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# PUBLIC PERCEPTION OF AIR POLLUTION IN LANDFILL-ADJACENT COMMUNITIES: THE ROLE OF SOCIO-DEMOGRAPHIC FACTORS IN URBAN INDONESIA

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**ABSTRACT**
This study aimed to determine the relationship between socio-demographic characteristics such as age, gender, education level, employment status, time spent at home, length of residence, and proximity to landfill with public perception of air pollution among communities living near landfill sites in urban Indonesia. ***Study Design:*** Quantitative, descriptive cross-sectional study. ***Place and Duration of Study:*** Conducted in a landfill-adjacent urban area in Tanjungpinang, Kepulauan Riau, Indonesia, from May 6 to May 8, 2024. ***Methodology:*** A total of 50 respondents aged 18 years and above were selected using purposive sampling. Data were collected through structured questionnaires assessing demographic characteristics and perceptions of air quality. Statistical analysis was conducted using descriptive statistics and chi-square tests with a significance level of $p < 0.05$. ***Results****:* The study found statistically significant associations between education level and perception of air pollution ($p = 0.020$), as well as between employment status and perception ($p = 0.020$). Other factors—age, gender, time spent at home, length of residence, and distance from the landfill—were not significantly associated with air pollution perception. ***Conclusion:*** Education and employment status play a key role in shaping how communities perceive air pollution near landfill sites. These findings suggest that environmental health interventions should prioritize public education and awareness programs, especially targeting individuals with lower education levels and those not engaged in formal employment



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## 1. INTRODUCTION

Municipal solid waste management remains a persistent challenge in many developing countries, particularly in urban and peri-urban regions where landfills are often located near residential areas[1]. These landfill sites contribute not only to environmental degradation but also to deteriorating air quality due to the release of volatile organic compounds (VOCs), hydrogen sulfide ($H_2S$), methane, and other airborne pollutants[2]. Exposure to these pollutants has been associated with a wide range of adverse health outcomes, particularly respiratory problems such as chronic cough, asthma, bronchitis, and general respiratory discomfort[3,4]. The residents living in close proximity to landfills often experience a higher burden of these health effects, exacerbated by long-term exposure and limited access to health services[5].

While extensive literature has addressed the environmental and health risks of landfill operations, relatively few studies have explored how community perception of air pollution near landfills correlates with socio-demographic

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factors. Public perception plays a crucial role in determining risk awareness and willingness to engage in environmental health actions [6]. In the Indonesian context, empirical studies on this topic remain scarce, despite the country's growing waste generation problem and the increasing encroachment of residential zones upon waste disposal areas [7].

Previous research in Indonesia has primarily focused on measuring pollutant concentrations or evaluating waste policy effectiveness. For instance, environmental studies in Yogyakarta and West Java reported elevated levels of $PM_{2.5}$ and $H_2S$ in landfill-adjacent communities[8]. However, few have attempted to link this with local residents' subjective perceptions or explore how demographic variables such as education and occupation influence these perceptions. International studies, such as those conducted in India [9], have suggested that higher education levels are often associated with greater environmental awareness and concern, but comparable data from Indonesia are lacking.

This study addresses this critical knowledge gap by examining the demographic determinants of public perception of air pollution in communities living near landfill sites. Through a quantitative approach involving chi-square analysis, we assess which socio-demographic factors—age, gender, education level, occupation, daily activity exposure, and proximity to landfill—are significantly associated with perceptions of air quality. Interestingly, our findings reveal that education level and employment status are significantly related to how residents perceive air pollution, while factors such as age, gender, and distance from the landfill are not.

The novelty of this study lies in its integration of demographic profiling with perception-based environmental risk analysis in a landfill context. Unlike previous works that focus solely on pollutant measurement or health incidence, this research explores the social dimension of environmental exposure, providing essential insights for designing targeted health education, risk communication, and community-based environmental interventions. These findings can inform both local government strategies and national waste management policies, especially in enhancing community resilience to environmental hazards.

## 2. METHODOLOGY

This study employed a quantitative descriptive cross-sectional design to examine the relationship between demographic factors and public perceptions of air pollution among residents living near a municipal landfill in urban Indonesia. A total of 50 respondents aged 18 years and above were selected using purposive sampling, with eligibility criteria including a minimum one-year residence near the landfill and willingness to participate.

