

Assessing sustainability of WASH projects in public and private schools of Jalalabad City, Nangarhar, Afghanistan

Mohammad Mukhlis Behsoodi ^{1,2*} , Muhammad Sagheer Aslam ¹ , Ezatullah Latifi ³ 

¹National Institute of Urban Infrastructure Planning, University of Engineering and Technology, Peshawar, PAKISTAN

²Faculty of Engineering, Alfalah University, Jalalabad, AFGHANISTAN

³Department of Civil Engineering, Faculty of Engineering, Alfalah University, Jalalabad, AFGHANISTAN

*Corresponding Author: mukhlis.behsoodi@gmail.com

Citation: Behsoodi, M. M., Aslam, M. S., & Latifi, E. (2023). Assessing sustainability of WASH projects in public and private schools of Jalalabad City, Nangarhar, Afghanistan. *European Journal of Sustainable Development Research*, 7(4), em0231. <https://doi.org/10.29333/ejosdr/13475>

ARTICLE INFO

Received: 11 Apr. 2023

Accepted: 28 Jun. 2023

ABSTRACT

This study examined the sustainability of water, sanitation, and hygiene (WASH) projects in six schools in Jalalabad City, Afghanistan, using interviews, surveys, and observations. The study applied a recently developed framework called the “sustainability assessment framework and indicators in water sanitation and hygiene system.” The study found that community engagement, availability of facilities, appropriate technology and infrastructure, behavior changes, financial sustainability, and monitoring and evaluation were critical factors in promoting the sustainability of WASH projects in schools. One school had a 70.12% total score of sustainability and had good and sustainable water supply facilities, while five schools had partially sustainable and acceptable conditions, which had 68.79%, 63.24%, 61.25%, 59.33%, and 57.81% total scores of sustainability. In assessing the sustainability of sanitation facilities, two schools had 62.03% and 57.16% sustainability scores and were in good and partially sustainable condition, three schools had 48.92%, 48.64%, and 48.42% sustainability scores and were in partially sustainable and acceptable conditions that needed improvement, and one school had 39.88% sustainability score and was in bad and unsustainable condition. The study recommends increasing investment in WASH facilities, implementing sustainable maintenance practices, increasing community engagement, developing targeted interventions, and regular monitoring and evaluation to ensure the long-term viability and sustainability of WASH facilities in schools.

Keywords: assessing, sustainability, WASH, framework, factors, sub-factor

INTRODUCTION

Sustainability and WASH

Sustainability refers to the ability of a system to sustain. It is the system that has the ability or capability to continue to exist, remain operational and maintain for an extended period of time. Sustainability and Sustainable development are commonly used as interchangeable terms. In 1987, World Commission on Environment and Development (WCED) prioritized sustainable development on the international agenda. WCED (1987) explained in the report titled “our common future” and defined sustainable development as “development that meets the need of the present without compromising the ability of future generations to meet their needs” (Aslam, 2013).

The 2030 agenda for sustainable development was approved and formally announced by the 193 UN member states at the historic UN General Assembly Summit in September 2015. They outlined a transformative vision for

economic, social, and environmental development, which will guide the work of the organization toward this vision for the next 15 years. This agenda includes 169 targets for 17 sustainable development goals (SDGs) (UN SDGs, 2018). 17 SDGs, which replaced millennium development goals (MDGs), aim to “end poverty in all its forms everywhere”, ensures access to affordable, reliable, sustainable, and modern energy for all,” and “revitalize the global partnership for sustainable development” (Johnston, 2016).

WASH is the acronym for water sanitation and hygiene and these three are grouped due to their interdependent nature of implementation, the goal sixth of SDGs ensures the availability and sustainable management of water and sanitation for all. Globally basic water supply and basic sanitation services are not available to 785 million and two billion people respectively (SDG Report, 2019).

Sustainable WASH Services

Sustainable WASH services or programs provide a condition for the continuous provision of water supply and sanitation services without any interruption or depletion of

the environment. For water, sanitation, and hygiene (WASH) services, sustainability refers to the “water flows continuously and sanitation system functions uninterrupted with agreed level without environmental damage and water source depletion (MoCC, 2016). The sustainability of community-based water supply is important for SDGs (Roekmi et al., 2018). The overall sustainability of WASH system can be reviewed from five aspects, which are also called elements or criteria (technical, environmental, social, economic, and institutional) or components of sustainability.

