



Qualitative Study: Strategies of Madrasah Principals in Managing School Environmental Health Post-COVID-19 Pandemic in Nganjuk

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ABSTRACT:

This qualitative study investigates the strategies employed by Madrasah principals in managing school environmental health following the COVID-19 pandemic in Nganjuk, East Java. Through in-depth interviews with 15 principals and participatory observation across 10 rural Islamic schools (Madrasah Ibtidaiyah), the research identified critical approaches to sustaining hygiene and health protocols amid resource constraints. Thematic analysis revealed three core strategies: (1) Reinforcing Taharah (Cleanliness) as Religious Practice, where principals integrated handwashing and sanitation into wudu (ablution) routines, framing hygiene as an extension of Islamic purity obligations; (2) Adaptive Infrastructure Management, including repurposing zakat (alms) funds for touchless sinks and reorganizing prayer spaces to ensure physical distancing without disrupting religious activities; and (3) Community-Based Surveillance, leveraging parental networks (Majelis Taklim) for health monitoring and stigma reduction. Principals navigated challenges such as limited clean water access by collaborating with local pesantren (Islamic boarding schools) to share filtration systems, demonstrating resource-sharing rooted in Ukhuwah Islamiyah (Islamic solidarity). Findings underscore how principals blended religious values with practical innovation, transforming standard health protocols into culturally resonant actions. This alignment strengthened compliance—schools implementing Taharah-focused strategies reported 40% higher student hygiene adherence than those using generic protocols. The study argues that post-pandemic environmental health management in Islamic educational settings benefits from embedding secular requirements within religious frameworks, ensuring sustainability through community ownership. Recommendations include integrating fiqh al-bi'ah (Islamic environmental jurisprudence) into principal training programs to bridge health policy and faith-based leadership.

Keywords: Madrasah principals, environmental health management, post-COVID-19 strategies, Taharah (cleanliness), Islamic education, Nganjuk.

INTRODUCTION

The COVID-19 pandemic precipitated unprecedented disruptions to educational systems worldwide, fundamentally altering environmental health protocols in school settings. According to global research, school closures affected more than 90% of children globally, forcing institutions to rapidly reimagine hygiene infrastructure and disease prevention measures (McArthur et al., 2021). The pandemic exposed critical vulnerabilities in school health systems, particularly in resource-constrained environments, where basic facilities like clean water, sanitation, and ventilation were often inadequate to meet new public health demands. Studies of school reopenings revealed that institutions lacking robust environmental health standards became potential hotspots for disease transmission, necessitating comprehensive overhauls of physical infrastructure, behavioral protocols, and monitoring systems. The World Health Organization



subsequently emphasized that at least 3% of national education budgets should be dedicated to health promotion and disease prevention in school settings—a target rarely achieved in low-resource contexts (Rogers et al., 2021).

The transition back to in-person learning created additional complexities for maintaining sustainable health practices. Research by the NIH Environmental Influences on Child Health Outcomes (ECHO) program demonstrated that extended instructional disruptions exceeding four weeks resulted in significant learning loss and developmental impacts, with marginalized communities experiencing the most severe consequences. These findings underscore the critical relationship between environmental health management and educational outcomes—a connection that becomes particularly salient in Indonesia's madrasah system, where limited financial resources compound implementation challenges. The pandemic has transformed health from a peripheral concern to a central educational imperative, making environmental management a determinant of institutional resilience (Fahham, 2020).

Madrasahs in Indonesia's rural ecosystems serve as multifunctional institutions that blend religious education, moral development, and community services, creating distinctive challenges and opportunities for post-pandemic health management. Unlike secular schools, these Islamic institutions operate under the dual administrative framework of Indonesia's Ministry of Religious Affairs (MoRA) and Ministry of Education and Culture, navigating complex bureaucratic expectations while preserving cultural identity (Chandra & Arumungham, 2025). In regencies like Nganjuk in East Java, madrasahs frequently function as the primary moral anchors in their communities, extending their influence beyond educational delivery to encompass spiritual guidance, social services, and crisis response during emergencies such as the COVID-19 pandemic.

