



Bridging Gaps: Cross-Sector Collaboration in Improving Sanitation Access in Last-Miles Communities of South Sulawesi, Indonesia

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ABSTRACT

Introduction: According to the Global Burden of Disease study, approximately 775,000 lives were lost prematurely in 2017 due to poor sanitation. In 2020, only 54% of the global population had access to safely managed sanitation. Therefore, this study aimed to explore cross-sector collaboration for improving sanitation access at "last mile" communities in South Sulawesi, Indonesia. Barriers to achieving Open Defecation Free (ODF) status were emphasized, with a focus on the dynamics between health centers (*puskesmas*) and village governments.

Methods: This qualitative case study was conducted with key stakeholders who were directly engaged in the STBM program, such as managers, district government officers, health officers, as well as sub-district, village, and *puskesmas* heads. Focus group discussions (FGDs) and in-depth interviews were used to collect data. Analysis was conducted thematically to determine patterns and obstacles to collaboration.

Results: There was no synergy between *puskesmas* and village governments in enhancing access to sanitation. *Puskesmas* operated by modifying the behavior of communities to construct their own latrines, while the village governments operated by providing financial support through village funds. This isolation led to community reliance on outside assistance as well as lowered ODF program effectiveness. FGDs also showed misconceptions among the stakeholders, and external influences on the pathogen spread to water and food sources (e.g., vectors (e.g., flies) spreading pathogens).

Conclusion: The synergy between *puskesmas* and village governments was a critical obstacle to attaining the ideal level of sanitation access and ODF status in the last-mile communities. Enhancing partnership by considering integrated planning, better communication, and participation of the community is necessary. The study showed that the existence of vectors, such as flies, worsened the sanitation issues. This underscores the significance of integrated and sustainable cross-sector partnerships to enhance access to sanitation and control vectors.

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INTRODUCTION

Sanitation is a deliberate act in nurturing clean living practices to avoid direct human contact with garbage and other toxic materials, improving the general health (1)(2). It enhances the health outcomes, economic growth, personal safety, and dignity in a far-reaching manner. Investment in the sector is associated with lower cost of healthcare and high productivity (3)(4)(5). This is specifically relevant in third-world countries, where sanitation is a huge burden that is disproportionately imposed on the vulnerable.

The Global Burden of Disease study shows that approximately 775,000 premature deaths in 2017 were due to poor sanitation. In 2020, only 54% of the entire world population had access to safely managed sanitation, proving the need for interventions. However, the process of providing access to sanitation remains difficult, specifically in areas characterized by high resource shortages. Investments in the sector were also essential to further reducing diarrheal diseases, which used to be the second most common cause of death among children across the globe. The disease contributed to 8% of all deaths among age groups below five in 2015 (6). This challenge prompts the need for scalable and sustainable solutions.

Sanitation is among the key elements ensuring the development of population and environmental health. Proper facilities are also crucial to curbing the spread of diseases caused by poor hygiene practices, such as diarrhea and gastrointestinal conditions. However, universal sanitation coverage was a thorn in the flesh of most developing countries, specifically in the last-mile communities, which were the most difficult to access due to geographical, social, and economic constraints. Poor infrastructure and behavioral conditions in these marginalised regions also worsen the risk of the disease spreading. Poor sanitation greatly enhanced the risk of communicable disease spread. In this case, vectors such as flies (*Musca domestica*) are able to transfer the pathogenic bacteria in human feces into water and food sources, thereby worsening the effects (7),(8).

The world was greatly behind schedule in the quest to achieve universal sanitation by 2030. However, more than 50% of the world population (4.2 billion people) had access to sanitation services, which were not adequately managing human waste. This has proved to be very dangerous to the health of human beings and the environment. Based on estimates, 673 million individuals continued to use toilets and defecated in the open, and almost 698 million children of school-going age lacked basic sanitation (9). Global statistics do provide context, but local information is essential in identifying solutions to action.

The issues of poor sanitation in Indonesia were reflected in the high rates of infectious diseases and the general poor health results among the communities (10). Sanitation conditions were observed to be lower in the country than in the neighborhood. Indonesia was almost at the same level as Vietnam and significantly lower than Malaysia and Singapore, which had shown outstanding commitments to environmental health (11). This underscores the urgent need for specific interventions that will be sensitive to the sociocultural and infrastructural environment. Programmes such as Community-Based Total Sanitation (STBM) had attempted to change the sanitation behaviours. However, the challenges remained specifically in the last-mile communities where poverty, inadequate infrastructure, and cultural activities were the contributing factors to the open defecation habit (12).

