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Optimizing Environmental Hygiene through Education as a Strategy for Preventing Infectious Diseases at the An-Nuriyyah Orphanage

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ABSTRACT

Orphanages, as communal living facilities, are vulnerable to the transmission of infectious diseases due to overcrowding, inadequate sanitation, and the low implementation of clean and healthy living behaviors. These conditions require health promotion and disease prevention interventions through educational programs to improve residents' knowledge, awareness, and hygiene practices. This community service program to improve the understanding of children and caregivers at An-Nuriyyah Orphanage regarding the importance of environmental hygiene in preventing infectious diseases. used to carry out the activities included health education, demonstrations of proper handwashing techniques, interactive discussions, question-and-answer sessions, and the use of posters as a visual communication medium. Success was assessed by comparing knowledge levels before and after the intervention. The results demonstrated a significant improvement in participants' knowledge, with the average score increasing from 39.0% before the intervention to 85.8% after the intervention, representing an increase of 46.8%. Participants also showed high enthusiasm and were able to correctly perform the recommended handwashing procedures. In conclusion, an educational approach combining health education, hands- on demonstrations, and active participation effectively improves participants' understanding and promotes the sustainable adoption of clean and healthy living behaviors in the orphanage environment.

Keywords: clean and healthy living behavior, community service, digital environmental hygiene, infectious disease prevention, orphanage

INTRODUCTION

Infectious diseases continue to pose a significant public health burden in developing nations, Indonesia included. A major contributing factor to their persistently high incidence is the limited adoption of Clean and Healthy Living Behavior (CHLB), compounded by substandard environmental sanitation, densely populated housing conditions, and restricted access to safe water sources. According to the World Health Organization (WHO), interventions such as consistent handwashing practices, improved sanitation facilities, and community health education represent some of the most effective strategies for breaking the chain of transmission for infectious illnesses, including diarrheal disease, acute

respiratory infections, dermatological conditions, and intestinal parasitic infections (Tiranda, 2023).

Therefore, health education is a key promotive and preventive strategy for reducing the burden of infectious diseases, particularly in communal living environments. Orphanages are especially vulnerable because children share daily activities and facilities, increasing opportunities for disease transmission. Inadequate environmental hygiene and poor Clean and Healthy Living Behavior (CHLB) further elevate this risk. As children are still developing lifelong health habits, continuous education and practical guidance are essential to promote consistent hygiene practices and prevent infectious diseases (Yuliana et al., 2022).

An-Nuriyyah Orphanage, located in Kampung Siluman, South Tambun District, Bekasi Regency, West Java, is a social welfare institution established in 1997 that provides residential care and guidance for orphans, underprivileged, and abandoned children aged 2 months to 20 years. At the time of the Community Service Program (PKM), the orphanage accommodated more than 50 children who participated in various collective daily activities under the supervision of caregivers. Although the orphanage is equipped with basic facilities, including shared dormitories, classrooms, a prayer room, a communal kitchen, bathrooms, and a clean water supply, the implementation of environmental hygiene and Clean and Healthy Living Behavior (CHLB) has not yet been optimized. This condition may increase the risk of infectious disease transmission among the residents.

Previous community-based health education programs have consistently demonstrated the effectiveness of hygiene promotion in improving health-related knowledge and behaviors. Health education combined with handwashing demonstrations significantly enhances participants' knowledge (Utami et al., 2026), while visual educational media improve personal hygiene compliance among orphanage children (Rahayu et al., 2025). Moreover, integrating lectures, demonstrations, and interactive discussions produces better learning outcomes than lectures alone (Saputra et al., 2020). Participatory educational approaches have also been reported to strengthen awareness of infectious disease prevention and encourage sustained healthy behaviors (Hartono et al., 2025).

However, most of these interventions have been implemented separately in terms of educational methods and media, and have primarily targeted schools or the general community. Studies integrating environmental hygiene education, WHO-standard six-step handwashing practice, visual educational media, and structured evaluation using pretest and posttest among orphanage residents as a vulnerable population remain limited. This gap highlights the need to develop a more comprehensive health education model tailored to the specific characteristics and needs of orphanage settings.

