indicator 3.9.2 on mortality attributed to unsafe WASH.

hygiene. Overall, 69% of the total diarrhoeal disease burden was attributable to unsafe WASH.

Acute respiratory infections (ARI) due to inadequate hand hygiene constituted the second largest proportion of the WASH-attributable disease burden. WASH-attributable ARI caused 356 000 deaths and 17 million DALYs, which represented 14% of the total ARI disease burden. In addition, 10% of the undernutrition disease burden was attributed to unsafe WASH and it is assumed that 100% of the disease burden from soil-transmitted helminthiasis was attributable to unsafe WASH.

### Impact on Children Under the Age of Five

Among children under the age of five, the total WASH-attributable disease burden amounted to 395 000 deaths and 37 million DALYs, representing 7.6% of all deaths and 7.5% of all DALYs in this age group. This included 273 000

deaths from diarrhoea and 112 000 deaths from ARIs. Among the two leading infectious causes of death for children under five globally.

**Table 1.** WASH-attributable disease burden by health outcome, 2019

Health outcome	Population- attributable fraction	Deaths (thousands)	DALYs (thousands)
Diarrhoea	69%	1035	54 590
Acute respiratory infections	14%	356	16 578
Undernutrition	10%	8	825
Soil-transmitted helminthiasis	100%	2	1942
Total	N/A	1 401	73 935

### Variations by Income Group and Region

WASH-attributable disease burden varied largely by income group, with 89% of attributable deaths being from low- and lower-middle-income countries. There were 270 000 deaths in low-income, 975 000 deaths in lower-middle-income and 112 000 deaths in upper-middle-income countries. In high-income countries, only the burden attributable to unsafe hygiene practices was estimated, which amounted to 44 000 deaths.

There is also substantial regional variation. More than three quarters of all WASH-attributable deaths were in

the WHO African and South-East Asian Regions, with 510 000 and 593 000 deaths respectively, compared with 33 000 deaths in the European region. While 18% of the diarrhoeal disease burden in high-income countries could be prevented through safe WASH, 76% and 66% could be prevented in low- and middle-income countries (LMICs) in Africa and South-East Asia respectively. Important disparities in disease burden within countries are also likely, due to within-country variations in WASH services and disease burden.

## Policy implications

These estimates are the first to calculate health gains along the WASH service ladder used to monitor the SDGs. The data confirm the importance of improving access to basic WASH services to reduce disease risks. But they also provide evidence of greater health gains associated with higher levels of services, reinforcing the need to redouble efforts to achieve the SDG 6 targets.

These data are an underestimate of the true burden of disease associated with unsafe WASH. Numerous other health outcomes are affected by WASH, but cannot yet be quantified due to lack of data. Insufficient data also means that the estimated health impact of unsafe WASH in non-domestic settings is not included in the current figures. Furthermore, the exacerbating impacts of climate change on WASH-related diseases and risks have not been captured.

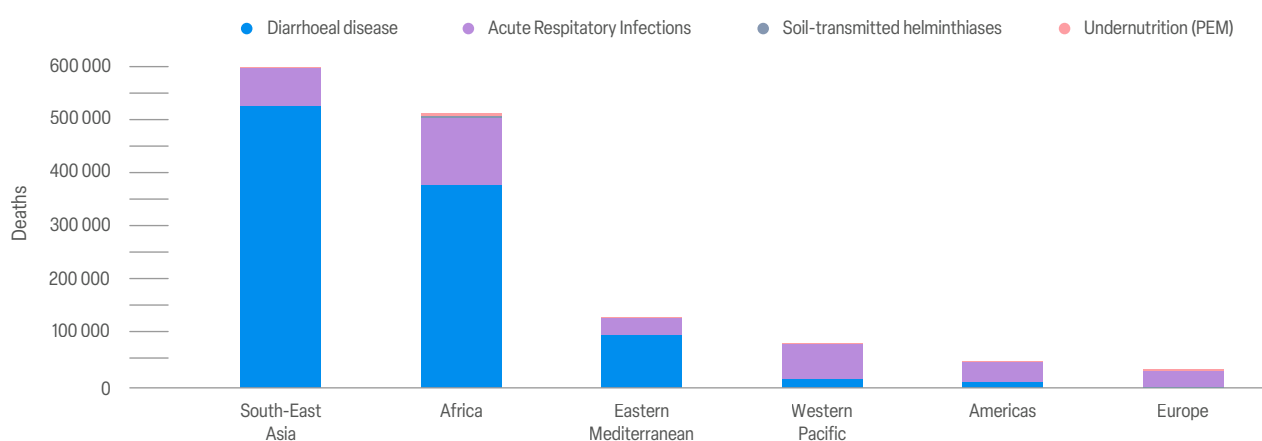
These data highlight the need to:

- **Double down on the goal of universal access to safe WASH.** The mid-term comprehensive review of the International Decade for Action Towards the Sustainable Development Goals saw renewed commitments from governments to accelerate progress towards the goal of universal access to safe WASH. By quantifying for the first time the health gains associated with higher WASH service levels, the updated

estimates provide strong evidence to support efforts to take these commitments to action.

- **Focus efforts on the poorest and most disadvantaged.** The burden of disease is largely driven by inadequate access in LMICs, and national estimates on WASH access often hide disparities within countries. Access to WASH services is typically lower among rural populations and lower socio-economic groups (2). Even in high-income countries, where access to safely managed drinking-water and sanitation services is generally high, certain marginalized communities are underserved (3, 4).
- **Adapt national monitoring systems to improve data on population exposure to safely managed services.** Data on higher levels of service remain sparse in many countries. Collecting information on higher service levels is needed to reflect the full burden of disease associated with unsafe WASH. Governments should adapt national and local monitoring systems to take into consideration the higher service levels called for in the SDG framework.

**Fig. 1.** WASH-related deaths by health outcome and WHO region, 2019



- 1 Wolf J, Johnston RB, Ambelu A, Arnold BF, Bain R, Brauer M et al. Burden of disease attributable to unsafe drinking water, sanitation, and hygiene in domestic settings: a global analysis for selected adverse health outcomes. *Lancet*. 2023 401(10393):2060-2071. doi: 10.1016/S0140-6736(23)00458-0.
- 2 Brown J, Acey CS, Anthonj C, Barrington DJ, Beal CD, Capone D et al. The effects of racism, social exclusion, and discrimination on achieving universal safe water and sanitation in high-income countries. *Lancet Glob Health*. 2023;11:e606-14. doi: [https://doi.org/10.1016/S2214-109X\(23\)00006-2](https://doi.org/10.1016/S2214-109X(23)00006-2).
- 3 World Health Organization (2019) 'Progress on household drinking water, sanitation and hygiene 2000-2017: special focus on inequalities', World Health Organization
- 4 Wolf J, Johnston RB, Ambelu A, Arnold BF, Bain R, Brauer M et al. Burden of disease attributable to unsafe drinking water, sanitation, and hygiene in domestic settings: a global analysis for selected adverse health outcomes. *Lancet*. 2023 401(10393):2060-2071. doi: 10.1016/S0140-6736(23)00458-0.

