

Research Paper

Evaluation of water, sanitation and hygiene status of COVID-19 healthcare facilities in Ghana using the WASH FIT approach

Mary Eyrām Ashinyo, Kingsley E. Amegah, Stephen Dajaan Dubik, Gloria Ntow-Kummi, Maxwell Kudzo Adjei, Joyce Amponsah, John T. Ayivase, Serwah Amoah, Anthony Ashinyo, Sodzi Sodzi-Tettey, Hectoria Awekeya, Agnes Codjoe, Isaac Eyrām Tegbey, Akosua Takyiwah O. Kwakye and Samuel Kaba Akoriyea

ABSTRACT

Access to improved water, sanitation and hygiene (WASH) is essential for the delivery of high-quality care in healthcare facilities and the prevention of hospital-acquired infections such as the transmission of the SARS-CoV-2. In addition, unimpeded access to WASH facilities in coronavirus disease 2019 (COVID-19) treatment centres (TCs) is central in facilitating compliance with infection prevention and control protocols. However, data for the WASH status of COVID-19 TCs in Ghana are limited. We evaluated the WASH status of seven COVID-19 TCs in Ghana using the WHO/UNICEF water and sanitation for health facility improvement tool (WASH FIT). The water domain had the highest number of indicators meeting standards with an average percentage score of 90.5% (range: 66.7–100%) across the seven TCs, followed by management (66.9%) and hygiene (58.7%). The TCs performed poorly in the sanitation and healthcare waste domain, with an average percentage score of 44.6% (range: 22.2–75%). These findings highlight the challenges being faced by COVID-19 TCs in implementing WASH services. Specific WASH interventions are urgently required to strengthen WASH services in the COVID-19 TCs. This should precede the prioritisation of resources to WASH infrastructure in the treatment facilities coupled with actions that involve all stakeholders.

Key words | COVID-19, Ghana, healthcare facilities, healthcare quality and safety, infection prevention and control, WASH

HIGHLIGHTS

- Water, sanitation and hygiene (WASH) in healthcare facilities is crucial in preventing the transmission of highly infectious diseases.
- We used the WHO/UNICEF water and sanitation for health facility improvement tool (WASH FIT) to evaluate the WASH status of COVID-19 treatment centres (TCs).
- There were gaps in the performance of the TCs across the four WASH domains.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Licence (CC BY-NC-ND 4.0), which permits copying and redistribution for non-commercial purposes with no derivatives, provided the original work is properly cited (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

doi: 10.2166/washdev.2021.254

Mary Eyrām Ashinyo (corresponding author)
Gloria Ntow-Kummi
Maxwell Kudzo Adjei
Joyce Amponsah
John T. Ayivase
Serwah Amoah
Samuel Kaba Akoriyea
Institutional Care Division,
Ghana Health Service Headquarters,
Accra, Ghana
E-mail: mary.ashinyo@ghsmai.org

Kingsley E. Amegah
Department of Health Information,
Hohoe Municipal Hospital,
Hohoe, Ghana

Stephen Dajaan Dubik
School of Allied Health Sciences,
University for Development Studies,
Tamale, Ghana

Serwah Amoah
Department of Public Health,
Korle-Bu Teaching Hospital,
Accra, Ghana

Anthony Ashinyo
National AIDS/STI Control Programme,
Ghana Health Service Headquarters,
Accra, Ghana

Sodzi Sodzi-Tettey
Department of Global Division,
Institute for Healthcare Improvement,
Boston, MA, USA

Hectoria Awekeya
Department of Quality Assurance,
Eastern Regional Hospital,
Koforidua, Ghana

- We call for the prioritisation of resources to WASH infrastructure in the TCs.
- This is crucial in building a resilient WASH system in the treatment facilities.

