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Policy Evaluation Of The Community-Based Water And Sanitation Program (Pamsimas) In Tana Tidung, North Kalimantan: A Qualitative Study

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ABSTRAK

Judul: Evaluasi Kebijakan Program Air dan Sanitasi Berbasis Masyarakat (Pamsimas) di Tana Tidung, Kalimantan Utara: Sebuah Studi Kualitatif

Latar belakang: Akses terhadap air bersih dan sanitasi terus menjadi masalah kesehatan masyarakat yang krusial di pedesaan Indonesia, terutama di daerah-daerah miskin seperti Kabupaten Tana Tidung. Studi ini menilai pelaksanaan Program Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat (PAMSIMAS) di Kecamatan Muruk Rian, Kalimantan Utara, dan meneliti dampaknya terhadap kesehatan masyarakat.

Metode: Data dikumpulkan menggunakan metodologi deskriptif-analitis kualitatif melalui wawancara mendalam dengan pemangku kepentingan, observasi langsung, dan analisis dokumen. Data penelitian dikumpulkan melalui wawancara menyeluruh dengan 15 narasumber penting, yang terdiri dari enam kepala desa di Kecamatan Muruk Rian, dua pejabat dari Dinas Kesehatan yang bertanggung jawab atas sanitasi, tiga kader kesehatan masyarakat, tiga fasilitator/KKM PAMSIMAS desa, dan satu pejabat dari Bappeda Kabupaten Tana Tidung. Dengan demikian, informasi yang dikumpulkan mencakup pandangan umum tentang kebijakan, teknis lapangan, dan keterlibatan masyarakat. Penilaian menggunakan enam kriteria William N. Dunn: efektivitas, efisiensi, kecukupan, kesetaraan, responsivitas, dan kesesuaian.

Hasil: Penelitian menunjukkan bahwa PAMSIMAS telah secara signifikan meningkatkan akses ke air minum, meningkatkan kesadaran kebersihan masyarakat, dan membantu mengurangi penyakit yang ditularkan melalui air. Namun demikian, kesulitan yang terus-menerus mencakup kemampuan teknis yang tidak memadai untuk pemeliharaan infrastruktur, kolaborasi pemangku kepentingan yang tidak cukup, dan keterlibatan komunitas yang tidak konsisten. Perbedaan dalam akses layanan air antar desa tetap ada, menyoroti perlunya langkah-langkah implementasi yang berfokus pada keadilan. Studi ini menunjukkan bahwa meskipun PAMSIMAS telah berpengaruh positif terhadap kesehatan masyarakat di Muruk Rian, keberlanjutan jangka panjang terhambat oleh keterbatasan institusional dan sosial. Meningkatkan tata kelola lokal, memperluas inisiatif pendidikan kesehatan, dan memperkuat jaringan dukungan infrastruktur sangat penting untuk mempertahankan hasil program

Simpulan: Temuan-temuan ini memberikan informasi kepada pembuat kebijakan dan memberikan wawasan yang dapat diterapkan untuk program-program berbasis komunitas lainnya di daerah-daerah terpencil di Indonesia. Penelitian ini menunjukkan bahwa Program PAMSIMAS di Kecamatan Muruk Rian berhasil meningkatkan akses air minum layak, meningkatkan kesadaran tentang perilaku hidup bersih dan sehat, dan menurunkan penyakit berbasis air. Namun, program ini menghadapi kendala seperti keterbatasan kemampuan teknis untuk memelihara infrastruktur, kurangnya kolaborasi antar pemangku kepentingan, dan rendahnya partisipasi masyarakat yang konsisten. Hasil ini memberikan pelajaran berharga bagi pembuat kebijakan.