South Sulawesi was among the Indonesian provinces that had gained significant achievement in access to sanitation, with a rate of 96.68. Based on records, it was the second-highest province after DI Yogyakarta. The campaign to achieve full open defecation free (ODF) was not easy, and only 68% (2,082 of 3,047 villages) of the villages met the status. Some districts, such as Pangkep, Maros, and Jeneponto, were stagnant in terms of development of sanitation access even when the government maintained a budgetary allocation toward STBM activities and promotion of its Five Pillars. The stagnation implied that the country had achieved approximately 100% access in certain areas, but the last phases of coverage were postponed. This pointed to the challenges of the entire population having access to healthy and suitable sanitation facilities.

Pangkep, Maros, and Jeneponto had a high level of 89.1, 89.6, and 94.8 coverage rates, respectively, but lagged behind in the development of full sanitation coverage (13). Despite a constant budgetary reinforcement of STBM activities, community-led total sanitation (CLTS) projects, and socialization of the Five Pillars of STBM at all levels of the community, the coverage acceleration was not as high as expected. To identify efficient intervention methods, it was necessary to understand the underlying cause of the gap in sanitation coverage.

This study aimed to identify the latent barriers to sanitation access among last-mile communities. The cross-sector collaboration between health centers (*puskesmas*) and village governments in South Sulawesi, Indonesia, was

also examined. The study adopted a qualitative approach to identify challenges impeding the attainment of ODF status and to provide evidence-based recommendations for integrated, sustainable solutions.

METHOD

A qualitative design with a case study method was adopted to investigate the level of cross-sector partnership in ensuring sanitation access to last-mile communities. The methods of data collection were focus group discussions (FGDs), in-depth interviews, and direct observations. Thematic analysis was conducted to determine patterns, relationships, and barriers of cross-sector collaboration. The study analyst acted as the primary tool, as well as the participant in the data gathering process. In order to reduce the possible bias, data triangulation was used when comparing the information provided by different sources and methods, and personal reflections were kept during the process.

The informants who were primarily individuals close to the program of STBM were divided into two categories:

Internal: Members of last-mile communities within the study areas.

External: Program managers (Sanitarian, Health Promotion, and PIS-PK program managers), district government officials (Bappeda: head of the agency and heads of relevant fields), health office representatives (head of the health office and head of public health), sub-district heads, village leaders/lurah, heads of Puskesmas (community *puskesmas*), and local community leaders.

The inclusion criteria included participants who had at least two years of experience in the implementation of STBM and were engaged in decision-making procedures connected to sanitation.

The sample sites were identified through arrangements with the STBM facilitators of every district in South Sulawesi. Three sub-districts were selected using the criteria of lowest ODF (open defecation-free) coverage and regional peculiarities. The selected areas were:

Labakkang Subdistrict, Pangkep Regency: In this district, the access to latrines stood at 92.04 as of August 31, 2020. The area was characterized by land and the coastal regions.

Tompobulu Subdistrict, Maros Regency: As of August 31, 2020, this district had 76.22% latrine access and was mountainous in nature.

Arungkeke Subdistrict, Jeneponto Regency: Latrine access was 82.43% as of August 31, 2020, and the area is coastal.

The areas were selected based on the heterogeneity of geographical and socio-economic factors that affected the process of sanitation interventions. The strategic selection offered a relative variety of representation. This allowed the full exploration of the issues and effectiveness of sanitation interventions in various contexts.

Data analysis commenced with the transcribing of information obtained from FGDs and in-depth interviews in the form of manual coding to derive major themes. Triangulation was conducted by comparing results across different data collection methods. Reliability and validity were ensured through member-checking with key informants and discussions among the study team.

RESULTS

Based on the results of the FGDs at the District and *puskesmas* levels, the reinforcing factors were identified. The achievement of latrine access required synergy and cross-sectoral roles from various related OPDs, specifically between *puskesmas* and village governments. Puskesmas were responsible for providing education and raising public awareness about the importance of PHBS (Clean and Healthy Living Behavior), while village governments played a role in financial support to achieve 100% healthy latrine access.