Agnes Codjoe
Department of Adult Health, School of Nursing and
Midwifery,
University of Ghana,
Legon, Ghana

Isaac Eyram Tegbey
Wejja-Gbawe Municipal Hospital,
Wejja-Gbawe, Accra, Ghana

Akosua Takyiwah O. Kwakye
World Health Organization Country Office,
Accra, Ghana

INTRODUCTION

Improved water, sanitation and hygiene (WASH) in COVID-19 treatment centres (TCs) is critical for high quality of healthcare and appropriate infection prevention and control (IPC) practices (Kolmos 2012; World Health Organization (WHO) 2017). High-quality healthcare is crucial for enhancing patient health outcomes (Snowdon *et al.* 2017). Besides, the quality of care is the bedrock for safe and effective care in healthcare settings, especially in pandemic situations (Ministry of Health (MOH) 2018). In highly infectious disease outbreak like COVID-19, improved WASH is critical for reducing healthcare-associated infections, improving occupational health and safety, IPC practices and for boosting the morale of staff and their performance (Kolmos 2012; Rainey & Weinger 2016). Improved WASH in healthcare facilities also has positive implications on uptake of services, reduction in healthcare cost and WASH-related behaviour at the community level (WHO 2017).

As of 2 March 2021, there has been 114,140,104 confirmed cases of COVID-19 with over two million deaths globally, including 84,023 cases, 77,972 recoveries and 607 deaths in Ghana (26 February 2021) (Ghana Health Service (GHS) 2021; WHO 2021). COVID-19 infections among healthcare workers are far greater than those in the general population. Globally, healthcare workers represent less than 3% of the population but account for 14% of COVID-19 cases reported to WHO (WHO 2020a).

Access to adequate WASH facilities in healthcare settings is the first line of defence in preventing COVID-19 transmission among healthcare workers and in the general population (McGriff & Denny 2020). This is because access to adequate WASH infrastructure is fundamental in facilitating compliance with IPC protocols which are critical in protecting patients and healthcare workers in healthcare

settings (Mushi & Shao 2020). The health risk due to the lack of access to improved WASH is heightened during an infectious disease outbreak, including COVID-19. Therefore, the provision of safe WASH in settings where COVID-19 patients are managed is essential for preventing human-to-human transmission of SARS-CoV-2, the virus that causes COVID-19 (WHO 2020b).

Despite the critical role WASH plays in the provision of safe care, access to WASH services in healthcare facilities has been suboptimal globally. For instance, data from the WHO global progress report on WASH in healthcare facilities showed that 712 million people have no access to water when they use healthcare facilities; the situation is worst in developing countries (WHO/UNICEF 2020). In Ghana, data for the WASH status of designated COVID-19 TCs are not known. We used the WHO/UNICEF WASH FIT to evaluate the WASH status of healthcare facilities managing COVID-19 cases in Ghana, taking into consideration the key aspect of the tool (water, sanitation, hygiene and management).

The WASH FIT is designed for regular assessment, review and improvement of healthcare facilities, as measured by the WASH indicators. This is particularly important for identifying gaps in WASH indicators and taking actions to ensure the adequacy of WASH services for the safety of healthcare workers, patients and caretakers. The WASH FIT consists of four key domains: (1) water, (2) sanitation, (3) hygiene and (4) management (WHO 2017). Each broad area includes specific indicators that are required for achieving minimum standards for a safe and clean environment in healthcare facilities. These standards build on the WHO core components of the IPC programme at the national and acute healthcare facility level (WHO 2016).

METHODS

The study was conducted in seven COVID-19 TCs in the Greater Accra region of Ghana. The Greater Accra region is regarded as Ghana's epicentre, with over 52% of all reported COVID-19 cases. A cross-sectional was employed to collect quantitative data from the TCs using the WHO WASH FIT. A preliminary session was held to review the WASH FIT. We evaluated the TCs for 62 WASH indicators to understand the overall WASH status of each TC. All COVID-19 TCs in the Greater Accra region participated in the WASH FIT assessment. The TCs were Ga East Municipal Hospital, 37 Military Hospital, Police Hospital, Ridge Hospital, Tema General Hospital, University of Ghana Medical Centre and Pentecost Convention Centre.

Ga East Municipal Hospital is a newly built 100-bed capacity healthcare facility, which is under the management of the Ghana Health Service. It provides both outpatient and inpatient services. Currently, the hospital is exclusively designated for the management of COVID-19 cases. The 37 Military Hospital is the largest military hospital in Ghana. The hospital has around 400 beds; the hospital provides a wide variety of services such as accident and emergency, public health, medical, laboratory, surgery, obstetrics and paediatrics and veterinary services ([The Electives Network n.d.](#)). The Police Hospital, which is also located in Accra, provides services that are similar to that of the 37 Military Hospital. The Ridge Hospital, which is Greater Accra Regional Hospital, has 420 beds. It has units such as surgery unit, imaging department, maternity centre, emergency and burns unit, national intensive care unit and others.

