

A Bibliography of UNC Water Institute Publications on WASH in Healthcare Facilities - October 2021



This bibliography contains links and abstracts to UNC Water Institute peer-review studies on WASH in Healthcare Facilities that were published from 2009 through October 2021. Recent studies discuss findings on disinfection efficacy, costing toolkits, conditions in maternity wards, energy access and other topics.

2021

[Evidence Map and Systematic Review of Disinfection Efficacy on Environmental Surfaces in Healthcare Facilities](#). *Int. J. Environ. Res. Public Health*, October 2021. Authors: Elizabeth C. Christenson, Ryan Cronk, Helen Atkinson, Aayush Bhatt, Emilio Berdiel, Michelle Cawley, Grace Cho, Collin Knox Coleman, Cailee Harrington, Kylie Heilferty, Don Fejfar, Emily J. Grant, Karen Grigg, Tanmay Joshi, Suniti Mohan, Grace Pelak, Yuhong Shu and Jamie Bartram
<https://doi.org/10.3390/ijerph182111100>

The researchers concluded that guidelines for disinfectant use are primarily based on laboratory data rather than a systematic review of in situ disinfection efficacy. It is critically important for practitioners and researchers to consider system-level efficacy and not just the efficacy of the disinfectant.

Keywords/tags: environmental cleaning, disinfection, healthcare acquired infections

[Healthcare provider satisfaction with environmental conditions in rural healthcare facilities of 14 low- and middle-income countries](#). *International Journal of Hygiene and Environmental Health*, July 2021. Authors: Donald Fejfar, Amy Guo, Emma Kelly, James Benjamin Tidwell, Oscar Ochieng, Ryan Cronk
<https://doi.org/10.1016/j.ijheh.2021.113802>

This study analyzes 2002 HCFs in rural areas of 14 LMICs. 86% of providers were unsatisfied with at least one element of WaSH infrastructure. Mobility-accessible WaSH resources are associated with higher HCP satisfaction. Adequate hygiene and IPC supplies are associated with higher HCP satisfaction. On premises, improved water service is important to healthcare provider satisfaction.

Keywords/tags: healthcare workers

[A toolkit for costing environmental health services in healthcare facilities](#). *Journal of Water, Sanitation and Hygiene for Development*, June 2021. Authors: Darcy M. Anderson; J. Wren Tracy; Ryan Cronk; Hayley Schram; Nikki Behnke; Jamie Bartram.
<https://doi.org/10.2166/washdev.2021.018>

This paper describes the development, structure, and functionality of the toolkit; provides guidance for its application; and identifies good practices for costing, including pilot testing data collection tools and iterating the data collection process, involving diverse stakeholders, considering long-term costs, and disaggregating environmental costs in records to facilitate future costing.

Keywords/tags: costing, finance, tools, water, sanitation, hygiene, environmental cleaning, waste management

[Development and application of tools to cost the delivery of environmental health services in healthcare facilities: a financial analysis in urban Malawi](#). *BMC Health Services Research*, April 2021. Authors: Darcy M. Anderson, Ryan Cronk, Emily Pak, Precious Malima, David Fuente, J. Wren Tracy, Innocent Mofolo, Holystone Kafanikhale, Irving Hoffman & Jamie Bartram.

Electronic health information systems have potential to support efficient data collection. However, it was found that existing records systems were decentralized and poorly suited to identify EHS costs. Research suggests a need to better code and disaggregate EHS expenses to properly leverage records for costing.

Frameworks developed in this study are a potential tool to develop more accurate estimates of the cost of providing EHS in HCFs.

Keywords/tags: costing, finance, tools, water, sanitation, hygiene, environmental cleaning, waste management, laundry, vector control, health information management

[Environmental conditions in maternity wards: Evidence from rural healthcare facilities in 14 low- and middle-income countries](#). *International Journal of Hygiene and Environmental Health*, March 2021.

