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Original Research

COMMUNITY-BASED SOLID WASTE MANAGEMENT OF TZU CHI BUDDHISM TOWARDS ENVIRONMENTAL HEALTH IN MALAYSIA

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ABSTRACT

Comunity-Based Solid Waste Management of Tzu Chi Buddhism Towards Environmental Health in Malaysia. *The solid waste problem in Malaysia continues to increase along with population growth, urbanization, and changes in urban consumption patterns, thus creating risks of environmental pollution and negative impacts on public health. This study aims to analyze the role of community-based solid waste management implemented by the Tzu Chi Association and its contribution to improving environmental health in Malaysia. This study used a qualitative approach with a case study design through in-depth interviews with Tzu Chi Association volunteers and coordinators and direct observation at waste collection and recycling centers. The results show that routine and participatory recycling activities contribute significantly to reducing the volume of solid waste ending up in landfills, improving waste sorting practices at the household level, and raising public awareness and changing behavior towards environmental cleanliness. These impacts have direct implications for reducing the potential for water and soil pollution related to environmental health. However, this study also identified major obstacles such as dependence on volunteers, unequal community participation, and limited supporting facilities. The study concludes that community-based solid waste management by the Tzu Chi Association is an effective strategy to complement government policies in supporting environmental health protection, although the sustainability of the program requires strengthened cross-sectoral collaboration between the government, NGOs, and the community.*

INTRODUCTION

Solid waste has become an increasingly complex environmental issue in both developing and developed countries, including Malaysia. Population growth, rapid urbanization, and changes in consumption patterns within urban communities have led to a substantial increase in the volume of solid waste generated. Ineffective solid waste management has the potential to contaminate water, soil, and air, thereby directly affecting environmental health and overall quality of life [(2)]. Poorly managed waste may also serve as a source of infectious diseases, provide breeding grounds for disease vectors, and contribute to the degradation of urban ecosystems [(1)]. Therefore, solid waste management constitutes a critical component of environmental health protection efforts.

In Malaysia, although the government has introduced various policies and regulations related to solid waste management, significant challenges persist at the local implementation level. Limited infrastructure, low levels of public awareness, and a high dependence on landfill disposal indicate that the existing solid waste management system has not yet functioned optimally [7]. This condition suggests that a government-centered approach alone is insufficient to address solid waste issues in a sustainable manner. Consequently, the active participation of communities and non-governmental organizations (NGOs) as strategic partners in environmental management is essential.

Based on these conditions, this study raises the following research question: What is the role of community-based solid waste management implemented by the Tzu Chi Association in supporting environmental health in Malaysia? In addition, this study seeks to examine the extent to which community-based approaches can contribute to reducing the environmental impacts and health risks associated with solid waste. Addressing this research question is crucial for understanding the effectiveness of NGOs in complementing government policies within the field of environmental management.

Several previous studies have examined solid waste management and its relationship to environmental health. Zurbrügg [5] emphasized that community-based solid waste management can enhance the efficiency of waste management systems while simultaneously promoting positive changes in community behavior. Other studies have demonstrated that community participation in recycling activities contributes to waste reduction and increases environmental awareness [6]. Moreover, the involvement of NGOs in environmental management has been recognized as effective in bridging the interests of governments and communities, particularly in densely populated urban areas [7].

However, a review of the existing literature reveals a notable research gap. Most previous studies have concentrated on technical aspects of solid waste management, such as collection systems, processing technologies, and operational efficiency, or on macro-level analyses of governmental policies. Studies that explicitly integrate the role of community-based NGOs with their impacts on environmental health remain limited, particularly in the context of developing countries such as Malaysia. Furthermore, few studies have explored how community participation mechanisms facilitated by NGOs can sustainably influence environmental behavior and health risks. Therefore, this study offers scientific novelty by focusing on the role of the Tzu Chi Association as a community-based actor in solid waste management and environmental health protection. The primary contribution of this study lies in providing empirical evidence on how collaboration between communities and NGOs can complement government policies and strengthen solid waste management systems oriented toward environmental health protection and sustainability.

MATERIALS AND RESEARCH METHODS

This study employed a qualitative research design using a case study approach. The qualitative method was selected to obtain an in-depth understanding of community-based solid waste management practices implemented by the Tzu Chi Association and their implications for environmental health. The case study approach enables researchers to examine social phenomena contextually and holistically within their natural settings, particularly in analyzing the dynamics of community participation and the role of non-governmental organizations (NGOs) in environmental management [9].