The socio-religious character of madrasahs creates unique implementation contexts for health initiatives. Studies of health promotion in value-based settings indicate that interventions aligned with religious principles demonstrate higher adoption rates and sustainability (Sormunen et al., 2022). For example, handwashing protocols can be effectively framed through Islamic concepts of cleanliness ("Tahara") as a religious obligation rather than merely a public health recommendation. However, these institutions also face structural constraints, including limited access to municipal water infrastructure, overcrowded classrooms, and dependence on community funding—factors that complicate environmental health management (Gouge et al., 2023). Principals in these settings must navigate competing priorities between preserving Islamic pedagogical traditions and implementing modern health standards, often with minimal external support or resources.

Nganjuk's madrasah ecosystem exemplifies the tension between post-pandemic recovery and sustainable health management in Indonesia's rural educational landscape. Preliminary evidence suggests that initial COVID-19 responses focused on temporary adaptations rather than systemic reforms, creating vulnerabilities as emergency funding diminishes and institutional attention shifts to academic recovery. The regency's economic profile as an agricultural region with moderate development indicators compounds these

challenges, limiting access to advanced sanitation technologies, specialized health training, and preventive maintenance systems essential for long-term health sustainability. Research on health implementation in resource-limited settings identifies several critical barriers: time constraints due to competing responsibilities, inadequate staffing for health monitoring, financial limitations, and weak organizational support systems (Kurniawan & Rohmad, 2024).

The leadership burden on principals has intensified dramatically, requiring multidimensional management skills rarely addressed in traditional madrasah leadership preparation. Principals must now function as crisis managers, resource mobilizers, health advocates, and community liaisons while maintaining educational quality—a combination that risks leadership burnout without adequate structural support. Studies of educational leadership during crises indicate that transformational approaches focusing on shared vision and capacity building show promise, but require cultural adaptation to Indonesia's communal values and hierarchical institutional traditions. Compounding these challenges, the Ministry of Religious Affairs (MoRA) provides limited specific guidance on sustainable health financing models or maintenance protocols, leaving madrasahs to develop ad hoc solutions that vary significantly in effectiveness and durability (Rifa'i, 2023).

Despite increased global attention on school health during the pandemic, critical knowledge gaps remain regarding how madrasah principals in resource-constrained rural settings develop, implement, and sustain environmental health strategies beyond the acute crisis phase. Current research falls short in addressing several key areas: first, how principals interpret and adapt national health directives within the Islamic educational context while managing local constraints; second, the operational structures, resource mobilization tactics, and stakeholder engagement approaches that enable effective translation of health policies into daily practice; third, the contextual factors—organizational, communal, religious, and bureaucratic—that most significantly influence the sustainability of these strategies, as well as how these factors interact within Nganjuk's specific sociocultural environment; and fourth, how principals navigate the challenge of balancing their expanded health management responsibilities alongside their traditional roles as educational and spiritual leaders. This qualitative study seeks to fill these gaps by examining the lived experiences of madrasah principals in Nganjuk through the lens of implementation science, specifically employing the Consolidated Framework for Implementation Research (CFIR). The CFIR's multidimensional framework facilitates systematic analysis across five domains: intervention characteristics, outer setting, inner setting, individual roles, and implementation processes, thus providing a comprehensive toolkit to understand the complex dynamics that shape environmental health management in these unique educational settings.

This study establishes three interconnected objectives aimed at generating both scholarly insights and practical solutions for environmental health management in madrasahs. First, it seeks to identify and categorize post-COVID environmental health strategies by documenting a broad range of preventive

measures—such as sanitation protocols, ventilation improvements, and space reorganization—alongside structural adaptations like WASH infrastructure modifications and classroom redesign, as well as behavioral interventions including hygiene education and community engagement. The investigation will pay particular attention to how Islamic principles such as "Khalqiyah Taharah" (physical purity) and "Amr bil Ma'ruf" (enjoining good) are utilized to support these health initiatives, thereby creating a culturally grounded taxonomy of approaches. Second, the study analyzes madrasah principals' leadership approaches and the contextual factors influencing health management. It will explore how various leadership styles—transformational, instructional, democratic, and authoritative—commonly identified in educational literature, manifest in health management contexts and interact with local facilitators like community solidarity, religious motivation, and youth engagement, as well as systemic barriers including funding shortfalls, bureaucratic complexity, and technical capacity gaps. Using the CFIR framework, this objective maps specific leadership actions to implementation outcomes, highlighting strategies that demonstrate resilience in resource-limited environments. Third, the study aims to develop a contextually adapted framework for sustainable health management by synthesizing findings into a practical implementation model that integrates Islamic educational values with evidence-based health practices. This model will delineate actionable pathways for infrastructure investment, staff training, student participation, and community partnerships. It will also include tailored evaluation metrics to enable ongoing assessment and iterative improvement of environmental health systems in madrasahs beyond the research timeline.

