The Impact of Slum Rejuvenation on the Quality of Public Health in Tigalingga Village, Dairi Regency

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Abstract

This study aims to analyze the impact of slum rejuvenation on public health in Tigalingga Village, Dairi Regency. The research method used was qualitative with a descriptive approach through interviews, observation, and documentation. The results showed that before the rejuvenation, the community lived in unhygienic environmental conditions, characterized by limited access to clean water, minimal sanitation facilities, and poor waste management. After the rejuvenation program, there was a significant improvement in environmental health and clean and healthy living behaviors (PHBS), as reflected in the increased ownership of healthy latrines, improved drainage systems, and more organized waste management. These changes resulted in a decrease in the number of environmentally related diseases such as diarrhea and acute respiratory infections (ARI). The main supporting factors for the program's success were government support and active community participation, while inhibiting factors included economic constraints and lack of facility maintenance. Thus, the slum rejuvenation program has been proven to have a positive impact on improving public health, but requires ongoing support to maintain its sustainability.

Keywords: Slum Rejuvenation, Public Health Quality, PHBS, Environmental Sanitation, Tigalingga Village

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Introduction

Slums are a serious problem facing many regions in Indonesia, including Tigalingga Village in Dairi Regency. Dense, unorganized environments, and limited access to clean water and sanitation facilities are major factors contributing to the deterioration of public health. Unhealthy physical environments often become breeding grounds for various infectious diseases, such as diarrhea, acute respiratory infections (ARI), skin diseases, and dengue fever. This not only impacts individual health but also creates a social and economic burden for the community as a whole. In response to these conditions, the government, through a slum rejuvenation program, is attempting to reorganize residential areas to make them more livable and healthy. This program includes infrastructure improvements such as roads, drainage, clean water systems, sanitation, and the provision of public open spaces. In Tigalingga Village, this rejuvenation effort is expected to improve the community's quality of life, not only in terms of the physical environment but also in terms of clean and healthy living behaviors [1].

However, the effectiveness of the slum rejuvenation program in improving public health requires further study. Are these physical environmental changes truly accompanied by a reduction in disease incidence? Has the community experienced behavioral changes toward a more hygienic lifestyle? And to what extent has this rejuvenation had a tangible impact on the health of mothers, children, and other vulnerable groups?

Table 1. Residential Environmental Data

Environmental Physical	Indicators BeforeRejuvenation	Rejuvenation
Access to Clean Water	45% households	85% households
Ownership of Adequate Toilets	38% households	80% households
Drainage System	Lots of puddles Smooth	no puddles
Waste Management	Dumped into the river	Collected by officers regularly

Based on data on the physical condition of the environment in Tigalingga Village before and after the slum rejuvenation program, significant improvements are evident in various aspects supporting public health. Prior to the rejuvenation, only around 45% of households had access to clean water, meaning more than half of residents still relied on unsafe water sources such as rivers or shallow wells [2]. However, after the rejuvenation, access to clean water increased to 85%, demonstrating the program's success in providing more equitable access to clean water. In terms of sanitation, the ownership of proper latrines also increased dramatically, from only 38% of households before the rejuvenation to 80% after. This is crucial because poor sanitation can potentially spread diseases such as diarrhea and gastrointestinal infections [3].

Meanwhile, the drainage system before the rejuvenation tended to be dysfunctional, as evidenced by the presence of stagnant water around the settlements. These stagnant waters can become breeding grounds for mosquitoes that carry dengue fever and other diseases. After the drainage improvements, water flows more smoothly without stagnant water, resulting in a cleaner and safer environment. Positive changes are also evident in waste management, which was previously carried out haphazardly, including dumping directly into rivers. This practice not only polluted the environment but also harmed public health. After the rejuvenation, waste is now better managed because it is routinely collected by officers, thus maintaining environmental cleanliness [4]. Overall, the data shows that the slum rejuvenation program has had a significant impact on improving the physical condition of the environment. This change forms an important foundation for improving public health in Tigalingga Village [5].

The problem of slums is not merely a matter of environmental aesthetics, but is a fundamental issue directly related to the quality of life and public health. In Tigalingga Village, Dairi Regency, dense housing conditions, minimal sanitation, and inadequate waste

management have long been contributing to high rates of environmental-related diseases such as diarrhea, acute respiratory infections (ARI), and skin diseases [6]. The government has implemented a slum rejuvenation program as a solution for improving the physical environment, but its effectiveness in improving public health has not been comprehensively evaluated [7].

