

2022 Hand Hygiene Research Summary



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About the Research Summary

For over 10 years, the Global Handwashing Partnership has synthesized the latest hand hygiene research through annual research summaries. These summaries provide the latest research, key findings, and guidance on hand hygiene best practices for program implementers, policy actors and researchers. This summary covers peer-reviewed publications from 2022 (methodology described in the [Annex](#)) and complements lessons learned from previous years to promote hand hygiene.

Research Highlights for 2022

Research highlights from 2022 are summarized in this section with key findings categorized by the following themes:

- Hand Hygiene Impacts
- Hand Hygiene Access and Supplies
- Determinants and Interventions for Hand Hygiene Behavior Change in Various Settings

Hand Hygiene Impacts

Studies published in 2022 cover various topics on hand hygiene impact. Most studies focus on assessing the effectiveness of different interventions in preventing and controlling diseases such as diarrheal disease, healthcare-associated infections, and parasitic infections.

Several studies evaluated the effectiveness of hand hygiene practices in preventing or controlling diseases among children. A systematic review and meta-analysis by [Wolf et al. \(2022\)](#) reviewed and synthesized evidence on the effectiveness of interventions to improve drinking water, sanitation, and handwashing with soap on the risk of diarrheal disease in children in low- and middle-income settings. The study found that interventions that promoted hand hygiene were effective in reducing the risk of diarrheal disease among children under 5 years old by 30%. Findings from this study are consistent with previous [studies](#) that concluded handwashing with soap can reduce the risk of endemic diarrhea up to 30 to 48%. [Ntshangase et al. \(2022\)](#) investigated the prevalence of diarrhea and handwashing practices among children attending early childhood development centers in KwaZulu-Natal, South Africa. The study revealed a high prevalence of childhood diarrhea among children in early childhood development centers, with prevalence associated with the number of children in a household and handwashing practices among children and their parents or guardians. A cross-sectional study by [Husen et al. \(2022\)](#) assessed the frequency of intestinal helminth infections and their related risk factors among school children in Adola Town, Ethiopia. The prevalence of intestinal helminth infections among school children was reported as 33.91%, with the rate of double infection noted as 2.72%. The authors found significant associations with risk factors such as gender, education level, toilet usage and handwashing habits before feeding and after defecation. [Sangalang et al. \(2022\)](#) examined the association between school water, sanitation, and hygiene and diarrhea, malnutrition, and dehydration among children in Metro Manila, Philippines. The study found that over 28% of students had diarrhea and 68% were dehydrated. Diarrhea was associated with poor handwashing behavior, while dehydration was associated with the lack of water in school restrooms.

Other publications focused on other impacts of hand hygiene, including healthcare-associated infections. [Wong et al. \(2022\)](#) focused on controlling healthcare-associated carbapenem-resistant *Acinetobacter baumannii* (CRAB). Through enhanced infection control measures, with emphasis on directly observed hand hygiene, hospital-onset CRAB infections decreased by 9.8% each year of the 5-year study period. Furthermore, a study by [Fenny et al. \(2022\)](#) evaluated the cost-effectiveness of a multimodal hand hygiene intervention involving alcohol-based hand rub for the prevention of neonatal bloodstream infections (BSI) in a neonatal intensive care unit in Ghana. Their analysis showed that the alcohol-based handrub program was effective in reducing patient cost of neonatal BSI by 41.7% and BSI-attributable hospital cost by 48.5%. Neonatal BSI-attributable deaths and length of hospital stay also decreased by 73% and 50% respectively, highlighting the significant potential cost-savings benefits from hand hygiene interventions. While individual study results may vary, these studies show the breadth of hand hygiene impact across several health and development outcomes.

What does this mean? Overall, the studies included in the 2022 review reinforce and support existing evidence that hand hygiene and hand hygiene improvements can have a significant positive impact on health. However, gaps in evidence remain regarding non-health impacts of hand hygiene, including its impact on economic stability, productivity, and dignity. While previous studies have evaluated the cost-effectiveness of hand hygiene, further evidence is needed on relative costs and return on investment for hand hygiene interventions.

Hand Hygiene Access and Supplies

Access to proper hand hygiene services, supplies, and facilities is a critical determinant to improving hand hygiene behavior. Studies published in 2022 examined socio-demographic factors that impact hand hygiene access and explored the effectiveness of various hand hygiene techniques and products.

