Review Article

Water Storage and Crisis Management in Educational Institutions: A Case Study of Rawalpindi Medical University in the Context of SDG 6

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Abstract

Water scarcity is an escalating challenge globally, particularly in developing countries like Pakistan. Healthcare and educational institutions require an uninterrupted and safe water supply to sustain clinical, academic, and residential operations. This review highlights the significance of water storage, crisis management strategies, and sustainable practices, with a focus on Rawalpindi Medical University (RMU) as a case study. It discusses infrastructure, environmental relevance, and policy implications in light of recent literature.

Keywords: Water crisis, sustainable practices, management strategies

Introduction Water Storage Infrastructure in Institutions

Water is a fundamental element of healthcare and development. The World Health Organization (WHO) emphasizes on the availability of safe and clean drinking water that ensures infection prevention and that access to safe water and a proper sanitation system and healthcare services, essential for infection prevention and reduced waterborne disease prevalence risk. Sanitation (1). Due to rapid climate changes, urbanization and erratic rainfall, has made water scarcity as a globe and public health priority in South Asia (2). The reliability of a water supply for healthcare and educational institutions such as Rawalpindi Medical University (RMU) and others, is not without its own specific issues to accommodating its multiplicities for academic, clinical, and residential use. These issues link directly to Sustainable Development Goal (SDG) 6 which promotes universal access to a safe and affordable drinking water supply with a spatial cognizance of improvements.

This review focuses on water storage and crisis management strategies opted by Rawalpindi while examining RMU's water storage infrastructure as an institutional model.

Water Storage Infrastructure in Institutions

Water storage facilities serve as critical buffers against supply disruptions. Studies indicate that institutional water tanks reduce dependency on municipal supply and enhance resilience during shortages (3). At RMU, the total storage capacity is 40,000 gallons, comprising a 10,000-gallon underground tank at the main campus and a 30,000-gallon tank for hostels (5). This strategic allocation ensures uninterrupted supply for clinical operations, academic activities and student hostels. Comparable systems in universities across South Asia have shown effectiveness in maintaining operations during municipal supply breakdowns (4,6). However, literature highlights that without proper maintenance, such infrastructure risks microbial contamination and leakage losses (7). These challenges are directly linked to SDG 6, which emphasizes universal access to safe and affordable drinking water, improved sanitation, efficient water management, and the protection of water-related ecosystems.

Public Health and Environmental Relevance

Safe and sufficient water is indispensable for infection prevention and hygiene within hospitals and educational facilities. Outbreaks of waterborne diseases often stem from inadequate storage and poor sanitation practices (8). Institutions with robust water systems, such as RMU, demonstrate improved resilience against such risks. From an environmental perspective, institutional water storage aligns with sustainability goals. By conserving and efficiently distributing stored water, universities can reduce stress on municipal groundwater resources (9). Studies also recommend integrating rainwater harvesting and wastewater recycling to supplement storage facilities (10). Institutional water storage practices align with the targets of SDG 6, particularly Target 6.1 (safe and affordable drinking water), Target 6.3 (improving water quality through safe storage and reduced contamination), and Target 6.4 (increasing water-use efficiency and ensuring sustainable withdrawals).

Crisis Management Strategies Recommendations for Institutional Sustainability

Water crisis management requires both structural and behavioral measures. RMU has implemented proactive strategies, including adequate storage capacity, balanced distribution, and conservation awareness campaigns, periodic maintenance, and contingency planning with municipal authorities (5). RMU's approach reflects practical contributions to SDG 6 by ensuring reliable access to clean water (Target 6.1) and promoting sustainable water management through awareness campaigns and leak prevention (Target 6.4).

Similar approaches have been adopted in other universities in Pakistan and India, where storage expansion, leak detection systems, and digital monitoring technologies improved crisis preparedness (11,12). Literature further emphasizes community awareness as a vital component, as behavioral change significantly influences water conservation outcomes (13).

Recommendations for Institutional Sustainability Conclusion

Based on the literature and RMU's experience, the following recommendation emerges:

1.Expansion of Storage Capacity – Anticipating future growth in student intake and facilities.
2. Rainwater Harvesting Systems – Effective in urban campuses, reducing reliance on municipal supply (14).

3. Water Recycling and Reuse – Greywater recycling in hostels and academic blocks conserves potable water (15).

4. Smart Monitoring Systems – Digital meters and leak detection reduce losses and improve efficiency (16).

5. Strengthened Awareness Campaigns – Faculty and student involvement fosters long-term behavioral sustainability.

6. Alignment with SDG 6 Targets – Institutional policies should be explicitly framed within the SDG 6 agenda to monitor progress, attract funding, and promote global partnerships for sustainable water management (Target 6.a and 6.b).

Conclusion

Water storage and management systems are critical for the functioning of healthcare and educational institutions. The case of RMU demonstrates how adequate infrastructure, maintenance, and crisis management strategies contribute to institutional resilience. Integrating sustainable practices such as rainwater harvesting, recycling, and smart monitoring can further strengthen preparedness against water scarcity in Pakistan and beyond. Strengthening institutional water infrastructure and sustainable practices not only ensures resilience for healthcare and educational operations but also directly advances the objectives of SDG 6. By adopting these measures, institutions like RMU contribute to the global movement towards clean water, sanitation, and sustainable development.

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