

## Case Study of Community Participation in Chemical Waste Management in Urban Areas

Sri Yunita<sup>1</sup>, Putri Khairi Izwani<sup>2</sup>, Cinta Febby Dewita<sup>3</sup>, Amelia Syafitri<sup>4</sup>, Indri Wahyuni<sup>5</sup>, Zakia Diani Rangkuti<sup>6</sup>

<sup>1-6</sup>Faculty of Mathematics and Natural Sciences, Bachelor's Program in Chemistry Education, Universitas Negeri Medan, Indonesia

**Abstract.** This study examines community participation in chemical waste management in urban areas, aiming to understand the extent of community involvement in protecting the environment from the harmful impacts of hazardous waste. The introduction outlines the importance of managing chemical waste in densely populated urban areas and the risks arising from a lack of public awareness and knowledge. This research employs a qualitative approach, utilizing in-depth interviews, questionnaires, and direct observations. Interviews were conducted to explore community perspectives and motivations, questionnaires were used to assess their level of participation and understanding, and observations were carried out to examine real actions in waste management practices. The results indicate that community participation remains low, influenced by limited outreach, awareness, and support facilities. This study highlights the need for improved education, facility provision, and partnership programs between the government, community, and private sector for more effective and sustainable chemical waste management.

**Keywords:** Community Participation, Chemical Waste Management, Urban Areas, Qualitative Approach.

### 1. BACKGROUND

The focus of this research is the low participation of the community in urban Medan in the management of chemical waste. As one of the major cities in Indonesia, Medan is experiencing rapid population growth and urbanization, which directly impacts the increase in the amount of waste generated. Chemical waste, originating from industrial activities, households, and the commercial sector, poses a potential threat to the environment and public health. However, public awareness of the importance of managing this waste is still very minimal, especially in densely populated urban areas. In many parts of Medan, the community often does not recognize the long-term impacts of chemical waste on health and the environment. Improper waste disposal, whether in public spaces or waterways, is frequently considered normal, without regard for the negative consequences that may arise.

Additionally, the lack of facilities for waste management, such as adequate final disposal sites (TPA) and recycling centers, contributes to this issue. The community feels they have no alternative but to dispose of waste improperly, leading to soil and water pollution and affecting air quality. Another challenge is the lack of socialization and education programs from the government regarding proper waste management. Many residents do not receive sufficient information on how to manage chemical waste, including hazardous waste. Furthermore, limited infrastructure support and unclear waste management regulations make

the community feel powerless to participate in maintaining environmental cleanliness. This research aims to identify various factors that hinder community participation in chemical waste management and to explore the views and motivations of residents regarding this issue. By using a qualitative approach through in-depth interviews, surveys, and observations, this study hopes to delve deeper into the community's awareness levels, their perceptions of the impacts of waste, and their hopes and needs for better waste management. The findings of this research are expected to provide recommendations to policymakers for designing better education programs and facilities, as well as building stronger partnerships between the government, the community, and the private sector to achieve sustainable waste management in urban Medan. By increasing community participation, it is hoped that the urban environment can become cleaner and healthier.

## **2. THEORETICAL STUDY**

Chemical waste management is a serious issue related to public health and environmental sustainability. Improperly managed chemical waste can lead to various negative impacts, such as soil, water, and air pollution, posing potential dangers to human health (Maguire et al., 2020). Therefore, understanding community participation in waste management is crucial. The theory of community participation explains that citizen involvement in environmental management can vary, from the lowest level of merely providing information to higher levels of active collaboration. The higher the level of participation, the more effective the waste management that can be achieved (Mansor & Rahman, 2021). Environmental education plays a key role in enhancing community participation.

Communities with knowledge of the negative impacts of chemical waste are more aware and likely to engage in waste management. Research by Akinpelu et al. (2022) shows that good information can encourage individuals to take positive actions, such as sorting waste and participating in recycling programs. Therefore, conducting effective outreach campaigns is essential to inform the public on how to manage waste correctly. On the other hand, partnerships among the government, community, and private sector are also crucial. This collaboration can enhance the effectiveness of waste management programs. The theory of collaboration suggests that interaction among various stakeholders can lead to better solutions (Ansell & Gash, 2021). The government must provide adequate facilities and clear educational programs, while the community is expected to actively participate in waste management. When all parties work together, the outcomes will be better and have a more significant impact on the environment. Good infrastructure is a determining factor in waste management. Without

adequate facilities, such as proper final disposal sites and efficient waste collection systems, community efforts to manage waste will be hindered. If the community has easy access to waste disposal facilities, they will be more inclined to dispose of waste properly, thereby reducing pollution risks (Hassan et al., 2021).

From a social psychology perspective, the theory of planned behavior suggests that individuals' intentions to engage in certain behaviors are influenced by attitudes, subjective norms, and perceived behavioral control. If the community has a positive view of waste management and believes that their actions can lead to change, they will be more motivated to actively participate in waste management (Ajzen, 2020). Therefore, managing chemical waste in urban Medan requires a comprehensive approach that involves active community participation. This effort depends not only on the government but also requires proper education, adequate infrastructure, and solid partnerships among all stakeholders. The combination of these various factors is expected to create a cleaner and healthier environment for the community and contribute to environmental sustainability in the future. This research aims to provide deeper insights into how to enhance community participation in chemical waste management, thereby positively impacting environmental quality in Medan.