This Community Service Program (PKM) was designed around a promotive-preventive framework, premised on the idea that enhancing knowledge serves as the key driver of behavioral change. The process began with a field-based needs assessment, followed by an educational intervention comprising health talks, guided demonstration and practice of the WHO six-step handwashing method, interactive discussion sessions, and poster-based visual media to reinforce key health messages. Intervention outcomes were then assessed through pretest and posttest measurements to capture shifts in participants' knowledge levels. It is anticipated that this knowledge gain will support the long-term adoption of Clean and Healthy Living Behavior (CHLB), ultimately lowering the risk of infectious disease spread within the orphanage setting.

The novelty of this program lies in the integration of four key intervention components: environmental hygiene education, WHO-standard six-step handwashing practice, visual educational media as a tool for reinforcing health messages, and a structured pretest-posttest evaluation within a single intervention targeting orphanage

children and caregivers. To the best of our knowledge, such an integrated approach has rarely been implemented in previous community service programs. Therefore, this program is expected to provide a more comprehensive promotive-preventive health education model that can be readily replicated in other orphanages with similar characteristics.

This program is expected to improve the knowledge and awareness of both orphanage children and caregivers regarding the importance of environmental hygiene in preventing infectious diseases, promote the adoption of Clean and Healthy Living Behavior (CHLB) in daily activities, and contribute to the creation of a cleaner, healthier, and safer orphanage environment. In addition to providing direct benefits to the partner institution, the program is expected to serve as a reference for educational institutions, healthcare professionals, and orphanage administrators in developing sustainable promotive-preventive health education programs for similar community settings.

METHOD

The Community Service Program (PKM) was conducted on Sunday, May 10, 2026, at An-Nuriyyah Orphanage, Kampung Siluman, South Tambun District, Bekasi Regency, Indonesia. The program employed a participatory educational approach based on Kolb's Experiential Learning Theory, which emphasizes that learning is most effective when participants actively engage in practical experiences and integrate newly acquired knowledge into their daily behavior. Conceptually, the intervention was also guided by the Health Belief Model, with educational materials designed to enhance participants' understanding of the risks of infectious diseases, the potential consequences of infection, and practical preventive measures that could be easily adopted by all orphanage residents (Fani Sarah, 2025).

The target participants of this community service program were the children and caregivers of An-Nuriyyah Orphanage. A total of 40 orphanage children aged 6 to 20 years, together with their caregivers who supervised daily activities, participated in the program. Considering the wide age range of the participants, younger children were directly assisted by caregivers during the educational sessions and handwashing demonstrations, whereas school-aged children and adolescents actively participated in all program activities, including the completion of the pretest and posttest questionnaires (Basri et al., 2025).

The implementation method consisted of four main components. First, an interactive health education session was conducted to provide information on environmental hygiene, common infectious diseases, risk factors for disease transmission, and prevention strategies based on Clean and Healthy Living Behavior (CHLB) (Zukmadini et al., 2020). The educational materials were delivered using language appropriate to the participants' level of understanding. Second, participants attended demonstrations and hands-on training on the WHO-standard six-step handwashing technique and proper hygiene practices for maintaining shared facilities. Participants were actively involved in practicing these procedures under the guidance of the facilitators. Third, interactive discussions and question-and-answer sessions were conducted to identify practical barriers to implementing CHLB within the orphanage and to strengthen participants' motivation to adopt healthier behaviors (Kurniawan, 2017). Finally, the effectiveness of the intervention was quantitatively evaluated using identical pretest and posttest multiple-choice questionnaires. Supporting educational materials, including leaflets, posters, and handwashing demonstration aids, were placed at strategic locations throughout the orphanage to reinforce key health messages after the completion of the program (Aloysia, 2026).