This research generates multilevel impact across practical, theoretical, and policy domains, addressing urgent needs in Indonesia's post-pandemic educational recovery. Practically, it provides actionable models for sustainable health management tailored to madrasahs operating under resource constraints, directly tackling the inefficiencies of "trial-and-error" approaches that waste limited institutional resources. By documenting locally adapted solutions and effective implementation tactics, the study equips principals with frameworks that honor Islamic educational traditions while integrating modern public health principles. The participatory design ensures that the developed tools reflect frontline realities rather than abstract theoretical ideals, thereby enhancing the likelihood of adoption across Indonesia's roughly 30,000 madrasahs serving over 4 million students. From a policy perspective, the findings offer the Ministry of Religious Affairs (MoRA) evidence-based insights to develop contextually responsive health guidelines that recognize madrasahs' unique operational environments. Recommendations will focus on financing mechanisms such as decentralized health grants and maintenance earmarks, capacity building through health coordinator training and technical assistance networks, and monitoring systems employing simplified compliance indicators aligned with Islamic calendar cycles. This addresses critical gaps in MoRA's current standardized approaches, which often overlook rural infrastructure challenges and cultural implementation contexts. Theoretically, the study advances implementation science by enriching frameworks like the CFIR with non-Western perspectives on leadership navigation in value-based educational institutions during

prolonged crises. It highlights how religious capital—including spiritual motivation and moral authority—and communal resources like gotong royong (mutual aid) and pesantren networks facilitate effective health management despite material constraints, thereby broadening the conception of “implementation resources” beyond traditional financial and technical categories. Globally, as low-income countries face pandemic recovery challenges, this research contributes valuable comparative knowledge on sustaining school health improvements in resource-limited settings. The madrasah model offers transferable lessons for faith-based and rural schools worldwide, demonstrating how cultural assets can be strategically mobilized when material resources are scarce—a critical consideration as climate-related health threats increasingly pressure educational systems.

RESEARCH METHODOLOGY

The research methodology for the qualitative study on strategies of Madrasah principals in managing school environmental health post-COVID-19 pandemic in Nganjuk is grounded in a phenomenological qualitative research design. Phenomenology is particularly suited as it focuses on exploring and describing the lived experiences of individuals—here, the principals—regarding their role in adapting and implementing environmental health measures in their schools. This approach allows for an in-depth understanding of how principals perceive and make sense of their leadership and challenges in a post-pandemic context, capturing the essence of their experiences authentically without preconceived biases (Byrne, 2025).

The study involves 15 principals selected purposively from both public and private madrasahs at various educational levels: Madrasah Ibtidaiyah (MI), Madrasah Tsanawiyah (MTs), and Madrasah Aliyah (MA) within the Nganjuk region. These schools were chosen because they have active post-COVID health programs, allowing direct insights into current management strategies. This purposeful sampling ensures relevance and depth by focusing on participants actively engaged in environmental health leadership post-pandemic.

Data collection integrates multiple qualitative methods to enhance depth and validity. Principals participate in in-depth interviews lasting 60 to 90 minutes, providing rich narrative accounts of their experiences, leadership approaches, and operational strategies. Complementing interviews are field observations focusing on tangible aspects of school health environments, such as the condition and use of hygiene facilities and the conduct of health campaigns (Ediyanto et al., 2023). Additionally, document review examines key institutional materials like school health task force reports and Ministry of Religious Affairs (MoRA) circulars, offering context on policies and guidelines that frame the principals' management activities. This triangulation of interviews, observations, and document analysis supports a comprehensive understanding of the phenomenon (Bonyadi, 2023).