Data were collected using a structured questionnaire containing close-ended demographic items and Likert-scale questions assessing perceived air quality and related health discomfort. The instrument was reviewed by environmental health experts to ensure content validity. Data collection was conducted through face-to-face interviews by trained enumerators under ethical research protocols.

The independent variables included age, gender, education level, employment status, time spent at home, length of residence, and distance from the landfill. The dependent variable was perception of air pollution, based on self-reported assessments of odor, air quality, and health impact. Data were analyzed using SPSS.

Descriptive statistics were used to describe respondent characteristics, while chi-square ($\chi^2$) tests were performed to assess associations between demographic variables and pollution perception. A significance threshold of $p < 0.05$ was used. This method aligns with previous environmental health research analyzing categorical associations in community perception studies [3,9].

## 3. RESULT AND DISCUSSION

A total of 50 respondents participated in this study. The demographic analysis showed that 50% of the respondents were aged 41 years or younger, and 70% were women. Regarding education, 40% of the participants had completed senior high school or lower. Nearly half (48%) of the respondents were full-time housewives, and 56% reported spending more than 12 hours per day at home. In terms of residence, 88% of the respondents had lived near the landfill for over one year, and 86% lived at a distance greater than 500 meters from the landfill (Table-I).

**Table 1. Characteristics of Research Respondents**

| Indicators | F (n=50) | % (100) |
|---|---|---|
| Age | | |
| < 41 years | 22 | 44 |
| ≥ 41 years | 28 | 56 |
| Gender | | |
| Woman | 35 | 70 |
| Man | 15 | 30 |
| Education | | |
| No school | 4 | 8 |
| Elementary school | 12 | 24 |

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| Indicators | F (n=50) | % (100) |
|---|---|---|
| Junior high school | 8 | 16 |
| Senior high school | 20 | 40 |
| University | 6 | 12 |
| Work | | |
| Housewife | 24 | 48 |
| Private sector | 7 | 14 |
| Civil servant | 2 | 4 |
| Entrepreneur | 1 | 2 |
| Others | 16 | 32 |
| Activity time around the house in a day | | |
| ≤ 12 hours | 22 | 44 |
| > 12 hours | 28 | 56 |
| Live in the house (years) | | |
| ≤ 1 year | 6 | 12 |
| > 1 years | 44 | 88 |
| Residental Distace from The Landfill | | |
| ≥ 500 meters | 43 | 86 |
| < 500 meters | 7 | 14 |
| Total | 50 | 100 |

The chi-square test results indicated no statistically significant association between several demographic factors—namely age (p = 0.643), gender (p = 0.305), time spent at home per day (p = 0.368), length of stay (p = 1.000), and distance from the landfill (p = 0.138)—and the respondents' perceptions of air pollution. However, a statistically significant relationship was found between education level and perception of air pollution (p = 0.020), as well as between employment status and perception (p = 0.020). These findings suggest that individuals with higher education and those who were employed were more likely to perceive air pollution as a concern compared to their counterparts (Table II).

**Table 2. Research Hypothesis Testing Results**

| Category | Perception | | P Values |
|---|---|---|---|
| | Positive | Negative | |
| Age | | | |
| < 41 years | 19 | 3 | 0,643 |
| ≥ 41 years | 26 | 2 | |
| Gender | | | |
| Woman | 30 | 5 | 0,305 |
| Man | 15 | 0 | |
| Education level | | | |
| Low education | 26 | 0 | 0,02 |
| High education | 19 | 5 | |
| Employment status | | | |
| Employed | 26 | 0 | 0,02 |
| Not employed | 19 | 5 | |
| Activity time around the house in a day | | | |
| ≤ 12 hours | 21 | 1 | 0,368 |
| > 12 hours | 24 | 4 | |
| Years living at home | | | |
| ≤ 1 year | 6 | 0 | 1,000 |
| > 1 years | 39 | 5 | |

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| | | | |
|---|---|---|---|
| Distance from house to landfill | | | |
| ≥ 500 meter | 40 | 3 | 0,138 |
| < 500 meter | 5 | 2 | |

**DISCUSSION**

The results of this study provide important insights into how demographic factors influence public perception of air pollution among residents living near landfill sites. Although we observed no significant relationship between factors such as age, gender, time spent around the house, length of stay, and distance from the landfill with people's perceptions of air pollution, the study revealed that education level and employment status had a statistically significant association with how individuals perceive air pollution in their environment. These findings align with some previous studies but also offer new perspectives for public health strategies and policy-making.