The urgency of this research lies in the importance of determining whether environmental infrastructure improvements truly have a significant impact on public health, or whether they merely provide visual changes without accompanying changes in clean and healthy living behaviors. If settlement rejuvenation is limited to physical development without understanding its impact on residents' health, the primary goal of improving community welfare will not be optimally achieved [8]. Furthermore, this research has strategic value as a basis for evaluating local government policies in implementing environmental management program [9]. The results are expected to form the basis for formulating more targeted follow-up policies, both in the form of improving environmental health facilities and fostering community development in maintaining cleanliness and health on an ongoing basis [10].

Therefore, research on "The Impact of Slum Rejuvenation on the Health Quality of the Tigalingga Village Community" is crucial not only to address academic needs but also to provide concrete recommendations for more humane, healthy, and sustainable regional development [11]. Based on these conditions and questions, this research is crucial to understand the extent to which slum rejuvenation contributes to improving the health quality of the Tigalingga Village community [12]. The results of this study are expected to serve as evaluation material for local governments in formulating more effective, sustainable, and community welfare-oriented settlement development policies [13].

Problem Identification

Based on the background outlined above, the problems in this research can be identified as follows:

1. The condition of slum settlements in Tigalingga Village was previously characterized by limited access to clean water, inadequate sanitation, poor drainage systems, and irregular waste management
2. These unhealthy environmental conditions have the potential to lead to high rates of environmentally related diseases such as diarrhea, acute respiratory infections (ARI), skin diseases, and dengue fever.
3. The government has implemented a slum rejuvenation program, but the extent to which this program has had a significant impact on improving public health is unknown.
4. Physical changes in the environment are not necessarily accompanied by changes in community clean and healthy living behaviors (PHBS)
5. There has been no specific study evaluating the effectiveness of the comprehensive slum rejuvenation program in Tigalingga Village.

Problem Formulation

Based on the problem identification, the problem formulation in this research is as follows:

1. What are the environmental conditions of the Tigalingga Village community before and after slum rejuvenation?
2. How did the quality of public health change before and after the implementation of the slum rejuvenation program?
3. Did the slum rejuvenation program significantly improve the quality of public health in Tigalingga Village?

4. How did the community's clean and healthy living behaviors (PHBS) improve after the rejuvenation program?
5. What factors support or hinder the effectiveness of slum rejuvenation on public health?

Literature Review

2.1. The Concept of Slums and Settlement Revitalization

Slums (or informal settlements) are understood as residential areas that experience a combination of inadequate physical, social, and economic conditions e.g., limited access to clean water, poor sanitation, high residential density, and inadequate infrastructure. Revitalization or slum upgrading efforts include physical interventions (improving water, sanitation, drainage, and housing networks), spatial planning, and strengthening public services, aimed at improving the quality of life and resilience of residential environments. Policy economics studies indicate that revitalization programs are place-based and can influence long-term urban development and resident well-being if comprehensively designed and implemented.

2.2. The Relationship Between Housing Environmental Conditions and Health

Modern scientific evidence confirms the close relationship between housing/environmental conditions and physical and mental health outcomes. Features such as access to safe water, adequate sanitation, good drainage, and proper waste management reduce the risk of environment-based infectious diseases especially diarrhea, acute respiratory infections (ARI), skin diseases, and vector-borne diseases like dengue fever. Systematic reviews and literature studies indicate that WASH (Water, Sanitation, and Hygiene) interventions and housing improvements have the potential to reduce the incidence of certain diseases, although effects vary depending on intervention design and local context.

2.3. Evidence on the Health Impacts of Slum Upgrading and Housing Interventions

Evaluative research on the effects of place-based upgrading has yielded mixed results: some studies report reductions in environment-based diseases and improvements in health outcomes, while others find smaller or inconsistent effects when interventions are solely physical without behavioral interventions and health services. This indicates that physical upgrading (e.g., water supply, toilets, drainage) often needs to be combined with health promotion programs, strengthening public services, and social policies to produce significant and sustainable health changes.

2.4. The Role of Community Behavior and Participation in Mediating Impacts

Infrastructure changes do not automatically result in improved health outcomes if community behavior remains unchanged. Community participation, Clean and Healthy Living Behavior (PHBS) education, and service management mechanisms (e.g., waste collection schedules, drainage maintenance) are critical success factors. International guidelines and practice studies recommend a participatory approach from planning to maintenance to ensure interventions are more relevant, acceptable to residents, and sustainable. Therefore, evaluation of the impact of rejuvenation must consider behavioral and local governance aspects in addition to physical outcomes.