The 650-bed University of Ghana Medical Centre (UGMC) offers world-class quaternary-level health service in Ghana, West Africa and beyond. Its focus areas include health service delivery, research, medical training and simulation ([UGMC 2020](#)). Tema General Hospital is the biggest healthcare facility in the Tema metropolis. It provides 24-h general and specialist services to its clients within the Tema metropolis. Lastly, Pentecost Convention Centre is a temporal facility for withholding and management of mild COVID-19 cases.

Data collection techniques included observation, documents review and interaction with managers of the TCs. Data collection was done by a trained WASH FIT team under the supervision of the Principal Investigator. One

WASH FIT team comprising medical and public health professionals evaluated the WASH indicators in the seven TCs. The data collection period lasted for 1 week.

Data collected from the treatment facilities were entered into Epi Info data entry client and exported to STATA 14.2 for analysis. We measured and presented the indicators by whether they meet the target, partially meet the target and not meeting the target. Standards for meeting the target, partially meeting the target and not meeting the target are defined in the WASH FIT guidelines by the WHO/UNICEF ([WHO 2017](#)). Overall, we tallied the percentage of the indicators meeting targets, partially meeting targets and not meeting targets for each WASH domain depending on the number of indicators assessed at each TC. The domains consisted of water (12 indicators), sanitation and healthcare waste (21 indicators), hygiene (18 indicators) and management (11 indicators) ([WHO 2017](#)). Based on the team capacity, we excluded 3 indicators bringing the total number of indicators assessed to 62.

ETHICS STATEMENT

Due to the emergency nature of the outbreak and the need to conduct this assessment to inform WASH policy for high quality and safe care in designated TCs, ethical review and approval were not sought. However, all identifiers have been removed from the report.

RESULTS

Percentage of indicators meeting WASH FIT standard per domain by TCs

A graphical presentation of the percentage of indicators meeting the WASH FIT standard domain by TCs is presented in [Figure 1](#). The water domain has the highest percentage of indicators meeting standards across the seven TCs with an average percentage of 90.5% ranging from 66.7 to 100%. The management domain was the second domain with the highest percentage of indicators meeting standards with an average percentage score of 66.9% ranging from 45.5 to 90.9%. Hygiene has about 58.7% of the indicators