Authors: Ryan Cronk, Amy Guo, Caroline Folz, Peter Hynes, Ashley Labat, Kaida Liang, Jamie Bartram
<https://doi.org/10.1016/j.ijheh.2020.113681>

73% of HCFs offering maternal and neonatal health (MNH) services did not meet the guidelines for the World Health Organization 'six cleans' (clean perineum, clean bed surface, clean hands, clean blade, clean cord tie, and clean towels to wrap the baby and mother). The items with the lowest availability were clean towels (40%). There are several low-cost, high-impact, context-relevant opportunities to enhance essential environmental conditions that would improve the quality of neonatal and maternal care in maternity wards in HCFs in LMICs.

Keywords/tags: facility standards, monitoring

[Safe Healthcare Facilities: A Systematic Review on the Costs of Establishing and Maintaining Environmental Health in Facilities in Low- and Middle-Income Countries](#). *Int. J. Environ. Res. Public Health*, January 2021. Authors: Darcy M. Anderson, Ryan Cronk, Donald Fejfar, Emily Pak, Michelle

Cawley and Jamie Bartram.

<https://doi.org/10.3390/ijerph18020817>

This review identifies opportunities to improve costing research through efforts to categorize and disaggregate EHS costs, greater dissemination of existing unpublished data, improvements to indicators to monitor EHS demand and quality necessary to contextualize costs, and development of frameworks to define EHS needs and essential inputs to guide future costing.

Keywords/tags: costing, finance, tools, water, sanitation, hygiene, environmental cleaning, waste management, laundry, vector control, health information management

2020

[Energy access in Malawian healthcare facilities: consequences for health service delivery and environmental health conditions](#). *Health Policy and Planning*, March 2020. Authors: Frances Reuland, Nikki Behnke, Ryan Cronk, Ryan McCord, et al.

<https://doi.org/10.1093/heapol/czz118>

Inadequate energy availability is associated with irregular water supply and poor medical equipment sterilization; it adversely affects provider safety and contributes to poor lighting and working conditions.

Keywords/tags: energy

[Application of tools to monitor environmental conditions, identify exposures, and inform decision-making to improve infection prevention and control practices in Malawian maternity wards](#). *Environmental Monitoring and Assessment*, January 2020. Authors: Hemali Harish Oza, Michael Benjamin Fisher, Lydia

Abebe, Ryan Cronk, Ryan McCord, Frances Reuland, Nikki Behnke, Holystone Kafanikhale, Innocent Mofolo, Irving Hoffman & Jamie Bartram.

Results suggest that Malawian maternity wards could reduce microbial contamination, and potentially reduce the occurrence of health-acquired infections by improving EH conditions and IPC practices. HCF staff can use the simple, low-cost EH monitoring methods used in this study to incorporate microbial

monitoring of EH conditions and IPC practices in HCFs in low-resource settings.

Keywords/tags: healthcare acquired infections, infection prevention, cleaning, disinfection

[Budgeting for environmental health services in healthcare facilities: A ten-step model for planning and costing](#). *International Journal of Environmental Research and Public Health*, 2020. Authors: Darcy Anderson, Ryan Cronk, Lucy Best, Mark Radin, Hayley Schram, J. Wren Tracy & Jamie Bartram.

This research develops a model to guide budgeting for EHS in HCFs. The model comprises ten steps in three phases: planning, data collection, and synthesis. Costing-stakeholders define the costing purpose, relevant EHS, and cost scope; assess the EHS delivery context; develop a costing plan; and identify data sources (planning). Stakeholders then execute their costing plan and evaluate the data quality (data collection). Finally, stakeholders calculate costs and disseminate findings (synthesis). This paper presents three hypothetical costing examples and discuss good practices.

Keywords/tags: costing, finance, tools, water, sanitation, hygiene, environmental cleaning, waste management

2019

[Coping with ill-health: health care facility, chemist or medicinal plants? Health-seeking behaviour in a Kenyan wetland](#). *BMC International Health and Human Rights*, June 2019. Authors: Carmen Anthonj, Peter Giovannini & Thomas Kistemann.

Community members had different strategies of coping with ill-health and few symptoms remained untreated. Whether via a health care facility admission, the visit of a chemist, or the intake of pharmaceuticals or medicinal plants: treatment was usually applied either via a healthcare service provider or by the community members themselves.