Research Methodology

3.1. Research Approach

This research uses a qualitative approach with a case study design in Tigalingga Village. A qualitative approach was chosen because the research objective is to deeply understand the meaning, experiences, and mechanisms by which slum renewal affects the health of residents in a specific local context rather than simply measuring the magnitude of the effect quantitatively. Case studies allow researchers to examine the renewal phenomenon within the local social, cultural, and institutional context, making the findings contextually rich and relevant for regional policy recommendations.

3.2. Research Timeline and Location

The research was conducted in Tigalingga Village, Dairi Regency the target location of the slum renewal program. Data collection was planned to cover the pre- and post-renewal phases (retrospective analysis through documents and informant recollections) and post-renewal phases, thus capturing changes in the physical environment, clean and healthy lifestyle behaviors, and health perceptions/indicators.

3.3. Subjects and Sampling Techniques

The research subjects consisted of: (1) households residing in settlements affected by the rejuvenation (representative of age and gender groups), (2) community leaders (village heads/officials), (3) health workers from community health centers/local health cadres, and (4) program implementers/planners (public health offices, housing offices/related permit offices). The sampling technique used purposive sampling (selection of informants based on relevance criteria) and snowball sampling to identify key informants who were difficult to reach. The number of informants was flexible (sampling until saturation) an approach recommended in modern qualitative research to ensure data richness and comprehensive thematic understanding.

3.4. Data Collection Techniques and Instruments

Primary data collection included:

1. Semi-structured in-depth interviews with households, community leaders, health workers, and program implementers. The interview guide was developed based on research indicators: physical environmental conditions (water, sanitation, drainage, waste), clean and healthy lifestyles (PHBS), family health experiences, and perceptions of program implementation.
2. Focus Group Discussions (FGDs) with community groups and health cadres to explore community dynamics, collective perceptions, and environmental management practices post-rejuvenation.
3. On-site participant observation (checking physical conditions: latrines, water sources, drainage, waste disposal sites, and environmental cleanliness). Observations were supplemented with field notes and photographic documentation (if permitted).
4. Document review: rejuvenation program reports, community health center data on environmental disease incidence, village meeting minutes, and planning documents.

The interview guide and FGDs were pilot tested on 2–3 informants to verify question clarity and adjust the flow before the main data collection. The use of these techniques was intended to triangulate data, resulting in more valid and rich results. This data collection method aligns with contemporary qualitative practices that emphasize depth, instrument flexibility, and triangulation.

3.5. Data Analysis Process

Qualitative data analysis will be conducted using a reflexive thematic analysis approach to identify key patterns and themes from interview, FGD, and observation data. Reflexive

thematic analysis was chosen because it provides a systematic yet flexible framework for exploring the social meanings and constructions of informants' experiences, as well as allowing researchers to reflect on the role of subjectivity in the coding process and theme development. Coding principles will refer to modern practical guidelines, including first-cycle and second-cycle coding techniques as outlined by Saldana (2021). If more structured conceptual categories are needed, the Gioia methodology can also be considered as a systematic approach for organizing empirical data into inductive conceptual/theoretical dimensions.

Practical analysis steps include: interview transcription → repeated reading (familiarization) → inductive and deductive coding → initial theme development → reflection/iteration with the data (re-labeling, grouping subthemes) → determination of final themes along with illustrations from informant quotes → integration of findings with the theoretical framework and documents. If the research team has more than one coder, discussions between coders can be held to increase consistency of interpretation (inter-coder discussion). However, quantitative assessment of agreement is not a sole prerequisite for a reflexive approach, as the role of researcher interpretation is still recognized.

3.6. Validity/Trustworthiness Strategy

To ensure the quality of qualitative research, this study applies the principles of trustworthiness credibility, transferability, dependability, and confirmability as described and recommended in contemporary literature. Concrete strategies to be implemented include:

1. Triangulation of sources and methods (interviews, focus group discussions, observations, documents) to strengthen evidence.
2. Member checking: Returning summaries of findings or important quotes to several key informants to verify meaning.
3. Audit trail: Keeping records of the research process (recordings, transcripts, analytical memos, analytical decisions) so that the analytical trail can be traced.
4. Thick description: Providing contextual descriptions and lengthy quotes so readers can assess the transferability of findings to other contexts.
5. Peer debriefing/inter-researcher discussions to test interpretations and reduce bias.