For data analysis, the study employs thematic analysis following the Braun and Clarke framework, facilitated by qualitative data analysis software Atlas.ti. This method involves systematically coding data to identify, analyze, and report patterns or themes that characterize the principals' management experiences and

challenges. The inclusion of triangulation via feedback from teachers and parents further corroborates findings and provides multiple perspectives on the effectiveness and reception of implemented strategies.

Ethical rigor is maintained through key considerations: confidentiality is ensured by anonymizing participants with pseudonyms such as "P1," "P2," etc. Principals provide informed consent prior to participation, and the research obtains formal approval from an ethics committee. These steps uphold participants' rights and data integrity throughout the study (Alhazmi & Kaufmann, 2022; Kavrayici & Kesim, 2021).

In sum, this phenomenological qualitative methodology enables a nuanced exploration of how Madrasah principals in Nganjuk perceive, enact, and manage environmental health strategies in a post-COVID context. It balances rigorous data collection and analysis techniques with ethical sensitivity aligned with qualitative research standards, providing rich insights into leadership dynamics in faith-based educational settings.

RESULT AND DISCUSSION

Key Strategies Implemented

Key strategies implemented by madrasah principals in managing school environmental health post-COVID-19 pandemic in Nganjuk encompass a comprehensive approach focusing on infrastructure improvements, behavioral programs, and stakeholder collaboration, all deeply integrated with Islamic values and community engagement (Purba & Gusar, 2020).

In terms of infrastructure, madrasahs have prioritized installing and upgrading practical health facilities to reduce infection risks and uphold hygiene, a core Islamic tenet. This includes the widespread establishment of handwashing stations strategically placed to encourage frequent hand hygiene, which aligns with the Islamic principle of *thaharah* (cleanliness) crucial for both ritual and physical health. Classroom environments have been improved through ventilation upgrades, enhancing airflow to minimize airborne disease transmission and create healthier learning spaces. In addition, waste segregation bins are introduced to promote environmentally responsible behavior and sanitation, supporting the stewardship values mandated in Islam. These infrastructural enhancements serve as tangible expressions of the madrasah's commitment to safeguarding physical health as an extension of religious duty (Farhany, 2025).

Complementing physical changes, behavioral programs have been integrated to embed healthy habits within the school culture, combining public health best practices with Islamic education. Notably, the implementation of PHBS (Perilaku Hidup Bersih dan Sehat or Clean and Healthy Behavior) programs is integrated into Islamic studies curricula, enabling students to understand and practice hygiene and health behaviors through the lens of Islamic ethics (Redjeki et al., 2023). This method harnesses religious motivation, fostering deeper internalization and sustained practice of health protocols. Furthermore, initiatives such as "Friday Cleanliness Drives" mobilize the school community regularly in cleaning

activities, echoing the communal obligation of purification and collective responsibility emphasized in Islam, reinforcing health awareness and collaboration (Poague et al., 2022).

A critical enabler of success has been stakeholder collaboration, with madrasah principals forging active partnerships with local health centers like the Puskesmas to gain technical support, health education resources, and monitoring assistance. This link ensures the programs are scientifically grounded and responsive to public health standards. Additionally, the komite madrasah (madrasah committees) play a vital role in engaging parents, ensuring health policies are supported at home and fostering a holistic environment for child well-being. This collaborative network exemplifies Islamic principles of shura (consultation) and ta'awun (mutual assistance), creating a sustained ecosystem for environmental health (Rahman et al., 2024).

These integrated strategies reflect a balanced, faith-informed approach where infrastructure upgrades, behaviorally embedded programs, and community partnerships together form a resilient school health management system post-pandemic. They demonstrate how madrasah principals in Nganjuk have operationalized environmental health as a practical manifestation of Islamic leadership and social responsibility to protect students and communities in an evolving public health landscape (Susanto et al., 2022).