Kata kunci: Kesehatan Masyarakat; PAMSIMAS; Perdesaan Indonesia; Sanitasi Air; William N. Dunn

ABSTRACT

Background: *Access to potable water and sanitation continues to be a critical public health issue in rural Indonesia, particularly in impoverished areas such as Tana Tidung Regency. This study assesses the execution of the Community-Based Drinking Water and Sanitation Program (PAMSIMAS) in the Muruk Rian Subdistrict of North Kalimantan and examines its effects on public health.*

Method: *Data were collected utilizing a qualitative descriptive-analytical methodology through comprehensive interviews with important stakeholders, direct observations, and document analyses. Research data was collected through in-depth interviews with 15 key informants, consisting of six village heads in Muruk Rian District, two officials from the Health Department responsible for sanitation, three community health cadres, three PAMSIMAS village facilitators/KKM, and one official from the Tana Tidung District Development Planning Agency (Bappeda). Thus, the information collected includes general views on policy, field techniques, and community engagement. The assessment utilized William N. Dunn's six criteria: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness.*

Result: *Research demonstrates that PAMSIMAS has markedly increased access to potable water, elevated community hygiene consciousness, and aided in the diminishment of waterborne illnesses. Nevertheless, persistent difficulties encompass inadequate technical capability for infrastructure upkeep, insufficient stakeholder collaboration, and inconsistent community engagement. Disparities in access to water services among villages persist, highlighting the necessity of equity-focused implementation measures. The study suggests that although PAMSIMAS has positively influenced public health in Muruk Rian, long-term sustainability is obstructed by institutional and societal limitations. Enhancing local governance, broadening health education initiatives, and bolstering infrastructural support networks are crucial for maintaining program outcomes.*

Conclusion: *These findings inform policymakers and provide transferable insights for other community-based programs in distant regions of Indonesia. This research indicates that the PAMSIMAS program in Muruk Rian District successfully increased access to safe drinking water, raised awareness about clean and healthy living behaviors, and reduced waterborne diseases. However, the program faced constraints such as limited technical capacity to maintain infrastructure, lack of collaboration among stakeholders, and low consistent community participation. This result provides valuable lessons for policymakers.*

Keywords: PAMSIMAS; Public Health; Water Sanitation; Rural Indonesia; William N. Dunn

INTRODUCTION

An essential component of economic growth, environmental sustainability, and public health, access to clean water and sanitation is a fundamental human right.[1] Despite Indonesia's wealth of water resources, securing fair and sustainable access to these vital services is a constant challenge in many rural and isolated areas, especially in North Kalimantan. According to Nastiti et al.[2] these challenges are frequently made worse by inadequate infrastructure, weak institutional capacity, and low community participation. Through increased temperatures, changed rainfall patterns, and a rise in the frequency of disasters, climate change has exacerbated water and sanitation vulnerabilities globally.[3]

Article 33(3) of the 1945 Constitution, Law No. 23/2014 on Regional Government, and Government Regulation No. 16/2005 on Drinking Water Provision all establish state obligations to provide equitable access to safe water, reflecting Indonesia's legal framework's recognition of water as a human right under General Comment No. 15 of the ICESCR (International Covenant on Economic, Social and Cultural Rights).[4] However, the translation of these mandates into effective local implementation is inconsistent and fragmented.[5] Examining how PAMSIMAS has been applied in frontier regions like Muruk Rian is crucial to comprehending the local situation within the framework of national laws and international issues.

Tana Tidung Regency in North Kalimantan, situated adjacent to the Malaysian border, illustrates these implementation gaps. Residents in Muruk Rian District continue to experience inadequate infrastructure, insufficient access to piped water from local water utilities (PDAM), and limited public awareness regarding hygiene practices.[6,7,8] The government has implemented the Community-Based Drinking Water and Sanitation Program (PAMSIMAS); however, numerous villages in this region still face restricted access and underutilization of the existing facilities.[9] Kristanto and Selly[35] emphasize that effective implementation of PAMSIMAS in rural areas is highly dependent on strong community participation, transparent communication, and local empowerment. Programmatic challenges have been observed in Maros Regency primarily attributed to inadequate stakeholder coordination and ineffective infrastructure

management.[10] Consistently, the availability of safe drinking water is correlated with a decrease in waterborne diseases global meta-analyses show that improvements in water access/quality, sanitation, and hygiene significantly reduce diarrhea in children, and disease burden estimates indicate that a substantial proportion of morbidity/mortality can be prevented with clean water services; national-level findings also reinforce that water quality/availability (e.g., qualified dug wells) is associated with lower diarrhea incidence in communities (Wolf et al., 2018; Prüss-Ustün et al., 2019; Dangiran & Dharmawan, 2020).[37,38,39]