The research was conducted at several community-based waste collection and recycling centers managed by the Tzu Chi Association in urban areas of Malaysia. These locations were selected based on their consistent implementation of solid waste management programs and active community participation. Data collection was carried out over a two-month period, from November to December 2025, to ensure that the data reflected routine and ongoing activities within the solid waste management program.

The research process began with a planning phase, which involved defining the research focus, formulating research objectives, and reviewing relevant literature related to solid waste management, community participation, and environmental health. This was followed by the field data collection phase, conducted systematically to obtain empirical information regarding the implementation of community-based solid waste management by the Tzu Chi Association. Observations focused on waste sorting and recycling activities, patterns of volunteer involvement, and the impacts of these activities on environmental cleanliness and potential health risks in the surrounding areas.

Sampling was conducted using a purposive sampling technique, based on the informants' direct involvement and experience in the solid waste management program. A total of 15 informants participated in this study, comprising 8 active volunteers from the Tzu Chi Association, 3 coordinators of recycling activities, and 4 community members who were directly involved in or affected by the program. The informants varied in age, gender, and duration of involvement, allowing for diverse and comprehensive perspectives. This sampling technique was selected because it enabled the collection of relevant and in-depth data aligned with the research objectives [(10)].

Data were collected through in-depth interviews, direct observation, and documentation review. In-depth interviews were conducted to explore informants' perspectives, experiences, and perceptions regarding the effectiveness and challenges of community-based solid waste management. Observations involved the direct examination of solid waste collection, sorting, and management processes at community recycling centers. Documentation review included the analysis of activity reports, organizational archives, and other supporting documents. The use of multiple data collection techniques aimed to enhance data validity through source and method triangulation [(11)].

The collected data were analyzed using descriptive qualitative analysis, which involved data reduction, data presentation, and conclusion drawing. The analysis was conducted iteratively to ensure that the findings accurately represented field conditions. The analysis focused on the relationship between community-based solid waste management and improvements in environmental health, including reductions in potential pollution and changes in community behavior related to waste management practices [(11)].

RESEARCH RESULTS AND DISCUSSION

Overview of Community-Based Solid Waste Management by Tzu Chi

The community-based solid waste management program implemented by the Tzu Chi Association in Malaysia represents a form of active community participation in efforts to maintain environmental health. This model emphasizes the involvement of volunteers and local communities in the collection, sorting, and distribution of solid waste for recycling purposes. Importantly, this approach demonstrates that behavioral change within households—historically the largest contributors to municipal solid waste—can be achieved through social mechanisms rather than relying solely on formal regulatory frameworks [(5)]. However, the reliance on voluntary participation also suggests potential limitations in long-term sustainability if the program is not supported by a stronger institutional framework.

Tzu Chi's activities are not limited to the technical dimensions of waste management but also incorporate educational and social components. Through routine activities at recycling centers, community members gain a better understanding of the impacts of solid waste on environmental quality and human health. This approach aligns with the concept of community empowerment, which emphasizes internal behavioral change driven by community awareness and collective action [(8)]. Nevertheless, the effectiveness of this educational approach is highly dependent on program continuity and volunteer capacity, indicating the need for further evaluation to assess the replicability of this model in the absence of systematic policy support.

Impact of Solid Waste Management on the Environment
Reduction of Solid Waste Sent to Landfills
One of the primary outcomes of Tzu Chi's solid waste management activities is a reduction in the volume of waste disposed of in landfills. Through community-level waste sorting, recyclable materials such as plastics, paper, metals, and glass are diverted from final disposal streams. This practice is consistent with World Bank findings, which indicate that source separation can reduce waste accumulation by approximately 30–40% [(12)]. However, it is important to note that this contribution remains localized and may not significantly influence overall city-level waste reduction without integration into formal government waste management systems.

The reduction in landfill waste has positive implications for environmental quality, particularly by decreasing the potential for soil and groundwater contamination caused by landfill leachate [(12)]. Nevertheless, the findings of this study indicate that without policy mechanisms regulating post-sorting recycling flows, the resulting environmental benefits may remain suboptimal and short-term.

Improved Residential Cleanliness
Field observations indicate that communities actively involved in Tzu Chi's programs tend to exhibit cleaner and more organized residential environments. Household waste is less likely to accumulate in open spaces or drainage systems, thereby reducing the risk of clogged drains and localized flooding. These findings support the observations of Marshall and Farahbakhsh, who highlighted the contribution of community-based waste management to improved residential environmental quality [(7)].