WASH projects are expected to benefit the users for a long period of time after being handed over to the community. Although there is more evidence that reflects the efforts of the Governmental organization and development sector organizations in the provision of water supply and sanitation services but less evidence on sustainability is available (Montgomery & Bartram, 2010). WASH as a concept in education is a strategic intervention towards providing schools with safe drinking water, improved hygiene, and sanitation facilities (Jain et al., 2019). The above-mentioned definition shows that the nature of WASH sustainability is a multi-criteria and requires an integrated framework for its measurement and different factors and sub-factors must be known to assess the sustainability of WASH-related systems.

Various approaches and methods are available in literature to provide guidelines for measurement of the sustainability of WASH projects; however, a specific framework (sustainability assessment framework and indicators in water sanitation and hygiene system) to measure the sustainability of WASH projects was recently developed, by an MSc student at Abdul Wali Khan University in Mardan, Pakistan (Younas, 2021). This framework is based on analytic hierarchy process (AHP), multi-criteria analysis (MCA) technique.

It is important and useful to test or apply such frameworks for their applicability, user-friendly nature, and expected outcomes. Such testing will help consultants, engineers, and policymakers towards a reliable adaptation of the framework. Besides that, in this study, we found the results to know the sustainability of WASH projects in public and private schools in Jalalabad City of Nangarhar Province in Afghanistan.

The findings of this study contributed to the body of knowledge on WASH in schools and inform policy and practice to ensure long-term access to WASH services in schools. The study's recommendations will guide schools, non-governmental organizations (NGOs), and policymakers on how to sustain WASH projects in schools and ensure that students have access to safe water, adequate sanitation, and hygiene facilities, ultimately improving their health and well-being.

RESEARCH SIGNIFICANCE

The justification and scope for the study are rooted in the urgent need to ensure access to safe water, adequate sanitation, and hygiene facilities in schools, especially in low-income countries. In Afghanistan, access to WASH facilities in schools is still limited, and as a result, the health and well-being of students are compromised. In this study, the sustainability of existing WASH projects in public and private schools in Jalalabad City of Afghanistan is evaluated, which

can help inform policy and practice to ensure long-term access to WASH services in schools.

MATERIALS AND METHODS

Location and Population Size

Jalalabad is a city located in the eastern province of Nangarhar, Afghanistan. The city lies on the banks of the Kabul River and is approximately 150 kilometers east of the Afghan capital, Kabul. Jalalabad is a major center of trade and commerce in the region, and it is home to several schools, universities, hospitals, and governmental institutions. According to the most recent estimates from Afghanistan Central Statistics Organization (CSO), the population of Jalalabad was approximately 356,274 in 2021 (CSO, 2021). However, it is important to note that population estimates in Afghanistan can be difficult to obtain and may not always be reliable. Nangarhar Province has 22 districts and the central city called Jalalabad with 10 zones (Figure 1).

Table 1 shows the six schools, which were selected in different zones of Jalalabad City for conducting this study in February 2023.

Methodology

Various approaches and methods are available in literature to provide and implement the guidelines for the measurement of the sustainability of WASH projects; however, a specific framework (sustainability assessment framework and indicators in water sanitation and hygiene system) to measure the sustainability of WASH projects was recently developed, by an MS student at Abdul Wali Khan University in Mardan, Pakistan (Younas, 2021). This framework is based on AHP, MCA technique. The mentioned research work has catered on both components of WASH, the water supply and sanitation. The component of hygiene was not evaluated separately, however, was included in water and sanitation as per their relevancy. Previously some work has been done on the development of an assessment framework for water supply (Aslam et al., 2016; Nare et al., 2011).

In this study, we visited all selected six schools (including three public and three private schools and all the facilities and equipment related to WASH were assessed by the above-mentioned framework in which data was collected from interviews with the school's principal, teachers, students, and other services workers using special questionnaire and some information was collected by checking the facilities and equipment related to the facility. Then the collected information was inserted into the Excel sheets and the calculations for every criterion sustainability score has been done for water supply and sanitation facilities separately in every school. The study applied the “sustainability assessment framework and indicators in water sanitation and hygiene system” to assess the sustainability of WASH projects.