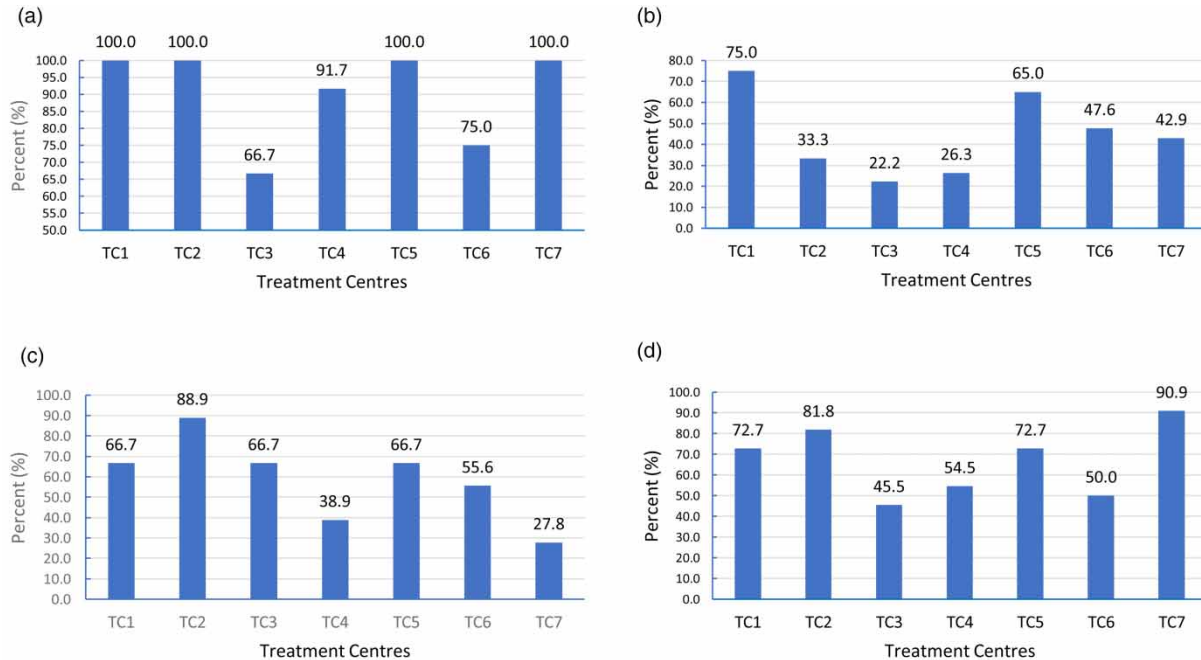


Figure 1 | Percentage of indicators meeting WASH FIT standard per domain by TCs: (a) water, (b) sanitation and healthcare waste, (c) hygiene and (d) management.

meeting standards with the minimum and maximum percentage score of 27.8–88.9%. The area with the lowest percentage of indicators meeting standards was the sanitation and healthcare waste domain with an average percentage score of 44.6% ranging from 22.2 to 75.0% (Figure 1).

Performance of water domain indicators by TCs

All the seven TCs had an improved water supply, and water services were available at all times and of sufficient quantity for all users. A reliable drinking water station was available for all TCs and accessible for staffs, patients and their caretakers except for TC3. All TCs had a facility for the safe storage of water. Details of the TC performance in the water domain are included in Supplementary Material, Table 1.

Performance of sanitation and healthcare waste domain indicators by TCs

Supplementary Material, Table 2 presents the performance of sanitation and healthcare waste by the TCs. All the seven TCs had usable toilets or improved latrines which were clearly separated for staffs and patients. All the TCs had latrines which were adequately lit. All the other

indicators did not universally meet the standard across all the TCs. Furthermore, none of the TCs had a toilet or improved latrine to provide the means to manage menstrual hygiene needs. Details of the TC performance in the sanitation and healthcare waste domain are included in Supplementary Material, Table 2.

Performance of hygiene domain indicators by TCs

Most of the TCs had a functioning hand hygiene station available at all point of care, while most of the TCs had inadequate hand hygiene promotion materials clearly visible. A significant number of the TCs had no functioning hand hygiene station available at waste disposal areas. All the TCs had lighting sufficiently powered and adequate to ensure the safe provision of healthcare, including at night. The performance of other hygiene indicators was varied across the TCs. Details of the TC performance in the hygiene domain are included in Supplementary Material, Table 3.

Performance of management domain indicators by TCs

WASH FIT and other quality improvement plans were in place and implemented and regularly monitored in TC2,

TC4, TC5 and TC7. Except for TC6, all the TCs had adequate cleaners and WASH maintenance staffs. All the TCs had a dedicated WASH/IPC focal person except for TC4. In the exception of TC3 and TC5, all staff had a job description written clearly and legibly which included WASH-related responsibilities and were regularly appraised on their performance. All the TCs recognised their high-performing staff and rewarded them and dealt with those that were not performing accordingly. Details of the TC performance in the management domain are included in Supplementary Material, Table 4.

Performance of WASH FIT domain

The radar diagram illustrates the overall performance of the TCs across the four WASH FIT domains. All the TCs performed highly in the water domain compared to sanitation and health care waste, hygiene and management domains. A similar observation was noted for the management domain compared to sanitation and healthcare waste and hygiene domains. The least performing domain for the TCs was sanitation and healthcare waste (Figure 2).