[The implementation of environmental health policies in health care facilities: The case of Malawi](#). *International Journal of Hygiene and Environmental Health*, May 2019. Authors: R. McCord, R. Cronk, J. Tomaro, F. Reulandad, N. Behnke, et al.
<https://doi.org/10.1016/j.ijheh.2019.05.003>

Review of Malawi's Ministry of Health and Population's 2018 Environmental Health Policy. Qualitative analysis of interviews to highlight successes and challenges of implementing policies in health care facilities. Successes include: a robust EH Department, designed to link the national level of government to individual facilities. Barriers include: insufficient financial support, lack of human resources, incomplete reporting, and insufficient training.

Keywords/tags: energy, policy, Malawi

2018

[The role of energy in health facilities: A conceptual framework and complementary data assessment in Malawi](#). *PLoS One*, July 2018. Authors: Laura Suhlrie, Jamie Bartram, Jacob Burns, Lauren Joca, John Tomaro, Eva Rehfuess.
<https://doi.org/10.1371/journal.pone.0200261>

The conceptual framework draws attention to the importance of energy in health facilities, highlighting that reliable electricity and thermal energy are required for the delivery of a broad range of health services. Recognizing the important role of energy is long overdue and should inform efforts to strengthen health systems in developing countries—at global, national and sub-national levels.

Keywords/tags: energy

[Environmental conditions in health care facilities in low- and middle-income countries: Coverage and inequalities](#). *International Journal of Hygiene and Environmental Health*, April 2018. Authors: Ryan Cronk, Jamie Bartram.

<https://doi.org/10.1016/j.ijheh.2018.01.004>

50% of HCFs lack piped water, 33% lack improved toilets, 39% lack handwashing soap. 39% of HCFs lack adequate infectious waste disposal and 59% lack reliable electricity. 2% of HCFs provide all four water, sanitation, hygiene, and waste management services. Inequalities by urban-rural, managing authority, facility type, administrative unit.

Keywords/tags: facility standards, monitoring

2017 - 2009

[A systematic review of waterborne infections from nontuberculous mycobacteria in health care facility water systems](#). *International Journal of Hygiene and Environmental Health*, May 2017. Authors: Trudy Li, Lydia S. Abebe, Ryan Cronk, Jamie Bartram.

<https://doi.org/10.1016/j.ijheh.2016.12.002>

Water is an overlooked source of infectious microorganisms in health care facilities. Waterborne nontuberculous mycobacteria (NTM) are ubiquitous, and particularly problematic in health care facility water systems, and cause a variety of diseases. The purpose of this review is to assess health care associated NTM infections from health care facility water systems.

Keywords/tags: water, healthcare acquired infections

[Water, Sanitation, and Hygiene in Rural Health-Care Facilities: A Cross-Sectional Study in Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia](#). *Am. J. Trop. Med. Hyg.*, September 2017. Authors: Amy Guo, J. Michael Bowling, Jamie Bartram, and Georgia Kayser.

<https://doi.org/10.4269/ajtmh.17-0208>

We found that fewer than 50% of rural HCFs had access to improved water sources on premises, improved sanitation, and consistent access to water and soap for handwashing. Adequate hand hygiene reduces disease transmission and health-care-acquired infections, but fewer than 25% of HCF in each country reported that a combination of water, soap, and hand-drying materials were always available. Our research points to a lack of basic WaSH services in rural HCFs in regions of sub-Saharan Africa, which poses a threat to the health of patients and health-care workers in these settings.

Keywords/tags: facility standards, monitoring

[Methods for the recovery of a model virus from healthcare personal protective equipment](#). *J Appl Microbiol.*, April 2009.

Personal protective equipment (PPE) plays a crucial role in interrupting transmission of infectious agents from patients to healthcare workers. The fate of micro-organisms when PPE is removed and disposed of has important consequences for infection control. Methods described here can be used to conduct rigorous studies of viral survival and transfer on PPE for risk assessments in infection control and HCW protection.

Keywords/tags: infection prevention