[Endalew et al. \(2022\)](#) analyzed the prevalence and factors associated with limited handwashing facilities – defined as a dedicated location for handwashing where either soap or water are available but not both – among 29 countries in Sub-Saharan Africa using data from Demographic Health Surveys. Based on their model, the prevalence of limited handwashing facilities was 66.16%. A cross-sectional study by [Muramatsu-Noguchi et al. \(2022\)](#) investigated the association between socioeconomic status and the presence of soap at handwashing facilities in Laos. The study found a significant linear relationship between the presence of soap and household wealth and educational attainment. Although the study did not assess people’s perception on the cost of soap in Laos, many [studies](#) from other countries have reported people’s perception that soap is too expensive. These studies suggest the need to invest in effective strategies to ensure adequate and affordable hand hygiene infrastructure and supplies to improve and sustain handwashing behavior in different contexts.

Other studies focused on the effectiveness of handwashing alternatives, such as alcohol-based handrub ([Muleba et al., 2022](#); [Vuai et al., 2022](#)). A systematic review by [Price et al. \(2022\)](#) included updated research in support of the [World Health Organization \(WHO\) recommendations](#) on alcohol-based handrub. The review evaluated the impact of volume, application time, rubbing friction, and hand size on microbiological load reduction, hand surface coverage and drying time related to alcohol-based handrub, and ultimately determined there was insufficient evidence to change the current recommendations set out by the WHO regarding the use of alcohol-based handrub. Another study by [Selam et al. \(2022\)](#) evaluated the quality and antimicrobial efficacy of locally manufactured alcohol-based handrubs in Ethiopia, with nearly 33% of tested products not complying with WHO ethanol and hydrogen peroxide limits. This study suggests the need for regular quality

What does this mean? Access to basic hand hygiene services, supplies, and facilities is an important determinant to improve hand hygiene behavior. Further research is needed on management and sustainability of the underpinning infrastructure required to ensure access and supplies. Where water is not accessible, alcohol-based handrub has proven to be a viable alternative to handwashing with soap and water.

monitoring of marketed alcohol-based handrubs, especially given the current wide use of such products during public health emergencies when the risk of transmitting diseases from hands are high.

Determinants and Interventions for Hand Hygiene Behavior Change in Various Settings

While access and supplies are necessary to ensure hand hygiene behavior, access alone is not enough to change hand hygiene practices. Behavior change efforts must address a range of behavioral determinants, enabling factors, individual motives, and barriers which may differ based on the setting. In this section, we examine a range of determinants that influence hand hygiene behavior and interventions to support sustained behavior change in various settings.

Domestic Settings

Hand hygiene in domestic settings is associated with a range of sociodemographic factors and behavioral determinants. Studies included in our analysis reported household knowledge, access to water, cultural beliefs and practices, and perceived susceptibility to illnesses as significant predictors of hand hygiene practice ([Agaro et al., 2022](#); [Ogutu et al., 2022](#)). For example, [Leung et al. \(2022\)](#) found that while parents had good knowledge of hygiene as a preventative measure, their attitudes and practices did not always translate into hand hygiene actions. This finding emphasizes the need to design programs that go beyond hygiene education and address key determinants to change hygiene behavior.

One qualitative study by [Sedekia et al. \(2022\)](#) assessed a WASH intervention on soil-transmitted helminth (STH) infection among children. The authors selected 20 households to engage in sessions that promoted various WASH improvement activities. These sessions were targeted to parents/guardians and provided information about STH infection, the role of WASH and STH infection prevention, and steps parents could take at home. Of the 20 households included in this intervention, 18 installed handwashing facilities. However, long-term provision of water and soap was limited, indicating that more sustained engagement may be required to encourage households to ensure these materials are consistently available at the home. In previous [research summaries](#), other successful interventions addressed a range of determinants to improve hand hygiene, considering household needs, level of understanding, beliefs, and sociocultural norms for positive behavior change.

Educational Institutions

Educational institutions provide an important context to promote hand hygiene behavior for the next generation. Limitations for hand hygiene support in schools include lack of access to basic handwashing facilities, especially in low and middle-income countries.

Multiple studies published in 2022 examined handwashing knowledge and practices among school children and their caregivers. A cross-sectional study by [Berhanu et al. \(2022\)](#) investigated handwashing practices

among public primary school children in Ethiopia, finding that only 23.4% of the children reported always washing their hands before eating and only 16.7% reported always washing their hands after using the toilet. Availability of handwashing facilities, grade level, residence, and presence of role models were significantly associated with reported handwashing practices. The findings revealed that students with access to a handwashing facility in their home were 3.62 times more likely to wash their hands compared to their counterparts. Likewise, students in urban areas and students with strong handwashing role models were 3.5 times and 4.41 times more likely to wash their hands respectively. Another study by [Steenkamp et al. \(2022\)](#) examined knowledge and practices related to hand hygiene among caregivers in an early child development center in South Africa. While most caregivers had good knowledge of handwashing, only 40% of caregivers reported washing their hands before feeding the children and only 25% reported washing their hands after changing a child's diaper. These findings indicate the need for interventions to improve handwashing practices among caregivers in early child development centers and corroborates the implications from [Leung et al. \(2022\)](#) (*under Domestic Settings*) to consider a range of determinants beyond existing knowledge when designing a program.