The program was implemented in three phases. The preparation phase included a preliminary assessment of the orphanage's environmental hygiene and sanitation conditions, coordination with the orphanage management regarding the program schedule and participant recruitment, development of educational materials and evaluation instruments, and preparation of demonstration materials, including soap, running water, posters, and leaflets. The implementation phase was conducted over one full day and consisted of the following activities: opening session, administration of the pretest, delivery of the health education session, demonstration and supervised practice of the WHO-standard six-step handwashing technique, interactive discussion and question-and-answer session, distribution of educational materials, and administration of the posttest (Sri et al., 2020). The evaluation phase involved a descriptive quantitative comparison of the pretest and posttest scores to assess changes in participants' knowledge, followed by coordination with the orphanage caregivers to monitor the continued implementation of Clean and Healthy Living Behavior (CHLB) after the completion of the program (Sulistiyani, 2025).

The success of the program was evaluated using two outcome dimensions. The first was an improvement in participants' knowledge, defined as at least a 70% increase in posttest scores compared with pretest scores. The second was behavioral change, assessed through participants' active engagement during the practical sessions and their ability to independently perform the WHO-standard six-step handwashing technique without additional guidance. These indicators served as early evidence of the internalization and adoption of Clean and Healthy Living Behavior (CHLB).

RESULTS

The Community Service Program (PKM), titled "Healthy, Infection-Free Orphanage: Environmental Hygiene Education as a Strategy for Infection Prevention at An-Nuriyyah Orphanage," was successfully conducted on May 10, 2026, at An-Nuriyyah Orphanage, Bekasi, West Java, Indonesia. The program involved all children and caregivers, who actively participated throughout the activities. The results are presented according to the research objectives, focusing on the impact of demonstration-based environmental hygiene education on participants' knowledge and awareness of infectious disease prevention.

Coordination with the orphanage management established the program schedule, implementation procedures, and participant recruitment. Educational materials, evaluation instruments, leaflets, posters, and demonstration equipment were prepared before implementation. The pretest and posttest consisted of 15 multiple-choice questions covering environmental hygiene, infectious diseases, the WHO six-step handwashing technique, bedroom and toilet hygiene, and food and drinking water safety. Educational materials were adapted with simple language and visual illustrations to suit children, adolescents, and caregivers.

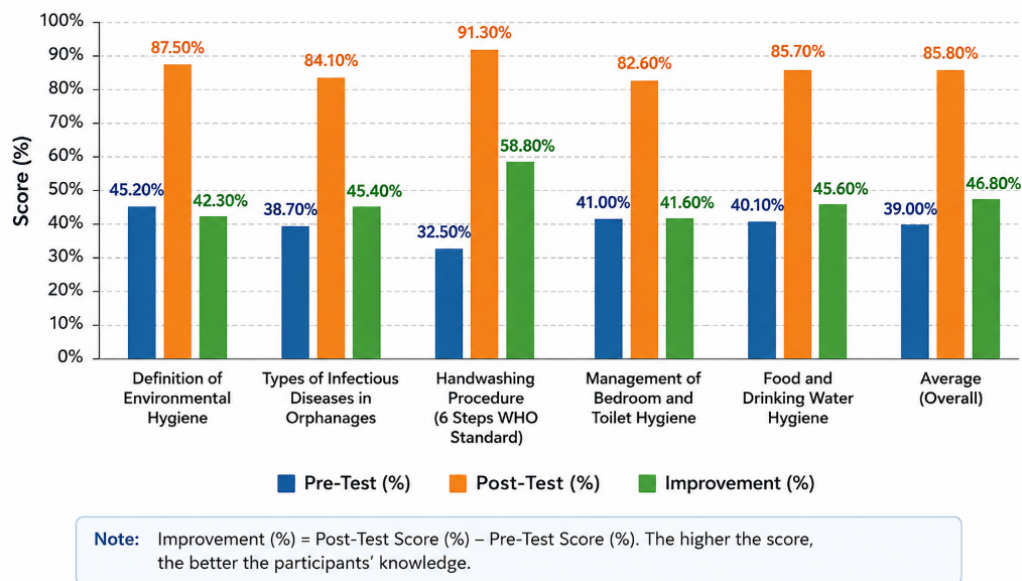


Figure 1. Health education session and interactive discussion with the children and caregivers of An-Nuriyyah Orphanage