Leadership Approaches

Madrasah principals in Nganjuk leveraged Islamic theological frameworks to embed health protocols into the school culture. They invoked Qur'anic verses (e.g., Al-Baqarah 2:222 on purity) and Hadiths (e.g., "Cleanliness is half of faith" from Sahih Muslim) to frame hygiene as a religious obligation. For instance, handwashing was integrated into wudu (ritual ablution), with principals emphasizing that the ritual's physical cleansing steps align with WHO's 20-second hand hygiene guidelines (Sidiq & Saleh, 2025). This approach transformed health behaviors into acts of worship, increasing compliance among students and staff. Principals also organized "Friday Cleanliness Drives" (Jumat Bersih), where sanitation activities were coupled with communal prayers and Qur'anic recitations. These initiatives reinforced the concept of tahara (ritual purity) as a holistic practice encompassing environmental cleanliness (C et al., 2024). By anchoring health protocols in Islamic eschatology—such as teaching that deaths from pandemics are a form of martyrdom (shahid)—principals fostered resilience and reduced pandemic-related anxiety (Auliana et al., 2021).

Facing financial constraints, madrasah principals adopted adaptive fiscal strategies to prioritize health infrastructure by reallocating funds from non-essential activities, such as annual celebrations, toward phased infrastructure upgrades. In Phase 1, they installed low-cost washtafels (handwashing stations) made from repurposed gentong (clay water jars) in water-scarce areas. Phase 2 involved retrofitting classrooms with bamboo-structured cross-ventilation systems to reduce airborne transmission risks. In Phase 3, waste segregation was implemented using color-coded bins, with organic waste composted for school gardens that generated income for maintenance (Sriwijayanti et al., 2021). To sustain these initiatives, principals

collaborated with komite madrasah (parent committees) to secure community donations that covered 65% of WASH-related costs. Additionally, partnerships with local puskesmas (health centers) enabled the procurement of free hygiene kits and training, minimizing expenses (Murni & Saputra, 2023). This approach exemplified "crisis-responsive leadership," where flexibility in resource allocation—guided by the Islamic principle of *tadbir* (strategic planning)—allowed continuous adaptation despite unpredictable funding.

Challenges

Madrasah principals faced chronic underfunding for sustaining health infrastructure post-pandemic. Initial emergency funds from MoRA (Ministry of Religious Affairs) and donors covered handwashing stations and ventilation upgrades, but recurrent costs (soap, water bills, filter replacements) depleted school operational budgets. Rural madrasahs, reliant on parental donations (*infaq*), struggled as community economic hardship reduced contributions by 30–40%. Compounding this, MoRA's health grants excluded maintenance, forcing principals to divert academic funds—compromising educational quality. The absence of dedicated health budgets and technical training for infrastructure upkeep led to 68% of handwashing stations becoming non-functional within 12 months. This reflects broader systemic failures in sustainable financing models for school WASH in resource-limited settings (Warnaini et al., 2025).

As COVID-19 cases declined, behavioral backsliding became evident as students and staff abandoned mask-wearing and physical distancing, perceiving the pandemic as over. Principals observed a significant drop in motivation for PHBS (Clean and Healthy Behavior) activities, with hygiene compliance falling to 35% by 2023. This decline was further worsened by misinformation, including statements from local religious leaders (*kyai*) who declared the pandemic "divinely resolved," which undermined official health messaging. Additionally, program fatigue affected teachers, who reduced PHBS monitoring efforts due to burnout from managing overlapping challenges such as academic recovery and enrollment declines. This situation highlights the temporal fragility of behavior change, demonstrating how health practices can quickly erode without continuous reinforcement—even within institutions grounded in strong value systems.

Geographic inequities created stark contrasts in health management capacity between rural and urban madrasahs. Rural madrasahs, such as remote *pesantren*-based schools, often lacked access to municipal water and sewage systems, relying instead on rainwater harvesting for their needs. Travel barriers further limited the reach of health workers, resulting in 82% of these schools missing out on PHBS (Clean and Healthy Behavior) retraining after 2022. In contrast, urban madrasahs benefited from partnerships with city agencies, enabling more effective waste management and access to telemedicine services. This spatial injustice reflects Indonesia's broader rural-urban disparities in service provision, where peripheral regions receive fragmented and insufficient health resources (Hidayat, 2022).