DISCUSSION

Improved WASH services in healthcare facilities are crucial for the safety of healthcare workers, patients and the general population. The role of adequate WASH services is

heightened during infectious disease outbreaks, such as the ongoing COVID-19 pandemic (WHO 2020b). We used the WHO/UNICEF WASH FIT to evaluate seven COVID-19 TCs in the Greater Accra Region, Ghana's epicentre of the global pandemic. Our findings demonstrate wide disparities in the performance of the TCs across the four WASH domains (water, sanitation and healthcare waste, hygiene and management). Similar WASH FIT evaluations in low- and middle-income countries showed performance variations of healthcare facilities across the four WASH domains (WHO/UNICEF 2015; Maina *et al.* 2019). Our findings are also consistent with the 2020 global progress report on WASH services in healthcare facilities (WHO/UNICEF 2020). The disparities in the performance of the TCs across the four WASH domains may be an indication of gaps in WASH services in the TCs. Targeted WASH interventions in the TCs are critical for Ghana's continuous fight against the COVID-19 pandemic. For improved WASH services in healthcare facilities, there is the need to identify these gaps and implement interventions in consultation with all stakeholders (Weber *et al.* 2018). The disparities in the performance of the TCs across the four WASH domains may be due to different hierarchies of the facilities, availability of resources, staff preparedness and leadership at the TCs.

The water domain had the highest number of indicators meeting standards in the TCs compared to sanitation and healthcare waste, hygiene and management domains. TCs had improved water supply, and water services were available at all times and of sufficient quantity for all users. Our finding is an indication of the availability and access to essential water services in the TCs. Consistent with this study, the global progress report on WASH services indicates that 50% of healthcare facilities had basic water service (WHO/UNICEF 2020). In Bongo and Kassena Nankana west districts in Ghana, 76% of healthcare facilities have an uninterrupted water supply (WaterAid n.d.). In variance with this evaluation, Mcateer *et al.* concluded that most healthcare facilities lack access to reliable supplies of safe water with inadequate WASH infrastructure (Mcateer *et al.* 2017). Access to water is central to handwashing which is vital in reducing the human-to-human transmission of the SARS-CoV-2. Hence, the need for water services is heightened in an environment where COVID-19 cases are managed.

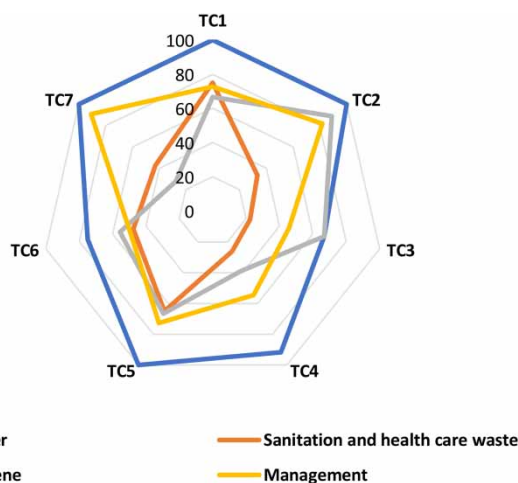


Figure 2 | Performance of TCs on WASH FIT domains.

Consistent with another study in Togo (Weber *et al.* 2018), the TCs performed poorly in the sanitation and healthcare waste domain. In sub-Saharan Africa, most healthcare facilities had no essential sanitation services (WHO/UNICEF 2020). Improved toilets were available at all the TCs visited and latrines separated for staff and patients. Our findings agree with a similar study in Uganda, where a vast majority of the healthcare facilities visited had improved toilets (Mulogo *et al.* 2017). According to WHO, people with suspected or confirmed SARS-CoV-2 should be provided with their own separate toilets, and where not possible, COVID-19 patients should share the same toilets which are not used by other non-COVID-19 patients (WHO 2020). These findings in the sanitation and healthcare waste domain call for the prioritisation of resources to sanitation infrastructure in the TCs. This should include financial and human resources coupled with the collaborative effort of facilities managers, staff, WASH committees, communities and the government of Ghana. For instance, there is the need for resource allocation for the installation of toilets for people with reduced mobility and hygiene needs of women in the TCs. Addressing these gaps is particularly important for a high quality of care, patient satisfaction, occupational safety and increased uptake of services in the TCs.