Recent research emphasizes the necessity of integrating sustainability frameworks such as FIETS (Financial, Institutional, Environmental, Technical, Social) alongside community-based models to enhance the long-term effectiveness of water and sanitation initiatives.[11] Chan et al.[12] developed a community-scale systems model to support climate adaptation in rural water and sanitation systems in the Solomon Islands, offering insights that are highly relevant for strengthening rural water resilience and local governance in Indonesia. Megaw et al.[13] emphasized the importance of inclusive water and sanitation programs that address the needs of marginalized populations. Giné-Garriga et al.[14] reviewed WASH responses across 84 countries during the COVID-19 pandemic, emphasizing the critical role of coordinated information systems insights that align with the objectives of Indonesia's SIMPAS program in strengthening data-driven water and sanitation management.

The Community-Based Drinking Water and Sanitation Program (PAMSIMAS) is a prominent initiative established by the Indonesian government in 2008, supported by international development partners such as the World Bank. The program seeks to enhance access to improved drinking water and sanitation services in rural and peri-urban regions by employing a participatory and community-driven methodology. PAMSIMAS focuses on low-income and underserved communities, fostering behavior change, local ownership, and sustainability through the engagement of community-based organizations (Kelompok Keswadayaan Masyarakat), village governments, and local stakeholders in the planning, financing, and maintenance of water and sanitation infrastructure.

By 2022, the PAMSIMAS program had expanded to approximately 37,000 villages across Indonesia, serving 25.9 million people and establishing itself as one of the largest rural WASH initiatives globally, as confirmed by Minister Basuki during the 2023 PAMSIMAS Kick Off Meeting.[34,36] PAMSIMAS has been implemented in Java and other developed regions, and numerous research have been conducted to study its implementation. However, relatively few studies have evaluated its performance in frontier and border areas such as Tana Tidung. In spite of the fact that PAMSIMAS has been extensively researched in Java and other well-developed regions, there is a paucity of empirical evidence concerning its application and the health effects it has in frontier and border regions like Tana Tidung.

These regions frequently encounter specific socio-geographic challenges, such as inadequate infrastructure, poor institutional coordination, and minimal public engagement, which are insufficiently addressed in conventional evaluations. The lack of localized assessments limits policymakers and practitioners in developing responsive and context-specific strategies. Addressing this gap is essential for ensuring that community-based water and sanitation programs are equitable and effective in various Indonesian contexts. This study seeks to address this gap by assessing the implementation of PAMSIMAS in Muruk Rian District through the lens of William N. Dunn's policy evaluation framework, which encompasses six essential criteria: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness.[15] This framework facilitates a thorough evaluation of the impact of policy implementation on service delivery outcomes in complex, underdeveloped contexts.

This study enhances public health policy literature by empirically assessing the efficacy of a nationally mandated program in an overlooked rural area. The research connects Dunn's evaluative aspects with empirical findings, providing pragmatic policy recommendations to enhance the design, execution, and sustainability of community-based water and sanitation initiatives. The results are especially pertinent for local governments, NGOs, and development partners aiming to enhance public health outcomes in remote, climate-sensitive, and underserved areas throughout Indonesia.

MATERIALS AND METHODS

This study employed a qualitative descriptive-analytical approach to evaluate the implementation of the Community-Based Drinking Water and Sanitation Program (PAMSIMAS) in Muruk Rian District, Tana Tidung Regency, North Kalimantan Province, conducted from January to June 2024. The qualitative design was chosen to capture experiences, perceptions, and challenges faced by stakeholders in implementing the program. Unlike quantitative research that applies the concept of population in a statistical sense, this study relied on key informants with extensive contextual knowledge and direct involvement in PAMSIMAS activities. A total of 15 informants were selected through purposive sampling, consisting of six village chiefs from Belayan Ari, Seputuk, Ria, Kapuak, Rian Rayo, and Sapari; two officials from the District Health Office responsible for sanitation and environmental health; three community health workers (kaders) involved in hygiene promotion; three facilitators or members of Kelompok Keswadayaan Masyarakat (KKM) managing the facilities; and one official from the Regional Development Planning Agency (Bappeda). Data were obtained primarily

through in-depth semi-structured interviews with the selected informants, complemented by direct field observations of water and sanitation facilities, as well as document reviews of program reports, health statistics, and related regional policies.

