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Construction of Clean Water Supply and Ablution Facilities at Al-Ikhlas Mosque

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ABSTRACT

Padang Baru Jorong in Nagari Ganggo Hilia, Bonjol District, Pasaman Regency, is a rural settlement of approximately 30 households that is not served by a municipal water pipeline. Al-Ikhlas Mosque had relied on a shallow dug well with visually poor water quality, and the congregation had to draw water manually with a bucket because no permanent ablution facility was available. This community partnership activity aimed to provide a functional water-supply system and construct an accessible ablution facility for the mosque congregation and nearby residents. The program was implemented through field observation, coordination with local authorities and mosque managers, technical design and budgeting, procurement of materials, and 32 hours of construction work involving lecturers, students, and community members. The completed works included a water pump, a 500 L storage tank supported by a 2.5 m steel tower, PVC distribution pipes, a roofed ablution structure, and water faucets. The system conveyed water from the well to the storage tank and distributed it by gravity to the ablution points. The activity reduced the need for elderly congregants to lift water manually and improved the availability and convenience of water for worship. The project shows that a simple, community-based water installation can address basic service limitations in an unserved rural mosque.

Keywords: *Ablution Facility; Clean Water Supply; Community Service; Rural Mosque.*

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INTRODUCTION

Reliable water access is essential for public health, hygiene, and daily activities. Drinking-water systems should protect water quality from the source to the point of use, while service planning should consider both safety and reliability [1]. Global monitoring also shows that universal access to safely managed drinking water and hygiene services has not yet been achieved, with rural communities facing the largest service gaps [2].

Small water supplies often face technical, operational, managerial, and financial constraints. Current guidance recommends context-appropriate standards, preventive risk management, sanitary inspection, and progressive improvement for community-scale systems [3], [4]. Water security also supports health, community stability, and sustainable development [5].

In Indonesia, the environmental health requirements for water are regulated through Ministry of Health Regulation No. 2 of 2023 [6]. The national framework for drinking-water supply is established through Government Regulation No. 122 of 2015 [7] and Ministry of Public Works and Housing Regulation No. 27/PRT/M/2016 [8]. Building water installations should also follow the principles of SNI 8153:2015 for plumbing systems in buildings [9].

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The sustainability of rural water infrastructure depends on appropriate management, maintenance, financing, technical performance, and community participation. Studies of community-managed systems show that institutional arrangements and local involvement strongly affect long-term service performance [10], [11].
Mosques require dependable water supplies because ablution is performed repeatedly each day. Studies have identified substantial variation in water use per ablution and have recommended efficient fixtures, user awareness, rainwater harvesting, and reuse of lightly contaminated ablution water to reduce demand on clean-water sources [12]-[15].

Padang Baru Jorong, Nagari Ganggo Hilia, Bonjol District, Pasaman Regency, contains the Sawah Nangguang settlement, located away from the main road and across the Batang Masang River. The settlement has approximately 30 households and is not connected to a municipal water pipeline. Al-Ikhlas Mosque, which has served the community since 1988, previously depended on a shallow dug well near the mosque.

Figure 1: Community service location.

Before the activity, the mosque did not have a permanent ablution facility. Water was collected from a dug well approximately 3 m deep using a bucket and rope. This method was difficult for elderly congregants. The water was also reported to have yellowish color, unpleasant taste, and odor. Based on the initial observation and discussion with mosque managers, the priority needs were a more practical water-lifting system, a storage tank, a distribution network, and an ablution facility. The objective of the activity was therefore to construct an integrated water installation and ablution facility that could be used by the congregation and surrounding community.

METHOD

The activity used a participatory community-service approach. The stages were arranged to provide a clear sequence from problem identification to construction and evaluation. The planning considered the practical principles for small water supplies and sanitary risk identification [3], [4], together with the basic requirements for building plumbing systems [9].

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A. Preparation Stage

The team conducted a field survey, identified the condition of the well and the proposed construction area, and discussed the activity with the Wali Nagari, jorong authorities, mosque managers, and community representatives. The team then prepared the technical design, work schedule, and cost estimate.