The health education program was delivered in two sessions. The first session introduced the concept of environmental hygiene and discussed common infectious diseases frequently encountered in crowded living environments, including diarrhea, acute respiratory infections, skin diseases, and intestinal parasitic infections, together with their associated risk factors for transmission. The second session focused on infection prevention strategies, including proper hand hygiene, the maintenance of clean bedrooms and toilet facilities, and safe food and drinking water hygiene practices. A practical demonstration of the WHO-standard six-step handwashing technique using soap and running water from a portable handwashing station was then conducted (Penuli, 2022). The demonstration was highly interactive, with participants actively practicing each step under the guidance of the facilitators. The children, in particular, showed great enthusiasm and eagerly took turns practicing the handwashing technique (Listri et al., 2016).

The discussion and question-and-answer session was conducted in a dynamic and interactive manner, with participants raising practical questions related to their daily living environment. These included strategies for reducing unpleasant odors in shared bedrooms, maintaining the cleanliness of communal toilets, and providing appropriate initial responses when a roommate exhibited symptoms of an infectious disease, such as diarrhea or fever (Chairiyah, 2023). To reinforce the educational messages, posters and leaflets were displayed at strategic locations throughout the orphanage, including near handwashing stations, bathroom entrances, dining areas, and dormitory corridors, serving as permanent visual reminders to encourage the consistent adoption of healthy hygiene practices (Puriastuti et al., 2026).

Participants' knowledge was evaluated using a pretest administered before the health education session and a posttest conducted immediately after the completion of all program activities. Both assessments employed the same evaluation instrument to ensure consistency in measuring knowledge gain. Individual scores were converted into percentages and analyzed descriptively by comparing the pretest and posttest results to determine the magnitude and percentage of knowledge improvement. The findings are presented in Figure 2.

Figure 1. Results of Pre-Test and Post-Test Evaluation of Community Service Program (PKM) Participants**Figure 2. Pretest and posttest evaluation results of Community Service Program (PKM) participants**

As presented in Figure 2, the participants' mean knowledge score increased markedly from 39.0% in the pretest to 85.8% in the posttest, representing an average improvement of 46.8 percentage points. The greatest improvement was observed in participants' knowledge of the WHO-standard six-step handwashing technique, which increased by 58.8 percentage points, from 32.5% before the intervention to 91.3% after the intervention. All knowledge domains demonstrated improvements of more than 40 percentage points, and the overall mean posttest score of 85.8% exceeded the program's predetermined success criterion, which was defined as achieving at least a 70% improvement compared with the baseline condition. These findings answer the community service program (PKM) research question by demonstrating that demonstration-based environmental hygiene education combined with active participation was effective in improving the knowledge and awareness of both orphanage children and caregivers regarding the prevention of infectious diseases.

DISCUSSION

The effectiveness of education in improving general knowledge. The 46.8% increase in average scores in this activity is consistent with the findings Fani Sarah, (2025) which reported that health education on healthy lifestyle practices, accompanied by handwashing demonstrations in school settings, successfully increased participants' knowledge significantly, with a similar pattern of improvement. This similarity in patterns strengthens the evidence that the combination of lectures and demonstrations is consistently effective across target contexts, whether in school settings or orphanages. However, when compared to the outcomes Hartono et al., (2025) For children in orphanages, where the role of visual media in long-term compliance has been highlighted, this activity provides an additional contribution in the form of quantitative measurement through pretest-posttest assessments—an aspect not explicitly emphasized in the study—thereby making the effectiveness of the intervention in this activity more objectively measurable.