Water supply

The evaluation of water supply facilities included assessing the availability, functionality, and reliability of water sources within the schools. Interviews were conducted with school staff and administrators to gather information on the water

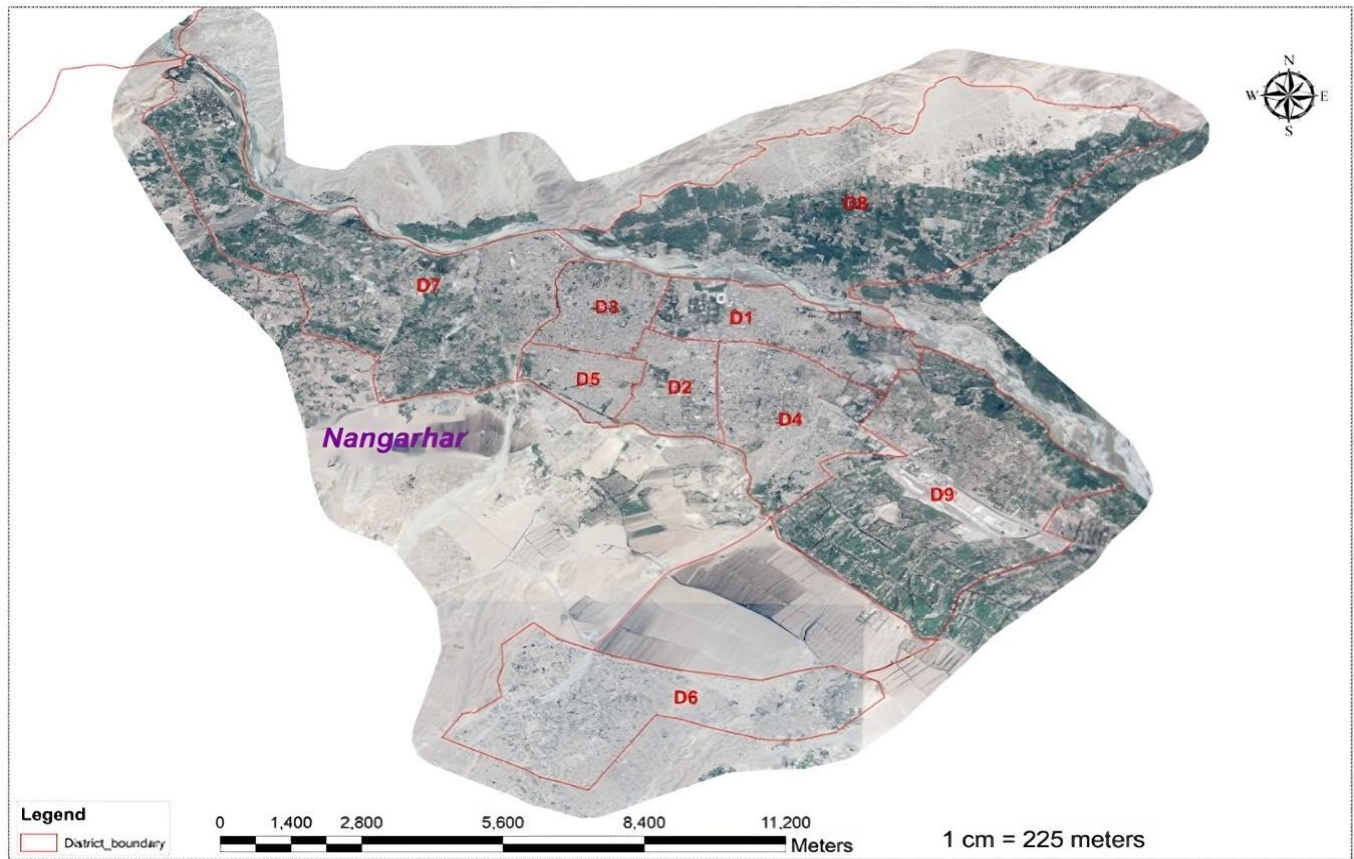


Figure 1. Map of Jalalabad City with zones, Nangarhar, Afghanistan (Google Map, 2023)

Table 1. School information in Jalalabad City

No	Name of school	Location (zone)	Number of students & staff			Remarks
			Students	Staff	Total	
1	Mohammadi Sahibzada High School	8 th	6,000	104	6,104	
2	Nangarhar High School	4 th	9,000	168	9,168	
3	Said Shamsuddin Majrooh High School	4 th	3,500	103	3,603	
4	Islah Private High School	1 st	1,300	42	1,342	
5	Iqra Private High School	4 th	1,200	50	1,250	
6	Noori Wahdat Private High School	8 th	950	47	997	
Total			21,950	514	22,464	

sources, such as wells, taps, or water storage systems. Observations were made to verify the condition and accessibility of the water supply facilities.