These approaches align with modern academic recommendations for maintaining the quality of qualitative research while recognizing the constructivity of research knowledge.

Results

What were the environmental conditions of the Tigalingga Village community before and after the slum rejuvenation? The environmental conditions of the Tigalingga Village community before the slum rejuvenation program were generally characterized by various fundamental problems, including physical, social, and environmental health issues. The residential environment was dominated by semi-permanent houses with substandard construction. High building density resulted in very narrow spaces between houses, thus hindering optimal air circulation and natural lighting. The drainage system at that time also did not function properly, resulting in frequent flooding during the rainy season. Furthermore, sanitation facilities such as sanitary latrines, waste disposal sites, and clean water sources were inadequate, forcing residents to rely on communal water sources or even exploit open water bodies for their daily needs. These conditions reflected the poor quality of the residential environment and increased the risk of spreading environmentally-related diseases such as diarrhea, skin diseases, and respiratory infections.

After the slum rejuvenation program, significant changes occurred in the quality of the physical environment and public health. The construction of habitable houses with permanent structures and the implementation of a more organized spatial plan provide comfort and security for residents. Access roads are widened and paved, improving mobility for residents. A more integrated drainage system is built to minimize waterlogging. Furthermore, the provision of sanitation facilities such as communal toilets, segregated waste disposal sites, and more hygienic clean water sources are crucial factors in improving public health. A cleaner and more organized environment not only reduces disease incidence but also increases public awareness of clean and healthy living practices.

Thus, a comparison of conditions before and after the rejuvenation demonstrates that environmental improvement interventions in slum settlements have significantly improved the quality of life for the residents of Tigalingga Village. These changes are not only physical but also bring about transformations in residents' social behavior and health, demonstrating that the settlement rejuvenation program is a strategic step in realizing livable and sustainable settlements.

How has public health changed before and after the slum renewal program? The public health of Tigalingga Village was relatively poor before the slum renewal program. Unhygienic environmental factors were the primary cause of various health problems. Many residents still used water sources with unsafe hygiene and disposed of household waste directly into open drains and rivers. The lack of sanitation facilities, such as sanitary latrines, led some residents to defecate in inappropriate locations. This situation was exacerbated by piles of garbage around the settlements that were not systematically managed, triggering the proliferation of disease vectors such as flies and mosquitoes. As a result, environmentally related diseases such as diarrhea, acute respiratory infections (ARI), skin diseases, and dengue fever were common among both children and adults.

After the slum renewal program was implemented, significant improvements in public health were observed. The provision of more adequate clean water facilities provided residents with access to hygienic drinking water and daily necessities. The construction of individual and communal latrines helps reduce open defecation, while a more organized waste management system prevents waste from accumulating in residential areas. Furthermore, health education programs conducted concurrently with the slum rejuvenation program raise public awareness of the importance of clean and healthy living. The impact is evident in the decline in the incidence of infectious diseases and increased community participation in maintaining environmental cleanliness.

Overall, the changes in public health quality following the slum rejuvenation program are not only seen in the reduction in disease cases but also in the improvement in quality of life and social well-being. A cleaner environment fosters a sense of comfort and security for residents and even increases productivity as they are no longer frequently plagued by health problems. This demonstrates that slum rejuvenation is not just a physical intervention, but also a long-term investment in the health and well-being of the Tigalingga Village community.

Conclusion

Based on the analysis of the impact of slum rejuvenation in Tigalingga Village, Dairi Regency, it can be concluded that the rejuvenation program has had a significant impact on improving public health. Prior to the rejuvenation, the residential environment was unhygienic, with limited access to clean water and sanitation, and poor waste management, leading to high rates of environmentally-related diseases

Following the rejuvenation, positive changes occurred in various aspects of environmental health, such as increased ownership of healthy latrines, a more organized drainage system, improved access to clean water, and more organized waste management.

These changes in physical infrastructure have had a direct impact on reducing disease incidence and improving community hygiene practices (PHBS). Furthermore, the program has fostered community awareness and active participation in maintaining environmental cleanliness.

However, the effectiveness of the program's implementation is still influenced by several supporting and inhibiting factors. Government support, cross-sector collaboration, and community involvement are key factors in its success. Meanwhile, obstacles faced include limited economic resources, lack of facility maintenance, and persistent, persistent, and persistent behaviors that are difficult to change. Therefore, the sustainability of the rejuvenation program requires long-term support and monitoring so that its impact can be maintained consistently.

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