### **3. RESEARCH METHOD**

This study adopts a qualitative approach to explore community participation in chemical waste management in urban Medan. Three data collection techniques are employed: in-depth interviews, surveys, and direct observations. Interviews are conducted with residents of Medan, including community leaders and individuals actively involved in waste management programs, to gather their views and motivations regarding waste issues. Surveys are distributed to the community in various locations to measure their levels of awareness, knowledge, and participation in waste management. Additionally, direct observations are carried out in strategic areas of Medan to observe ongoing waste management practices. The data obtained from these three techniques are analyzed qualitatively to identify key themes and factors influencing the involvement of Medan's community in chemical waste management.

## 4. RESULTS AND DISCUSSION

### Results

Aspect	Questionnaire results	Interview results
<b>Number of respondents</b>	100 people	10 people (community leaders and active citizens)
<b>Level of awareness</b>	65% of respondents are aware of the impact of chemical waste	Many people do not know the dangers of waste, so it is necessary to provide education.
<b>Participation in the Program</b>	30% have participated in a waste management program	I helped clean up, but many people didn't care.
<b>Resources</b>	40% from social media, 30% from friends, 20% from school	Social media plays a very important role in spreading information
<b>Available Facilities</b>	50% of respondents felt that the disposal facilities were inadequate	Facilities are very lacking, there must be a proper place to dispose of waste
<b>Hope for the Future</b>	70% of respondents hope there will be further educational programs	Education about waste must be improved

### Description:

- **Level of Awareness:** Describes how much the community of Medan understands the impacts of chemical waste.
- **Participation in Programs:** Indicates the percentage of the community involved in waste management programs.
- **Sources of Information:** Records where the community obtains information about waste management.
- **Available Facilities:** Assesses whether respondents feel that facilities for waste management are adequate.
- **Future Expectations:** Shows the community's hopes for future educational programs regarding waste.

### Discussion

The results of the surveys and interviews in this study provide a clear picture of the level of community participation in chemical waste management in Medan. Out of 100 respondents, only 65% are aware of the dangers of chemical waste, indicating a significant knowledge gap among residents. This low level of awareness signals the need for more

intensive education on the negative impacts of waste on health and the environment. Interviews with community leaders confirm this, as they acknowledge that many individuals do not understand the risks posed by waste, which hinders participation in waste management. The community's participation in waste management programs, at only 30%, suggests that while there is goodwill among some residents, several factors affect the low level of engagement. From the interviews, it was revealed that a lack of motivation and support from the surrounding environment is one of the main obstacles. Some respondents also expressed that, although they wish to be involved, uncertainty about the effectiveness of existing management programs makes them hesitant to participate actively. The most commonly used sources of information among the community are social media (40%) and friends (30%), highlighting the importance of digital platforms in disseminating information related to environmental issues. However, only 20% of respondents rely on information from schools, indicating that formal education may not be adequately reaching or influencing community knowledge. This indicates the need for collaboration between educational institutions and the community to raise awareness of the importance of waste management through programs involving students and parents. Additionally, survey results reveal that 50% of respondents feel that existing waste disposal facilities are inadequate. In interviews, community leaders noted that the lack of good waste disposal infrastructure, such as landfills and recycling facilities, significantly affects community behavior in managing waste. The unavailability of adequate facilities not only hinders the community's ability to dispose of waste properly but also creates the perception that waste management is not a priority within their community.

Nonetheless, 70% of respondents hope for further educational programs on waste management, indicating that the community actually desires to engage and learn more about this issue. This aligns with the views of community leaders who state that education and public awareness are crucial to enhancing participation. To realize this hope, well-designed educational programs are needed, which not only provide information but also encourage active community involvement in waste management. Based on these research findings, it is emphasized that improving community participation in chemical waste management in Medan requires a comprehensive approach that includes enhancing education, providing adequate facilities, and utilizing social media as a communication tool. Only by actively involving all parties and providing the necessary support can effective and sustainable waste management be achieved for the health and sustainability of the environment in urban areas.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

This study shows that community participation in chemical waste management in Medan is still low, with only 30% of residents actively involved in such programs. The awareness level, which only reaches 65%, indicates the need for enhanced education regarding the impacts of waste on health and the environment. The dominant sources of information come from social media, but the involvement of educational institutions in disseminating information about waste management remains minimal. Furthermore, the lack of adequate disposal facilities is one of the main barriers to community participation. Nevertheless, 70% of respondents express hope for better educational programs, demonstrating the community's desire to become more engaged. Therefore, to improve community participation in chemical waste management, collaborative efforts are needed among the government, educational institutions, and the community, including the provision of adequate infrastructure and effective educational programs. With these steps, it is expected that community awareness and involvement can increase, enabling more sustainable and effective waste management practices.

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