Sanitation

The assessment of sanitation facilities focused on evaluating the availability and quality of toilets and hand washing facilities. Surveys and interviews were conducted with students, teachers, and staff to gather data on the number of toilets, their condition, and whether they were gender-segregated. Observations were made to assess the cleanliness and functionality of the sanitation facilities.

Hygiene

The evaluation of hygiene practices involved assessing behavior changes and the availability of hygiene-related infrastructure and materials. Surveys and interviews were conducted to gather information on the knowledge and practices of students and staff regarding hand washing, personal hygiene, and waste management. Observations were

made to assess the presence of hand washing stations, soap availability, and waste disposal systems.

By employing a combination of interviews, surveys, and observations, the study aimed to provide a comprehensive assessment of the water supply, sanitation, and hygiene components in the selected schools, thus capturing the various aspects that contribute to the sustainability of WASH facilities.

RESULTS AND DISCUSSION

Results

The study in the selected six schools in Jalalabad city of Nangarhar province was conducted and calculations were done based on the framework mentioned above. Finally, the result of the calculations shows that the sustainability of WASH facilities is different in every school as shown in **Table 1** and **Table 2**. The results, which come out in percentage show the sustainability score from hundreds.

Table 2. Grading criteria of sustainability assessment with traffic light signal






Overall grading	Accumulative sustainability score	Traffic light signal	Accumulative sustainability score (%)	Likelihood of sustainability	Remarks
A	Excellent		85-100	Sustainable	
B	Good		70-84		
C	Acceptable		50-69	Partially sustainable	
D	Acceptable with improvement		41-49		
E	Not acceptable		1-40	Not sustainable	

Table 3. Results of sustainability assessment of water supply systems













No	Name of school	Total score for sustainability (%)	TLS	Situation	Sustainability
1	Mohammadi Sahibzada High School	63.24		Acceptable	Partially sustainable
2	Nangarhar High School	68.79		Acceptable	Partially sustainable
3	Said Shamsuddin Majrooh High School	70.12		Good	Sustainable
4	Islah Private High School	57.81		Acceptable	Partially sustainable
5	Iqra Private High School	59.33		Acceptable	Partially sustainable
6	Noori Wahdat Private High School	61.25		Acceptable	Partially sustainable

Table 4. Results of sustainability assessment of sanitation facilities

No	Name of school	Total score for sustainability (%)	TLS	Situation	Sustainability
1	Mohammadi Sahibzada High School	48.92		Acceptable with improvement	Partially sustainable
2	Nangarhar High School	62.03		Acceptable	Partially sustainable
3	Said Shamsuddin Majrooh High School	57.16		Acceptable	Partially sustainable
4	Islah Private High School	39.88		Not acceptable	Not sustainable
5	Iqra Private High School	48.64		Acceptable with improvement	Partially sustainable
6	Noori Wahdat Private High School	48.42		Acceptable with improvement	Partially sustainable

The traffic signal model or weightage model for the assessment of sustainability shows the score of sustainability. To have more visual representation, the traffic light signal model is used as given below (Younas, 2021).

This model was used by Aslam et al. (2016), SC (Bouabid & Louis, 2015), and CFA to calculate the weight of the likelihood of sustainability. Based on this grading criteria, the system obtains above 70.00% score will have a greater likelihood of sustainability. WASH system obtains a score of less than 40.00% is not sustainable and will not be suggested for implementation. Category of partial sustainability range from 41.00%-49.00% is accepted with improvement in project design.

As mentioned before, we have assessed water supply and sanitation facilities separately and the results for every school and system are shown separately in **Table 3** and **Table 4**.

Discussion

The study conducted in the selected six schools in Jalalabad City of Nangarhar Province, focusing on the sustainability of WASH facilities, has yielded some interesting findings. The calculations based on the discussion and methodology used in the study have shown that the sustainability of WASH facilities is different in each of the six schools.

The results of the study, presented in the form of tables showing the sustainability score in percentage, indicate that some schools have a higher sustainability score than others. This variation in sustainability scores could be attributed to several factors, such as the level of investment in WASH facilities, the maintenance practices in place, and the level of facility users' engagement in the upkeep of the facilities.