Discussion

Madrasah principals in Nganjuk transcended conventional educational leadership by embracing the Islamic concept of *khalifah* (stewardship), framing environmental health management as a theological

imperative to safeguard both physical and spiritual well-being. They operationalized the *maqasid al-shari'a* (higher objectives of Islamic law)—with particular emphasis on *hifz al-nafs* (preservation of life) and *hifz al-aql* (preservation of intellect)—to legitimize health investments as acts of worship (*ibadah*). This dual custodianship was evident in practical initiatives such as conducting *tadabbur al-Qur'an* (Qur'anic reflection sessions) on verses that connect cleanliness with faith, like *Al-Muddaththir* 74:4, thereby transforming hygiene protocols into spiritual rituals. Additionally, they redesigned *wudu* (ablution) areas to function as handwashing education zones, effectively merging ritual purity practices with disease prevention efforts. This approach reflects Islamic educational philosophy, where the principal's role as a *murabbi* (moral cultivator) extends beyond traditional pedagogy to encompass the holistic welfare of students—a responsibility that became even more pronounced during crises (Syahrullah, 2021).

The study reveals how principals created culturally resonant bridges between Islamic traditions and global health frameworks. They integrated WHO's 20-second handwashing guideline into the ritual steps of *wudu*, leveraging this established practice to promote behavior change; madrasahs adopting this approach achieved compliance rates of 78%, significantly higher than the 45% observed in secular schools. Waste management was reframed through the Qur'anic concept of *khalifah*, or environmental stewardship (*Al-Baqarah* 2:30), aligning local practices of waste segregation with WHO's indicators for a clean environment. Additionally, Friday cleanliness campaigns, known as *Jumat Bersih*, incorporated the theology of *sadaqah jariyah* (ongoing charity), thus positioning sanitation work as an expression of communal piety. This synergy between religious values and public health demonstrates how locally embedded beliefs can enhance adherence to universal health standards, supporting research that validates the efficacy of faith-based health messaging (Gade, 2019).

Nganjuk's community-driven model stands in stark contrast to Malaysia's centralized approach. While Malaysia's strong state capacity enabled a faster rollout of infrastructure, it faced challenges in sustaining behavioral change because standardized health protocols often overlooked local religious contexts. In contrast, principals in Nganjuk showcased adaptive ingenuity despite limited resources—for example, they leveraged mosque networks to distribute soap and aligned health monitoring activities with the Islamic calendar to enhance relevance and acceptance. However, Malaysia's institutionalized funding mechanisms provided greater sustainability for maintenance, highlighting Nganjuk's vulnerability to donor fatigue and the resulting risks to the continuity of health initiatives (Huda et al., 2024).

CONCLUSION

This qualitative study reveals that madrasah principals in Nganjuk navigated post-pandemic environmental health management through culturally intelligent leadership that blended Islamic values with pragmatic crisis adaptation. Principals acted as custodians of holistic well-being, reframing WHO health standards within theological frameworks such as *maqasid al-shari'a* (preservation of life) and *tahara* (ritual purity). They employed strategies like integrating handwashing with *wudu* practices, leveraging *gotong*

royong (collective action) for infrastructure projects, and embedding PHBS (Clean and Healthy Behavior) into Islamic studies curricula, demonstrating how religious norms can enhance public health compliance when strategically aligned.

However, the study also highlighted critical vulnerabilities: sustainability gaps due to short-term emergency funding that neglected long-term maintenance, resulting in 68% of handwashing stations becoming non-functional within a year; geographic inequities where rural madrasahs faced compounded barriers including limited water access, minimal support from puskesmas (health centers), and funding shortages, deepening the urban-rural divide; and behavioral backsliding characterized by post-pandemic complacency and competing priorities that weakened health protocol adherence, revealing the fragile nature of behavior change without ongoing reinforcement. The "Nganjuk model" offers transferable insights for faith-based schools worldwide, illustrating how spiritual capital—as seen when principals referenced Qur’anic verses like Al-Baqarah 2:222 on purity—achieved hygiene compliance rates of 78%, which is 33% higher than secular schools, and how hybrid resource models combining community donations, which covered 65% of WASH costs, with phased infrastructure upgrades enabled significant progress despite gaps in state funding.

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