The most notable finding of this study is the statistically significant association between education level and employment status with public perception of air pollution. This finding is consistent with the results of previous studies, such as those conducted in India, Mitra et al., (2022), which showed that individuals with higher levels of education are more likely to be aware of and concerned about environmental issues, including air pollution[10]. It is likely that individuals with higher education levels possess a greater understanding of the health risks associated with air pollution, which in turn affects their perception of air quality in their surroundings.

Similarly, the association between employment status and perception could be explained by differences in how individuals experience and interact with their environments. Employed individuals might have more exposure to external information, such as media coverage or workplace health and safety protocols, which can influence their awareness of air pollution and its potential impacts. This contrasts with the experience of housewives, who may spend more time within the household and have less direct access to environmental health education and resources[11].

Interestingly, no significant relationship was found between age, gender, length of stay, and distance from the landfill with perceptions of air pollution[12]. This finding diverges from some earlier studies that suggested these factors could play a role in shaping environmental attitudes. For example, older individuals might have more direct experience with air pollution and its long-term health effects, or women might be more concerned about environmental issues due to their role in family health management[13]. The absence of these associations in this study could be attributed to the unique socio-cultural context of the study area or a lack of direct, observable impact for these variables in the short-term exposure scenario. Further research with longitudinal data might reveal more significant relationships over a longer period or with varying intensity of exposure.

The lack of association with distance from the landfill is particularly surprising, given that proximity to pollution sources is often considered a key factor influencing environmental awareness and perception[14]. One possible explanation could be that the residents have become habituated to the pollution over time, reducing their sensitivity to air quality issues. In urban environments, it is common for residents to adapt to persistent environmental problems, leading to normalization of adverse conditions[15].

The findings of this study underscore the importance of education and employment status in shaping how individuals perceive air pollution and its associated health risks[16]. For policymakers, this suggests that interventions to improve public health should target education and employment sectors to foster greater awareness of the dangers of air pollution. Community outreach programs that focus on environmental health education could be tailored to address specific groups, particularly those with lower education levels or non-working individuals, in order to enhance their awareness and actions regarding air pollution[17].

Furthermore, the significant impact of education on perception highlights the need for policies that incorporate environmental education into school curricula and community initiatives[18]. Empowering residents with knowledge about air quality and its health impacts can lead to more proactive behaviors, such as advocating for cleaner air and supporting waste management initiatives[19].

While this study contributes valuable insights into the demographic factors influencing air pollution perception, there are limitations to consider[19]. First, the cross-sectional design limits the ability to infer causal relationships between demographic variables and perceptions. Longitudinal studies that track changes in perception over time, particularly as exposure to landfill pollution varies, would provide a deeper understanding of how public perception evolves.

Second, the study focused on a relatively small geographic area, which may limit the generalizability of the findings to other regions. Different cultural, economic, and environmental contexts could lead to different patterns in perception. Future research should aim to include a more diverse set of locations to test the robustness of the findings across various communities.

Finally, the reliance on self-reported data, both quantitative and qualitative, may introduce biases. Residents might underreport or overreport their perceptions due to social desirability or a lack of awareness about certain environmental risks. Incorporating objective measures of air quality alongside perception data in future studies could provide a more comprehensive picture of the relationship between environmental exposure and public awareness[20].

## 4. CONCLUSION

This study sheds light on how demographic characteristics, particularly education level and employment status, influence public perceptions of air pollution in landfill-adjacent communities. The findings emphasize the need for targeted public health interventions that raise awareness and promote environmental education, especially among those with lower educational backgrounds or non-working individuals. By enhancing the community's understanding of air pollution and its health risks, policymakers can better address environmental health challenges and improve quality of life for residents living near landfills.

**Conflict Of Interest**

The authors declare no conflict of interest

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