It is crucial to note that the sustainability of WASH facilities is an essential component of ensuring safe and

hygienic environments for students to learn and grow. The findings of this study highlight the need for continued investment in WASH facilities in schools and the importance of implementing sustainable maintenance practices to ensure the long-term viability of these facilities.

In conclusion, the results of the study conducted in six schools in Jalalabad City of Nangarhar Province demonstrate that the sustainability of WASH facilities varies across schools. Further research may be necessary to identify the specific factors contributing to these variations and to develop targeted interventions to improve the sustainability of WASH facilities in schools.

SUGGESTIONS AND RECOMMENDATIONS

Based on the findings of the study, the following suggestions and recommendations can be made to improve the sustainability of WASH facilities in schools:

- Increase investment in WASH facilities:** Schools that scored lower during assessing sustainability may need additional investments in WASH facilities to improve their conditions. Governments, NGOs, and other stakeholders should prioritize funding for such schools to improve the sustainability of their WASH facilities.
- Implement sustainable maintenance practices:** The study indicates that maintenance practices play a critical role in the sustainability of WASH facilities. Schools should adopt sustainable maintenance practices, such as regular cleaning and repairs, to ensure that the facilities remain functional and hygienic.

3. **Increase community engagement:** The level of community engagement in the upkeep of WASH facilities also affects their sustainability. Schools should involve students, teachers, parents, and other stakeholders in maintaining the facilities. This can include organizing regular cleaning campaigns, forming committees responsible for maintenance, and raising awareness about the importance of WASH facilities.
4. **Develop targeted interventions:** Further research is necessary to identify the specific factors contributing to the variation in sustainability scores across schools. Based on the findings, targeted interventions can be developed to address the unique challenges faced by each school.
5. **Regular monitoring and evaluation:** Schools should regularly monitor and evaluate the sustainability of their WASH facilities to identify areas for improvement. This can include conducting regular inspections and surveys to assess the functionality and hygiene of the facilities.

In conclusion, improving the sustainability of WASH facilities in schools is essential to provide safe and hygienic environments for students to learn and grow. The suggestions and recommendations outlined above can help schools address the challenges they face and ensure the long-term viability of their WASH facilities.

CONCLUSIONS

Based on the results obtained, the following conclusions can be formed:

1. The sustainability of WASH facilities is an essential component of ensuring safe and hygienic environments for students to learn and grow.
2. This variation in sustainability scores could be attributed to several factors, such as the level of investment in WASH facilities, the maintenance practices in place, and the level of facility users' engagement in the upkeep of the facilities.
3. WASH system obtained above 70.00% score will have a greater likelihood of sustainability. The system obtained a score of less than 40.00% is not sustainable and will not be recommended for implementation. The category of partial sustainability ranges from 41.00%-49.00% is accepted with improvement in project design.
4. The calculations based on the discussion and methodology used in this study have shown that the sustainability of WASH facilities is different in each of the schools. The water supply systems assessed in the schools in Jalalabad are mostly acceptable and in partially sustainable condition, but the sanitation facilities are in critical condition and most of them need improvement and more investment and attention.
5. Schools that scored lower during assessing sustainability may need additional investments in WASH facilities to improve their conditions.
6. Schools should regularly monitor and evaluate the sustainability of their WASH facilities to identify areas for improvement and adopt sustainable maintenance practices, such as regular cleaning and repairs, to ensure that the facilities remain functional and hygienic.

Future Scope

This study is focused on the assessment of the sustainability of WASH projects in public and private schools of Jalalabad City in Nangarhar, Afghanistan. However, further studies can be conducted on the following issues by using the mentioned framework or any other method:

1. Assessing the sustainability of WASH projects in public schools of rural areas in any province of Afghanistan.
2. Assessing sustainability of WASH projects in public and private schools in any other city of Afghanistan.
3. Assessing sustainability of WASH projects in public and private universities in any other city of Afghanistan.
4. Assessing sustainability of any type of WASH project in any village, city, or province in any place, where the study is needed.

Author contributions: MMB, MSA, & EL: conception & comments MMB: data collection, analysis, & writing - first draft. The authors agree with the results and conclusions.

Funding: No funding source is reported for this study.

Acknowledgements: Mohammad Mukhlis Behsoodi would like to acknowledge his supervisor, Dr. Sagheer Aslam and all faculty members of the National Institute of Urban Infrastructure Planning and Management, University of Engineering and Technology, Peshawar for their support and assistance in the completion of the study. The authors would like to thank the principals and staff members of the schools for their valuable support and provisions during the field study and the close collaboration of Department of Research and Development at Alfalah University, Jalalabad, Afghanistan.