A study by [Lange et al. \(2022\)](#) tested the effect of a simple hand hygiene intervention on the behavior and practices of parents and preschool children in South Africa. The intervention used [GloGerm](#) to show kids how hand hygiene prevents the spread of germs, while parents received a packet and health messages related to their child's hand hygiene activities at school. Through this intervention, the authors found that parents reportedly made the small changes necessary to improve overall hand hygiene for themselves and their family. This study highlights the importance of interventions including not only the child but also the caregiver or parent to improve hand hygiene in educational settings.

Healthcare Facilities

Multiple studies published in 2022 focused on hand hygiene compliance in healthcare settings ([Al-Anazi et al., 2022](#); [Kamara et al., 2022](#)). A cross-sectional study by [Umar et al. \(2022\)](#) reported hand hygiene compliance as 34.7% among nurses working in public hospitals in Ethiopia, with positive association between hand hygiene compliance and gender (male), work experience (greater than 5 years), training in hand hygiene, availability of running water, and knowledge of hand hygiene. Another study by [Yehouenou et al. \(2022\)](#) investigated hand hygiene behavior in a public hospital in Benin; several factors, including knowledge, attitudes, and social factors, influenced hand hygiene behavior in this setting. In a qualitative study among healthcare workers in Iran, [Ahmadipour et al. \(2022\)](#) identified three broad categories of barriers to hand hygiene practice in healthcare settings that operate at multiple levels. First, the authors identified barriers related to the individual, which



includes two subcategories related to knowledge and attitudes towards hand hygiene. Second, the authors identified barriers related to facility management, which included improper behavioral patterns of supervisors and unsuitable training and planning. Finally, the authors identified barriers related to the organization, which included heavy workloads, improperly designed wards, a lack of equipment (handwashing facilities), and lack of quality equipment (poor quality of soap or disinfectant).

Other studies focused on specific interventions or initiatives to improve hand hygiene in healthcare settings. [Nalule et al. \(2022\)](#) conducted a controlled before-and-after study of a multi-modal intervention to improve hand hygiene during the perinatal period in Cambodia. The intervention included hand hygiene infrastructure provision, cues and reminders, and participatory trainings delivered at the facility to improve hand hygiene practices among midwives and caregivers during childbirth through the return to the home environment. The authors found that the intervention led to a significant improvement in hand hygiene compliance among healthcare workers and caregivers in the healthcare facility but limited improvements for caregivers in post-natal care periods (return to the home environment), suggesting the need to improve hand hygiene practices along the continuum of care. [Dramowski et al. \(2022\)](#) implemented the SafeHANDS intervention, also a multimodal hand hygiene intervention, in a resource-limited neonatal unit in Ethiopia. Their intervention included education, reminders, and feedback, leading to a significant improvement in hand hygiene compliance, as well as a reduction in healthcare-associated infections. These studies highlight the importance of implementing multi-modal interventions to improve hand hygiene in healthcare settings, especially in resource-limited settings.

Humanitarian Settings

Studies published in 2022 investigated the impact hygiene and broader WASH interventions can produce in humanitarian contexts. [White et al. \(2022a\)](#) conducted a qualitative case study in Northern Iraq to investigate how hygiene behavior is affected by conflict and displacement. The authors found that the ongoing conflict and displacement had a negative impact on hygiene practices, such as handwashing and sanitation. [Bisimwa et al. \(2022\)](#) conducted formative research to develop evidence-based targeted WASH interventions to reduce cholera in hotspots in the Democratic Republic of the Congo. The **Preventative Intervention for Cholera for 7 Days (PICH7)** program was developed based on this research, which includes interventions such as promoting hand hygiene, water treatment, and safe food handling practices and emphasizes the importance of community engagement and participation in the development and implementation of such interventions in this context.

Some studies examined more novel approaches to address hand hygiene in humanitarian settings. [White et al. \(2022b\)](#) examined a novel handwashing stand (**Oxfam Handwashing station**) and hygiene promotion package (**Mum's Magic Hands**) that was designed to facilitate hand hygiene in displacement camps during the COVID-19 pandemic. The authors conducted a qualitative assessment which revealed an increase in handwashing behavior in the camps.

Overall, these studies highlight the need for evidence-based and context-specific WASH interventions to improve hygiene practices, emphasizing the importance of learning from previous research and good formative research for specific issues to inform program design for effective interventions.