The interactive approach put forth by Miles, Huberman, and Saldana[16], which consists of three essential steps data reduction, data display, and conclusion formulation and verification was used to examine the data. William N. Dunn's six policy evaluation criteria effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness were used to organize the main findings of the theme analysis technique. Triangulation between data sources and collection techniques was used to guarantee the reliability of the data. To confirm the results and interpretations, member verification was also done with important informants.

RESULTS AND DISCUSSIONS

In-depth interviews with key informants and field records pertaining to the PAMSIMAS program's execution in Tana Tidung Regency's Muruk Rian District served as the foundation for this study's conclusions. The six policy evaluation criteria effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness that William N. Dunn established were used to examine the data. This study used William N. Dunn's policy assessment framework to assess the PAMSIMAS program's implementation and public health impact in Muruk Rian District. The results shed light on the program's performance in relation to important policy aspects and how those implementation outcomes resulted in community-level health changes. The program's implementation in accordance with Dunn's six evaluation criteria and its observable influence on public health outcomes are the two primary facets of the topic.

a). Program Implementation Based on Dunn's Evaluation Criteria

The Muruk Rian District PAMSIMAS program was evaluated using William N. Dunn's six policy evaluation criteria: effectiveness, efficiency, adequacy, equity, responsiveness, and appropriateness. Community members reported improved piped water and hygienic practices, indicating that the program increased access to clean water and reduced open defecation. Despite administrative delays and limited money, community participation supported efficiency. However, numerous distant settlements lacked infrastructure, making adequacy and equity difficult. The lack of established maintenance methods and repair budgets hindered responsiveness, but suitability was generally verified; however, some eligible areas were not prioritized. These data indicate that community initiative and institutional constraints created a mixed but generally positive implementation outcome.

1. Effectiveness

In seven villages, the PAMSIMAS Program was implemented in Muruk Rian District between 2018 and 2021 thanks to State Budget (APBN) funding through the Special PAMSIMAS Grant (HKP). Water treatment plants, reservoirs, piping networks, and ponds are among the clean water infrastructure included in the building. The community is reportedly using and operating all of that infrastructure. In 2020, the Special Allocation Fund (DAK) also facilitated the establishment of residential connections and distribution networks in two villages.

The neighborhood now has direct access to clean water at home, according to observation results. A technical officer said, "*This program allows the community to design a clean water system according to the village's water source conditions, and it is very effective in reaching houses that are not served by the Regional Drinking Water Company(PDAM)*". A sanitation official from the area said, "*With the construction of clean water facilities in the village, the community's water needs are met, and the program also influences the community's behavior towards living a healthy life*."

The employees of the regional health department also stated that "*the community no longer needs to go down to the river or the well to fetch water. Due to the easy access to water at home, many people are already beginning to break the practice of open defecation. We take an educational approach such as counseling, training, leaflet distribution, and involving community leaders to demonstrate proper sanitation practices*," said a sub-district program implementer. He also stated, "*PAMSIMAS utilizes springs equipped with purification and storage technology, thereby improving water quality and reducing the risk of contamination*."

Numerous village chiefs from the program's target areas have said that PAMSIMAS's presence significantly aids the community's access to clean water; in fact, a total of six village heads were interviewed, representing Belayan Ari, Seputuk, Ria, Kapuak, Rian Rayo, and Sapari villages in Muruk Rian District. Thus, the conclusion regarding the perspectives of village heads is based on responses from all six leaders whose villages directly implemented the program. According to one recipient, "*Roughly 90% of the houses have access to water currently*." Additionally, the community is getting more involved in keeping the clean water facilities clean. However, there are still certain difficulties. A source said, "*At first, some people still defecated in the river because they weren't used to toilets. The upkeep of facilities is another difficulty, as "the maintenance of facilities largely still relies on community self-help."*

The PAMSIMAS program's implementation in Muruk Rian District shows a noteworthy level of efficacy in accomplishing its main goals, which are to increase access to clean water and encourage hygienic

behavior. The result is consistent with Dunn's definition of effectiveness, which places emphasis on how well program objectives are achieved. Indicators of behavioral and infrastructure-based efficacy are in line with community members' reports of improved sanitation habits, a decrease in open defecation, and an increase in the availability of piped water.