B. Procurement of Materials and Equipment

The main materials included PVC pipes and fittings, faucets and accessories, 50 × 50 × 5 mm angle steel, concrete blocks, sand, river stone, coarse aggregate, cement, formwork boards, reinforcement steel, roofing sheets, timber, a 500 L water tank, and a water pump. Supporting equipment included an iron cutter and a welding machine.

C. Implementation

Field implementation was conducted over 32 hours after the preparation and procurement stages were completed. Students who had completed plumbing courses participated under the supervision of the service team.

1. Prepared the water source and installed the water pump.
2. Constructed the foundation and steel tower for the 500 L storage tank.
3. Installed PVC pipes from the well to the tank and from the tank to the ablution facility.
4. Constructed the roofed ablution facility, including columns, walls, floor, and faucets.
5. Tested the pump, tank, pipe connections, and faucets through a functional inspection.

Figure 2: Sequence of community partnership program implementation.

RESULTS AND DISCUSSION

A. Preparation and Procurement

The preparation stage confirmed the activity location, partner responsibilities, construction schedule, technical design, and cost plan. Materials were procured gradually in accordance with the construction sequence. The participation of mosque managers and community members supported site access, material handling, and coordination. Such local involvement is important because community participation and clear management roles influence the sustainability of rural water systems [10], [11].

B. Water Pump, Tower, and Storage Tank

The first construction component was the water-lifting and storage system. A pump was installed near the well to transfer water to the tank. A steel tower approximately 2.5 m high was constructed from 50 × 50 × 5 mm angle steel. The tower elevated the 500 L tank and

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allowed gravity flow to the ablution faucets. The arrangement reduced the need for congregants to draw water manually.

Figure 3: Installation and setup of the water pump.

Figure 4: Construction of the water-tank tower.

Figure 5: Painted tower, piping installation, and 500 L water tank.

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The tank and piping system created a simple source-to-storage-to-user arrangement. For continued operation, the well area, pump, tank cover, tower, and pipe network should be inspected routinely. WHO guidance for small supplies recommends preventive risk management and sanitary inspection to identify contamination pathways and maintenance needs [3], [4].

C. Construction of the Ablution Facility

The ablution facility was constructed beside the mosque. The work included clearing the site, installing bowplanks, constructing foundations and reinforced columns, building concrete-block walls, casting the floor, installing the roof, and connecting PVC pipes and faucets. The final facility provided sheltered access to water for ablution.

Figure 6: Assembly and casting of reinforced columns.

Figure 7: Floor and column work, concrete-block walls, and roof installation.

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Figure 8: Completed structural form of the ablution facility.

Figure 9: Installation of PVC pipes at the ablution facility.

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Figure 10: Completed clean-water and ablution facilities at Al-Ikhlas Mosque.

D. Service Benefits and Further Improvements

The completed system improved physical access to water and provided a dedicated place for ablution. It also reduced the manual workload previously experienced by elderly congregants. The installation followed a simple layout that can be maintained with locally available materials and skills. This is consistent with the need for appropriate technologies and manageable operating arrangements in small community water systems [10], [11].

The activity focused on construction and functional testing. It did not include laboratory testing of physical, chemical, or microbiological water quality. Therefore, the water should not be described as meeting drinking-water standards until testing confirms compliance with the applicable health requirements [1], [6]. Future activities should include periodic water-quality testing, sanitary inspection, tank cleaning, pump maintenance, and clear assignment of operation and maintenance responsibilities.

Water efficiency should also be considered during operation. Previous studies show that water use during ablution can be reduced through efficient faucet design, user awareness, harvested rainwater, and reuse of suitable ablution water for non-potable purposes [12]-[15]. These options can be evaluated in a future development stage after the basic service has operated reliably.

CONCLUSION

The community partnership activity produced a functional water-supply and ablution system at Al-Ikhlas Mosque in Sawah Nangguang. The completed components consisted of a water pump, a 2.5 m steel tower, a 500 L storage tank, PVC distribution pipes, a roofed ablution structure, and water faucets. The system transferred water from the well to the tank and distributed it by gravity to the ablution points, reducing the need for manual water lifting. Community coordination and student participation supported implementation. Continued benefits depend on routine inspection, tank and pipe maintenance, water-quality testing, and clear management responsibilities. Future improvement should include sanitary inspection and water-conservation measures.

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