Declaration of interest: No conflict of interest is declared by the authors.

Ethical statement: Authors stated that the proposal for this research work and project was signed by Mohammad Mukhlis Behsoodi's advisor and verified by the director of NIUIP, UET Peshawar in Pakistan on 26/Jan/2023. As an employee at Alfalah University, for conducting this study in Jalalabad city of Afghanistan, Mohammad Mukhlis Behsoodi and Ezatullah Latifi, the lecturers in civil engineering department of Alfalah University needed the support of Research and Development Department of Alfalah University for the legal process. The research plan was verified in the meeting of research committee of faculty in the faculty of engineering on 4 February 2023 with registration number: 9-2023, and verified in the meeting of research committee of Alfalah University on 6 February 2023 with registration number: 9-2023. An official letter was delivered to the Directorate of Education of Nangarhar province on 31 January 2023, Doc# 367, which was confirmed on 7 February 2023. The letter was forwarded to all of the mentioned schools. Permission for data collection was obtained in the second week of February 2023 and after filling out the questionnaires and forms, the principal of every school signed and stamped the mentioned forms. Authors further stated that all sensitive or confidential personal data was kept private in this paper. Informed consents were obtained from the participants.

Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

REFERENCES

- Afghanistan Central Statistics Organization (CSO)/National Statistics and Information Authority (NSIA). (2021). *National Statistics and Information Authority (NSIA)*. [www.http://nsia.gov.af/](http://nsia.gov.af/)
- Aslam, M. S. (2013). *Sustainability of community-based drinking water systems in developing countries* [PhD thesis, McGill University].
- Aslam, M. S., Adil, M., Mirza, M. S., & Frigon, D. (2016). Sustainable community-based drinking water systems in developing countries: stakeholder perspectives. *Journal of Water Supply: Research and Technology—AQUA*, 65(5), 407-416. <https://doi.org/10.2166/aqua.2016.088>
- Bouabid, A., & Louis, G. E. (2015). Capacity factor analysis for evaluating water and sanitation infrastructure choices for developing communities. *Journal of Environmental Management*, 161, 335-343. <https://doi.org/10.1016/j.jenvman.2015.07.012>
- Jain, N., Chileshe, R., Muwowo, F., & Mulenga, S. (2019). Assessing sustainability of WASH projects using USAT: A case of public schools in Zambezi District of Zambia. *International Journal of Social Science Research*, 8(1), 29-45.
- Johnston, R. B. (2016). Arsenic and the 2030 agenda for sustainable development. In *Proceedings of the 6th International Congress on Arsenic in the Environment* (pp. 12-14). <https://doi.org/10.1201/b20466-7>
- MoCC. (2016). Sector sustainability check study rural open defecation free (ODF) & rural (drinking) water supply schemes (RWSS) Punjab & Sindh provinces. *AAN Associates*.
- Montgomery, M. A., & Bartram, J. (2010). Short-sightedness in sight-saving: half a strategy will not eliminate blinding trachoma. *Bulletin of the World Health Organization*, 88, 82-82. <https://doi.org/10.2471/BLT.09.075424>
- Nare, L., Odiyo, J. O., Francis, J., & Potgieter, N. (2011). Framework for effective community participation in water quality management in Luvuvhu Catchment of South Africa. *Physics and Chemistry of the Earth, Parts A/B/C*, 36(14-15), 1063-1070.
- Roekmi, R. A. K., Baskaran, K., & Chua, L. H. C. (2018). Community-based water supplies in Cikarang, Indonesia: are they sustainable? *Natural Resources Forum*, 42(2), 108-122. <https://doi.org/10.1111/1477-8947.12146>
- SDG Report. (2019). The sustainable development goals report 2019. *Frontiers in Public Health*, 10. <https://doi.org/10.3389/fpubh.2022.871575>
- UN SDGs. (2018). The 2030 agenda and the sustainable development goals: An opportunity for Latin America and the Caribbean. *cepal.org*. https://www.cepal.org/sites/default/files/events/files/2030_agenda_and_the_sdgs_an_opportunity_for_latin_america_and_the_caribbean.pdf
- WCED. (1987). *Our common future*. Oxford University Press.
- Younas, M. (2021). *Development of sustainability assessment framework and indicators in water sanitation and hygiene system*.