However, improvements in cleanliness were not uniformly observed across all communities, indicating disparities in participation levels. This finding confirms that environmental improvements achieved through community-based programs are highly dependent on the degree of community engagement and cannot fully substitute for the role of formal public waste management services.

Impact on Community Environmental Health
Reduction in the Risk of Environmentally Related Diseases
Poorly managed solid waste can serve as a breeding ground for disease vectors, increasing the risk of environmentally related diseases. With more organized waste management practices, the risk of diseases such as diarrhea and dengue fever may be reduced [(13)]. In this context, Tzu Chi's activities function as an important preventive environmental health intervention. However, this study did not quantitatively assess changes in disease incidence; therefore, the causal relationship between improved waste management and health outcomes remains indicative rather than conclusive. This limitation highlights the need for future studies that integrate environmental management data with public health indicators.

Air Quality and the Physical Environment
Educational programs conducted by Tzu Chi have contributed to a gradual decline in the practice of open waste burning within participating communities. The reduction in open burning has positively affected local air quality and reduced exposure to hazardous pollutants [(12)]. This outcome demonstrates that behavior-based interventions can generate tangible environmental benefits.

Nonetheless, these behavioral changes remain vulnerable to reversal if they are not reinforced by regulatory enforcement and the availability of accessible and reliable waste management alternatives.

The Role of Environmental Education and Awareness

Education as a Tool for Behavioral Change

Environmental education initiatives implemented by Tzu Chi through a learning-by-doing approach have proven effective in fostering new waste management habits [14]. However, the success of this approach is highly dependent on the intensity of volunteer engagement and long-term commitment, both of which may decline over time in the absence of structural and institutional support.

Strengthening Social Values and Community Solidarity

Volunteer-based activities also contribute to the strengthening of social values and community solidarity, which constitute important forms of social capital [15]. However, this social capital is not inherently stable and may weaken in response to economic pressures or changes in community leadership, underscoring the need for institutional strategies to sustain collective engagement.

Barriers to Community-Based Solid Waste Management

Limited Community Participation

Uneven levels of community participation highlight the inherent limitations of community-based approaches. The prevailing perception that solid waste management is primarily the responsibility of the government remains a significant barrier [4]. This finding indicates the need for incentive-based policies and the formal integration of community programs into official waste management systems.

Limited Facilities and Structural Support

Constraints related to facilities and infrastructure further demonstrate that community-based programs cannot operate effectively in isolation. Without adequate support from local governments and enabling policy frameworks, program effectiveness may stagnate. This finding emphasizes the importance of synergy among communities, NGOs, and governmental institutions to ensure the long-term sustainability of solid waste management efforts [2].

Comprehensive Discussion: Positioning of the Study within Previous Research

This study reinforces previous findings indicating that community-based solid waste management is an effective approach for improving environmental quality and public health [4–5]. However, the distinct contribution of this study lies in its integrative focus on both the technical aspects of waste management and the environmental health dimension. While many previous studies have emphasized operational efficiency or the economic value of recycling, this study positions environmental health as the primary outcome, thereby offering a more holistic perspective on the benefits of community-based solid waste management.

Policy and Practical Implications

The findings of this study have significant implications for solid waste management policy in Malaysia. The model implemented by the Tzu Chi Association may serve as a reference for the development of community-based programs in other regions. The integration of environmental education, active community participation, and supportive policy frameworks is essential for achieving sustainable environmental health outcomes [12].

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that community-based solid waste management implemented by the Tzu Chi Association has made a meaningful contribution to improving environmental health in Malaysia. This approach has proven effective in reducing the volume of waste disposed of in landfills, improving household-level waste sorting practices, and fostering community awareness and behavioral change related to solid waste management. Through volunteer-driven recycling programs, the Tzu Chi Association has demonstrated that active community participation can serve as a critical instrument in mitigating environmental pollution and reducing the potential risk of environmentally related diseases. Accordingly, community-based solid waste management functions not only as an environmental management strategy but also as a preventive approach that supports sustainable public health protection.

Based on these findings, it is recommended that local governments strengthen collaboration with non-governmental organizations and local communities by providing supportive policies, adequate infrastructure, and incentive mechanisms that encourage sustained community participation in solid waste management. In addition, the practice-based environmental education model implemented by the Tzu Chi Association should be replicated and formally integrated into national solid waste management strategies to enhance long-term environmental health outcomes. From an academic perspective, further research is recommended to employ quantitative approaches to more precisely measure the impacts of community-based solid waste management on environmental quality and public health indicators. Comparative studies across different regions or countries are also needed to identify best practices that can be adapted and scaled within the broader context of sustainable environmental management.

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