Barriers to Collaboration

In Pangkep Regency, there was no synergy between the *puskesmas* and the village government to achieve 100% access to healthy latrines. This is based on information from an informant (IPK-DK3) who stated:

“We have the same scenario, villages with the same health objectives, namely, to achieve ODF, but the ultimate goal is different. The aim is the same, but the results are different...Why? First, because the health sector (the party) lacks funds, it simply sells the program and thus creates a ripple effect. This ripple effect

aims to raise awareness among the population about building latrines independently, while the village... takes charge of the activities and costs... The same objective was to prevent people from openly defecating... which breeds jealousy". (IPK-DK3)

Assistance provided by other OPDs, such as Public Works and Social Services, was not coordinated with the health authorities, which affected the triggering process. Based on the information above, misaligned priorities between puskesmas and village governments hinder effective collaboration.

Misperceptions and Misaligned Expectations

Misunderstanding between village governments and *puskesmas* was a major challenge to the realization of the ODF situation in both Maros and Jeneponto Regencies. The village governments tended to believe that *puskesmas* had the complete role of sanitation programs. Meanwhile, *puskesmas* required village governments to use their powers and resources to facilitate the implementation of ODF strategies.

An informant from the village stated:

"We have a habit of attending Musrenbang, but what is to be done does not always match the needs of the field. Planning could be more focused when all the OPD sit together". (Informant IJ-PD4)

This disparity led to loopholes in planning and implementation, specifically with programs that needed collective action. Triggering sessions often did not include the major decision-makers of village governments, which limits the follow-up procedures of the program and extends its success. The representatives of the villages frequently focused on short-term financial assistance rather than the long-term programs of behavioral change, which also became a major barrier to ODF success.

Communication channels between the two entities were not consistent, which further worsened the lack of synergy. The potential of *puskesmas* and village governments collaborating was not fully exploited without frequent communication and distinct roles.

Challenges in External Assistance

The ADD assistance program was not sustainable, as nearly all the constructed public toilets were dysfunctional. This was attributed to poor location or a lack of joint analysis before construction. A resident of IM-W29 stated that:

"There is a public toilet in the village, but it is not used due to a lack of water.

This shows that ineffective infrastructure development is caused by poor planning and an inability to coordinate efforts, leading to resource wastage.

Examples of Successful Collaboration

There were a lot of difficulties, but some achievements in the cross-sector collaboration were observed. In Bonto Sunggu Village, Jeneponto Regency, the village government and *puskesmas* worked together, using village funds to build latrines. This was facilitated by the continuous community education programs provided by the *puskesmas*.

Lesson: Sustainable effects on enhancing access to sanitation were achieved through planned cooperation between *puskesmas* and village governments.

The results showed key challenges, such as the absence of synergy, perception, unsustainable infrastructure, and external conditions, including the spread of vectors. This was consistent with the existing literature on the issue of sanitation in resource-constrained environments. However, the case of Bonto Sunggu Village showed that cross-sector cooperation and collaborative planning help to overcome the challenges. This offered a viable way forward to realize ODF in last-mile communities.

DISCUSSION

The results show that there is no strong synergy between village governments and *puskesmas* in the efforts to achieve the 100% coverage of latrine use. Despite the implementation of the STBM program, the two parties seemed to have worked independently. The *puskesmas* were mainly concerned with how to change the behavior of the community to promote independent latrine construction. Meanwhile, village governments were more concerned with how to provide financial assistance by allocating village funds. This scenario led to the community becoming dependent on governmental support, which diminished the success of the triggering program. Jeneponto and Pangkep are used as examples of how dependency may lead to stagnation of progress when roles and responsibilities are not well articulated. This study was consistent with the results reported by Bartram et al. (2014), who observed that the absence of cross-sectoral coordination could be a hindrance to the success of sanitation programs (14).

Despite the adoption of the sanitation policies, the implementation challenges were common at the local level because of the absence of coordination and mutual understanding among the stakeholders. This is supported by Venkataramanan et al. (2018), who asserted that the success of sanitation programs heavily depended on cross-sectoral collaboration as well as the full engagement of local governments, the health sector, and the community (12). Designated methods to clarify roles and responsibilities among stakeholders could mitigate the issues, as observed in successful cases such as Bonto Sunggu (15).