Public Spaces

Proper hand hygiene plays a major role in preventing the spread of diseases in public spaces. One study by [Akter et al. \(2022\)](#) investigated implementation barriers and facilitators to a COVID-19 intervention in Bangladesh, focusing on the benefits of engaging the community for program delivery. The authors used a mixed-methods approach and found that engaging influential community members, free-of-cost materials, and telemedicine services were key facilitators in the successful implementation of the program, while irregular participation in trainings, lack of communication and coordination among stakeholders, and inadequate resources were identified as significant barriers. Another study by [George et al. \(2022\)](#) evaluated COVID-19 preventive hygiene behaviors by observing mask wearing, handwashing, and physical distancing behaviors in public indoor spaces in the Democratic Republic of the Congo. The study used a cross-sectional design and found that most participants were observed to be adhering to preventive hygiene practices.

[Admednur et al. \(2022\)](#) addressed an often-overlooked issue, assessing the quality of water meant for handwashing among food establishment customers. The authors found that microbial load was varied based on water quality, type of water container used, method of taking water from the container, handwashing technique, and hand drying. Findings from this study imply that food establishment owners should treat water for handwashing; however, research around water quality for handwashing remains unclear.

Overall, compared to the [2021 hand hygiene research summary](#), there were fewer studies focused on hand hygiene in public spaces. It remains critical to examine hand hygiene practices in public settings and ensure continued monitoring and evaluation of hygiene programs to accomplish sustained behavior change.



Photo Credit: UNICEF

What does this mean? Hand hygiene factors and compliance vary across settings. Findings from 2022 publications support the need to address a range of behavioral determinants for long-term hand hygiene behavior change. Likewise, formative research is needed to understand target populations and their key motivators to design thoughtful and context-specific interventions and programs. As we reimagine the new normal beyond COVID-19, research should reflect the lessons learned over the last few years and continue to address gaps in hand hygiene research across settings.

Conclusions and Recommendations

This summary is reflective of the emerging findings around hand hygiene across various settings. While there have been significant strides over the last few years, continued research around hand hygiene is needed to ensure progress. Based on the research published in 2022, consider the following:

- **Conduct further research on non-health outcomes.** Hand hygiene is often linked to disease prevention and thus, many studies focus on the links between hand hygiene and various health outcomes. However, there were limited studies focused on non-health outcomes in 2022. Further research is needed to link hand hygiene to non-health outcomes, such as economic benefits to individuals and the community, as well as issues such as child development, dignity and inclusion. This data could be used in advocacy efforts and encourage more investment toward hand hygiene beyond the usual funders.
- **Knowledge is not enough to drive behavior change.** Many studies noted knowledge as a determinant for hand hygiene; however, the research also shows that high knowledge in handwashing does not necessarily equate to long-term behavior change. Efforts should focus on addressing a range of determinants to change hand hygiene behavior, including ensuring access to hand hygiene facilities, addressing social and cultural norms, and targeting individual motives.
- **Alcohol-based handrub is an effective alternative to handwashing with soap and water.** Studies published in 2022 examined the use and efficacy of alcohol-based handrub, including the proper formulation and the cost savings that alcohol-based handrub brings to these settings. Where soap and water is not available, evidence shows that alcohol-based handrub is an effective solution to disinfect a person's hands.
- **Build on existing opportunities to accelerate hand hygiene progress.** This growing evidence base of effective approaches for hand hygiene should be utilized when developing and implementing plans for national hand hygiene coverage. The upcoming global guidelines for hand hygiene in community settings, led by WHO and UNICEF, provide an impetus for further evidence review and generation around hand hygiene.

Overall, this analysis builds on the existing evidence base for hand hygiene and reinforces what is already known in many ways. All studies included in this summary are available [here](#). As we look toward the future, it is important to continue to take stock of the latest evidence and build on key findings to identify and share hand hygiene best practices.

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ANNEX | Methodology

Searches for handwashing studies published in 2022 on three databases resulted in the number of studies listed below:

- PubMed – 180 studies
- Global Health and CINAHL – 136 studies

From the initial search, a total of 316 publications were identified. Initial eligibility criteria include:

1. Article is published between January 1, 2022 through December 31, 2022.
2. Article includes relevant hand hygiene terms in its title and/or abstract.
3. Article is free to access (non-gated).

After deleting duplicates and confirming publications as open access, a total of 152 studies were identified for final analysis, which included a more in-depth review and evaluation of the publication. A more detailed breakdown of the study characteristics of the 152 publications is included in the table below.

Setting	Number	Percentage
Domestic	30	20%
Healthcare Facility	52	34%
Educational	16	11%
Public Space	10	7%
Workplace	7	5%
Humanitarian	3	2%
Undefined	34	22%
Outcome Focus		
COVID related	49	32%
Non-COVID related	103	68%
Study Design		
Cross-sectional	21	14%
Literature Review	7	4%
Cohort	24	16%
Case-control study	9	5%
Formative	27	16%
Microbiological	24	15%
Randomized controlled trial	14	9%
Policy Analysis	15	10%
Not defined	11	7%