Across the knowledge domains, the greatest improvement was observed in the WHO-standard six-step handwashing technique (58.8%), whereas more conceptual topics, such as environmental hygiene and common infectious diseases, demonstrated relatively smaller gains. This finding is consistent with Kolb's Experiential Learning Theory, which suggests that active participation through direct practice enhances knowledge retention more effectively than passive learning. By engaging participants through visual, auditory, and kinesthetic experiences, the handwashing demonstration facilitated stronger learning outcomes than concept-based instruction alone. Furthermore, the low baseline score for handwashing knowledge (32.5%) indicates that although many participants routinely washed their hands, they were unfamiliar with the WHO-standard six-step technique required to ensure effective hand hygiene, which is consistent with previous studies Aloysia et al., (2026). This finding is consistent with previous studies reporting that handwashing practices in community settings are frequently performed incompletely and do not fully adhere to the recommended hand hygiene procedures.

From the perspective of the Health Belief Model, the substantial improvement in knowledge suggests that the educational intervention enhanced participants' perceived susceptibility to infectious diseases, reinforced the perceived benefits of preventive behaviors, and strengthened self-efficacy through hands-on practice. These three components are considered essential determinants of sustainable health behavior change. This finding is consistent with previous studies Puriastuti et al., (2026), This demonstrates that a combination of lectures, demonstrations, and interactive discussions yields a greater increase in knowledge than lectures alone, as participants are actively engaged in the learning process. Meanwhile, in contrast to the long-term participatory approach that is emphasized, this activity is still limited to a single intervention session; therefore, the sustainability of the awareness generated after the activity still needs to be ensured through follow-up monitoring.

The key strength of this program lies in its educational-participatory approach, which synergistically integrates interactive lectures, practical demonstrations, discussions, and structured evaluations, thereby engaging participants with different learning styles and providing optimal benefits across all age groups. The use of visual aids such as posters and leaflets as permanent reminders helps extend the impact of the intervention beyond the day of the event, while the involvement of caregivers as agents of change adds value in ensuring the independent sustainability of healthy lifestyle practices (Utami et al., 2026). On the other hand, there are a number of limitations that must be acknowledged: since the program is conducted over a single day, monitoring long-term behavioral changes must rely on caregivers' reports; the wide age range of participants poses its own challenges in delivering the material; and the program's sustainability depends heavily on the commitment of caregivers and the support of the care facility, which are external factors beyond the direct control of the PKM team.

The success of this initiative opens up opportunities for further development. The intervention model, which has proven effective, has the potential to be replicated at other orphanages in Bekasi Regency and the surrounding areas that may face similar hygiene issues, and can be developed into a sustainable program with periodic monitoring sessions every three to six months to track medium-term behavioral changes, as demonstrated Yuliana et al., (2022) that health education programs conducted on a regular basis yield far better sustainability than one-time interventions. The educational materials can also be expanded to cover other relevant health topics, such as the prevention of airborne infectious diseases, oral health, and household waste management. The results of these activities can serve as the basis for proposing a collaborative program with the Bekasi Regency Health Office or the Tambun Selatan Community Health Center to integrate the orphanage into a more systematic and long-term community health development program.

CONCLUSION

The community service activity at the An-Nuriyyah Orphanage successfully achieved its stated objective: to increase the knowledge and awareness of the children and caregivers regarding environmental hygiene as a strategy for preventing infectious diseases. Evaluation results showed an increase in the average knowledge score from 39.0% to 85.8%, a difference of 46.8%, exceeding the minimum target of 70%. The highest increase occurred in the aspect of the WHO's six-step handwashing method, at 58.8%, proving that hands-on demonstrations are most effective for procedural material. All measured aspects of knowledge increased by more than 40%. The participatory-educational approach—which combined interactive lectures, demonstrations, discussions, and visual media—proved effective in reaching participants of all ages. It is recommended that this program be implemented periodically, expanded to other orphanages, and further developed through collaboration with the Department of Health to create a healthy orphanage environment that is sustainably protected from infectious diseases.

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