Cross-sectoral engagement in health governance and policy development was essential to strengthening collaboration among various stakeholders. The call to implement the "Health in All Policies" method underscored the need for intersectoral strategies to address health issues, including sanitation. Although national sanitation policies had been established in many countries, the implementation was often hindered by a lack of prioritization, weak leadership, underinvestment, and capacity limitations. In South Sulawesi, the challenges were compounded by inconsistent communication and misaligned priorities between village governments and *puskesmas* (14),(16),(17).

Public health issues were often complex, including multiple causes and a wide range of cross-sectoral stakeholders. The complexity made it impossible to have a single solution to the problems effectively. The development of effective policies played a crucial role in tackling the complex issues (18). Therefore, understanding the processes and factors influencing cross-sectoral collaboration was essential for the success of programs that relied on intersectoral partnerships. Strengthening coordination mechanisms through regular intersectoral meetings and participatory forums could enhance collaboration and coordination of goals (19).

Population health management referred to large-scale transformational efforts through collaborative adaptive health networks that reorganized and integrated services across public health sectors. Facilitators for cross-sectoral collaboration included clear responsibilities for specific activities, effective communication channels, the integration of core values from each sector in planning and implementation, as well as the collaborative development of health education programs. Training programs targeting both village officials and *puskesmas* staff could improve understanding of roles and foster mutual accountability. Engaging consumers as key stakeholders in the planning and execution of intersectoral programs was also crucial. A bottom-up method, which focused on understanding stakeholders' insights into the value of committing to the vision and goals of the partnership, was key to achieving realistic partnership objectives (20).

Direct community engagement was increasingly recognized as an essential element in improving healthcare systems and enhancing community participation in shaping the environment. Creating a sense of urgency among stakeholders was a crucial step in securing commitment (19). Furthermore, sanitation was a challenge that required comprehensive policies with proper infrastructure and funding to resolve the issue, specifically in last-mile communities. Decision and policy-making should be integrated and holistic as well as supported by participatory and collaborative processes to achieve success in the long term (21).

The sanitation problem was made more complex by the existence of vectors such as flies (*Musca domestica*). Vectors serve as carriers of pathogens, transferring bacteria from human feces to food and water, thereby increasing the health risks associated with poor sanitation. Addressing these vector-borne transmission pathways was crucial in improving overall sanitation outcomes. Integrated efforts from multiple sectors are required to ensure proper waste management, vector control, and community education (1). Furthermore, social determinants of health contributed to the intractability of public health challenges (22). Integrated efforts in South Sulawesi have shown the potential to mitigate vector-borne risks when local governance collaborates with health and environmental sectors.

Effective intersectoral collaboration included explicit responsibilities for specific activities, clear communication channels, inclusion of core values of each sector in planning and implementation, as well as the collaborative development of health education programs. Engaging consumers as key stakeholders in planning and implementing intersectoral programs was important (23). A bottom-up method, which focused on gathering stakeholders' insights into the value of commitment to the partnership's vision and goals, was also crucial (20). Without a complete understanding of partnership maturity, setting realistic goals and providing appropriate support remained difficult (24). Community engagement was increasingly viewed as key to improving healthcare systems and increasing community engagement in shaping their living conditions. Focusing on participatory methods could improve the harmonization of national policies with the realities faced by last-mile communities. (19).

To overcome sanitation problems, particularly in the last-mile groups, comprehensive policies were necessary. These policies should be supported by appropriate infrastructure and funding, with policy-making and decision-making processes that were holistic, integrated, and grounded in a collaborative and participatory method (25).

Comparison with Previous Studies

The results are in line with Bartram et al. (2014), who emphasized that cross-sectoral coordination is crucial for the success of sanitation programs, particularly in remote and underserved areas (14). Similarly, the study supports Venkataramanan et al. (2018), who stated the importance of community-based methods and the active engagement of local governments in improving sanitation access (12). These collaborations underscore the need to have collaborative and participatory methods in dealing with sanitation challenges.

The absence of synergy between *puskesmas* and village governments is a more critical obstacle than the accessibility of geographical areas and water supply, as observed by O'Reilly and Louis (2014). Although physical factors are still pertinent, operational misalignments and role distributions became the main issues in attaining ODF status in the study areas(26). The differences can be explained by the geographical and socio-cultural specifics of South Sulawesi and the necessity of specific interventions that consider the local dynamics of governance and the behavior of local communities.