The TCs performed well in the hygiene domain compared to the sanitation and healthcare waste domain. In terms of hygiene indicators meeting standards, it was varied across the seven TCs. Five out of the seven TCs had a functioning handwashing station at all point. This finding is comparable to other WASH evaluations in sub-Saharan African countries (WHO/UNICEF 2015; Mcateer *et al.* 2017). Hand hygiene plays a crucial role in stopping the further spread of SARS-CoV-2 (WHO 2020a). Therefore, regular programmes aimed at promoting hand hygiene in healthcare facilities are recommended. However, we found that most of the TCs lacked hand hygiene promotion materials at critical places. Similar findings were also reported by another study in Kenya (Maina *et al.* 2019). The presence of hand hygiene materials at critical places in the TCs could contribute to compliance with handwashing at critical moments.

Furthermore, we observed that the TCs performed well in the management domain compared to sanitation and

healthcare waste and hygiene domains. Most of the TCs had adequate cleaners and WASH maintenance staff available. We also noted that most of the TCs also offered IPC training to their new healthcare personnel. This is particularly important for minimising the risk of COVID-19 infection among healthcare workers in these TCs. Inadequate IPC training has been noted as part of the reasons for healthcare workers becoming infected with COVID-19 (Wang *et al.* 2020). Protocols for operation and maintenance of WASH facilities and funding for WASH infrastructure were limited in the TCs. These could have implications on sustaining well-functioning WASH infrastructure in the TCs. Challenges for financing WASH infrastructure in healthcare facilities have been reported in a similar evaluation in the Republic of Togo (Weber *et al.* 2018).

CONCLUSION AND RECOMMENDATION

Robust WASH infrastructure in the COVID-19 TCs is fundamental to the efficient and effective management of COVID-19 cases by frontline healthcare workers. Findings suggest gaps in the performance of the TCs on water, sanitation, hygiene and management. This brings into light; the challenges being faced by COVID-19 TCs in implementing WASH services. There is the need for resource prioritisation to WASH infrastructure in the TCs. This is particularly important for improving WASH conditions, health service delivery and utilisation, and the safety of healthcare workers and patients in the TCs. The resource prioritisation should trigger actions that are collaborative to ensure the involvement of all stakeholders in the TCs. Such intervention is crucial for building a resilient WASH system for improved quality and the safety of service delivery and utilisation in the TCs.

To the best of our knowledge, this is the first study that evaluated the WASH status of selected healthcare facilities in Ghana using the WHO/UNICEF WASH FIT. Since most of these TCs were advanced healthcare facilities, we recommend similar evaluations in primary healthcare facilities. This is crucial in taking evidence-based decisions for improved WASH services in Ghanaian healthcare facilities.

DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

REFERENCES

- Ghana Health Service 2021 *Situation Update, Covid-19 Outbreak in Ghana as at 26 February 2021*. Available from: <https://ghanahealthservice.org/covid19/latest.php>.
- Kolmos, H. 2012 *Health Care Associated Infections: Sources and Routes of Transmission*. Infection Control – Updates, February 2012. <https://doi.org/10.5772/36470>.
- Maina, M., Tosas-Auguet, O., McKnight, J., Zosi, M., Kimemia, G., Mwaniki, P., Hayter, A., Montgomery, M., Schultsz, C. & English, M. 2019 *Extending the use of the World Health Organisations' water sanitation and hygiene assessment tool for surveys in hospitals – from WASH-FIT to WASH-FAST*. *PLoS ONE* **14** (12), 1–15. <https://doi.org/10.1371/journal.pone.0226548>.
- Mcateer, J., Chae, S., Person, M., Quick, R., Atuheirwe, E. & Nakayima, L. 2017 *Evaluation of Water, Sanitation, and Hygiene in Healthcare Facilities, Kamwenge District, Uganda 2017 Preliminary Report: Baseline Data Collection Funded by Ministry of Health Uganda*. Available from: <https://thewashroom.waterforpeople.org/wp-content/uploads/sites/2/2020/11/WASH-in-HCFs-in-Kamwenge-CDC-Evaluation-Baseline-Report-Mar-2017.pdf>.
- McGriff, J. A. & Denny, L. 2020 *What COVID-19 reveals about the neglect of WASH within infection prevention in low-resource healthcare facilities*. *American Journal of Tropical Medicine and Hygiene* **103** (5), 1762–1764. <https://doi.org/10.4269/ajtmh.20-0638>.
- MOH 2018 *Ghana National Healthcare Quality Strategy*. Available from: <https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:32016R0679&from=PT%0Ahttp://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012PC0011:pt:NOT>.
- Mulogo, E. M., Matte, M., Wesuta, A., Bagenda, F., Apecu, R. & Ntaro, M. 2017 *Water, sanitation, and hygiene service availability at rural health care facilities in Southwestern Uganda*. *Journal of Environmental and Public Health* **2018**. <https://doi.org/10.1155/2018/5403795>.
- Mushi, V. & Shao, M. 2020 *Tailoring of the ongoing water, sanitation and hygiene interventions for prevention and control of COVID-19*. *Tropical Medicine and Health* **48** (1), 47–49. <https://doi.org/10.1186/s41182-020-00236-5>.
- Rainey, R. & Weinger, M. 2016 *The Role of Water, Sanitation and Hygiene (Wash) in Healthcare Settings to Reduce Transmission of Antimicrobial Resistance*. Infection Prevention and Control (Issue 2), pp. 59–62).
- Snowdon, D. A., Leggat, S. G. & Taylor, N. F. 2017 *Does clinical supervision of healthcare professionals improve effectiveness of care and patient experience? A systematic review*. *BMC Health Services Research* **17** (1), 1–11. <https://doi.org/10.1186/s12913-017-2739-5>.
- The Electives Network n.d. *A Description of 37 Military Hospital*. <https://www.electives.net/hospital/5617/preview> (accessed 3 March 2021).
- UGMC 2020 *University of Ghana Medical Centre*. Available from: <https://ugmedicalcentre.org/>.
- Wang, J., Zhou, M. & Liu, F. 2020 *Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China*. *Journal of Hospital Infection* **105** (1), 100–101. <https://doi.org/10.1016/j.jhin.2020.03.002>.
- WaterAid n.d. *Water, Sanitation and Hygiene (WASH) in healthcare facilities: a situation analysis of Bongo and Kassena Nankana West Districts*. Available online from <https://washmatters.wateraid.org/sites/g/files/jkxooof256/files/wash-in-healthcare-facilities-in-ghana.pdf>.
- Weber, N., Martinsen, A. L., Sani, A., Assigbley, E. K. E., Azzouz, C., Hayter, A., Ayite, K., Baba, A. A. B., Davi, K. M. & Gelting, R. 2018 *Strengthening healthcare facilities through water, sanitation, and hygiene (WASH) improvements: a pilot evaluation of WASH FIT in Togo*. *Health Security* **16**, S24–S45. <https://doi.org/10.1089/hs.2018.0042>.
- WHO 2020a *Prevention, Identification and Management of Health Worker Infection in the Context of COVID-19*. Available from: https://apps.who.int/iris/bitstream/handle/10665/331340/WHO-2019-nCov-HCW_risk_assessment-2020.1-eng.pdf.
- WHO 2020b *Water, Sanitation, Hygiene, and Waste Management for SARS-CoV-2, the Virus That Causes COVID-19*. Interim Guidance, 29 July, 1–11. Available from: <https://www.who.int/publications/i/item/water-sanitation-hygiene-and-waste-management-for-the-covid-19-virus-interim-guidance>.
- WHO 2021 *WHO Coronavirus Disease (COVID-19) Dashboard*. WHO.Int. Available from: <https://covid19.who.int/>.
- WHO/UNICEF 2015 *Water, Sanitation and Hygiene in Health Care Facilities: Status in Low- and Middle-Income Countries*. World Health Organization, Geneva. Available from: https://apps.who.int/iris/bitstream/handle/10665/154588/9789241508476_eng.pdf;jsessionid=8BB20D0F383BB2585E35A2CEA1EF1457?sequence=1.
- WHO/UNICEF 2020 *Global Progress Report on Wash in Health Care Facilities*. Available from: <https://www.who.int/publications/i/item/9789240017542>.
- World Health Organization 2016 *Guidelines on Core Components of Infection Prevention and Control Programmes at the National and Acute Health Care Facility Level*. World Health Organization. Available from: <https://www.who.int/infection-prevention/publications/ipc-components-guidelines/en/>.
- World Health Organization 2017 *Water and Sanitation for Health Facility Improvement Tool (WASH FIT)*. World Health Organization.

First received 29 November 2020; accepted in revised form 26 March 2021. Available online 9 April 2021