Implications for Public Health

The clearance of this study for the general population's health is extensive. This is because of the lack of synergy between *puskesmas* and village governments and the need to be more integrative in community-based health programs, specifically in sanitation. Cross-sectoral coordination would help increase the SDG 6 implementation goals of ensuring that everyone has adequate sanitation by 2030 with improved management. These results further emphasize the necessity of the role of government to develop more inclusive policies of sanitation with increased budgetary allocations and improved capacity of the workforce in the health sector and local government. The threat of communicable diseases, such as diarrhea spread, can be reduced by enhancing cooperation between village governments and the health sector, which would influence the health status of the population positively.

There is an absence of synergy between *puskesmas* and village governments, which underscores the importance of a more integrative method to community-based health programs. Enhanced cooperation and coordination of priorities in all sectors can hasten the delivery of SDG 6, which aims to achieve sufficient sanitation by 2030. More policy attention to sanitation, such as higher budgetary allocations and workforce capacity building, is necessary in the long run.

Limitations and Cautions

Despite the contribution of the study, some limitations were observed. First, the sample was restricted to 3 districts in South Sulawesi. This could influence the extrapolation of the results to other parts of Indonesia. Second, although the qualitative approach provided in-depth insights, it remained susceptible to respondent perception bias within the program. This methodology cannot be able to fully represent the broader variation of field conditions. The constraints in the availability of more specific information on socio-economic conditions and other environmental aspects affect the validity of the results. Therefore, the limitations should be considered when interpreting the results.

Recommendations for Future Study

According to the results, there are a number of aspects that require improvement in the upcoming study. First, more investigation is required to examine more successful methods of enhancing cross-sectoral partnership, specifically between *puskesmas* and village governments. In other areas of Indonesia or other developing countries, studies may be able to give a more holistic picture of the differences as well as the issues of sanitation in various socio-cultural situations. Proper investigation on socio-economic variables, including poverty and land tenure, that determine the behavior of communities in constructing sanitation is also required. The effectiveness of community-based sanitation programs should be assessed longitudinally. This will assist in comprehending the long-term effect of current interventions and allow developing more comprehensive and sustainable policies.

CONCLUSION

In conclusion, FGDs results showed ineffective collaboration and synergy among *puskesmas* and the village governments to ensure ODF status. This was observed in the fact that there was a difference in perceptions and methods between the two entities on the quest to achieve 100% latrine access. Furthermore, cross-sectoral coordination was observed to be inadequate, and the regency-level policies did not work fully. Complete access to latrines should have synergy and concerted cross-sectoral functions of diverse related departments (OPDs), in particular between the village governments and the health sector.

The need to attain the accessibility of latrines, specifically to last-mile communities, is a collection of internal and external factors. The internal factors were income, possession of land, community conduct, and attitude regarding latrine design. Meanwhile, external factors, including cross-sectoral synergy, budgeting, policies, and regulations, remained equally important. The environmental conditions, such as access to clean water and geographical issues, were also supportive factors and need to be addressed specifically.

Regardless of the level of difficulty, successful cases of effective cooperation, such as in Bonto Sunggu Village, showed how coordinated efforts between the *puskesmas* and the village government produced sustainable sanitation gains. Therefore, fostering strong cross-sectoral partnerships, enhancing policy implementation at local levels, as well as addressing both key and supporting factors through holistic and inclusive strategies, are crucial to advancing progress toward SDG 6 and ensuring sustainable sanitation for all.

AUTHOR'S CONTRIBUTION STATEMENT

Muh. Saleh led the investigation and was responsible for study design, data collection, and manuscript writing. Wildan Setiabudi and Andi Bunga Tongeng provided critical insights into the theoretical framework and contributed to the review of relevant literature. Nildawati and Muhammad Rachmat significantly contributed to data collection, data analysis, and manuscript review, as well as revised the final draft of the manuscript. Hamsah Sinring and Ain Khaer facilitated fieldwork and coordinated interviews at the study site. All authors have read and approved the final manuscript and contributed equally to its development.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest concerning the study or the publication of this manuscript. There are no financial or personal relationships that could have influenced the objectivity or the results. The authors confirm that all aspects of the study were conducted without any undue influence.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, generative artificial Intelligence (AI) technology, specifically ChatGPT, was used solely to enhance reviewed, revised, and validated by the authors to ensure accuracy, coherence, and compliance with academic and publication ethics standards. The authors assume full responsibility for the entire content of this manuscript, including its originality, integrity, and scientific validity.

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