Mubarok & Yafiz[17], who stress that increased access to clean water and sanitation immediately lowers the prevalence of waterborne illnesses such as skin infections and diarrhea, support this finding. Local health officials also noted a decrease in these ailments, indicating that PAMSIMAS programs were behaviorally transformational and well-targeted. Proactive outreach by local governments further increased effectiveness. Public awareness increased as a result of educational initiatives and participatory strategies engaging well-respected community members. According to Kallay & Takacs[18], maintaining sanitation projects in rural areas requires this kind of community-driven behavior modeling.

However, the study identified several notable restrictions. Despite the construction of facilities in eight communities, some isolated places remained underserved due to geographical and logistical constraints. Such behavior indicates that infrastructure scalability and more dynamic targeting tactics are required. These results are consistent with those of Saputra et al.[19] who contend that infrastructure reach and maintenance preparedness frequently limit the efficacy of rural water projects.

Effectiveness was also evident from an operational perspective in the way the community responded to local demands, such as their initiative to keep facilities in excellent condition in spite of the restricted PDAM coverage. In conclusion, the PAMSIMAS program in Muruk Rian met important performance standards for community behavior modification and service delivery; nevertheless, additional development and improvement are required to reach outlying communities and maintain long-term effects.

2. Efficiency

Two primary funding sources the Special Allocation Fund (DAK) and the APBN Special Grant for PAMSIMAS (HKP) are used to carry out the PAMSIMAS Program in the Muruk Rian District. APBN-HKP, DAK, Village Budget (APBDes), and community donations through the INKIND and INCASH programs are some of the sources of funding. The Minister of Finance Regulation Number 76 of 2020 specifically directed the disbursement of Reserve DAK monies. The facilitator's financial report reveals that each village received its payout in two stages. Every step of the budget realization and payout process has been meticulously documented.

The observation's findings demonstrate that funding has been used in line with plans for pipeline network growth and physical development. In the sub-district, an informant from the program implementation team said, "*The success of the physical development of PAMSIMAS from 2018 to 2021 is inseparable from thorough planning, the use of appropriate technology, and a community-based approach*." As the informant put it, "*This program also builds collaboration between local governments, communities, and other parties so that the available resources can be used optimally*." Partnerships are also supported. "*The work of the community itself is closely tied to the success of the program,*" said a central agency technical informant. Because of their independence, the facilities continue to operate at their best by reducing the maintenance burden.

According to a health sector source, "*The management of funds is carried out directly by the Community Working Group or POKMAS formed through community discussions and approved by the village head*." The reason comes from a governance standpoint. Facilitators accompany all fund disbursements, which the POKMAS treasurer is required to report.

Additionally, field observations demonstrate that the village authority and the community work together to oversee and use the amenities. This is in line with the institutional organizational framework set forth in the Decree of the Regent of Tana Tidung, which creates the Drinking Water and Sanitation Facility Management Agency (BPSPAMS) and Community Self-Reliance Groups (KMM) at the local level. A supervisor, coordinator, secretariat, technical facilities unit, financial unit, and community complaint unit are all part of the local organizational structure, according to information from the document. PAMSIMAS activities in the Muruk Rian District exhibit the practice of employing financial and human resources managed directly from the district level down to the village community level, according to budget data, realization reports, observation results, and interviews. Ulfah, Selintung, and Bakri[8] analyzed the PAMSIMAS clean water services in Marioriwawo District, emphasizing how quality, quantity, continuity, payment capability, and institutional factors helped the community-based program succeed.

Interviews and document analysis show that the way funds are distributed, coming from APBN-PAMSIMAS, DAK, and local budgets, was structured into measurable steps, particularly in villages like Seputuk and Belayan Ari. The two-stage disbursement model enhanced transparency and monitoring, thereby facilitating efficient budget utilization. Community working group (POKMAS) significantly contributed to the management of these funds, supported by facilitators and guided by pertinent regulations, including those related to DAK.

Participatory planning enhanced efficiency by ensuring that interventions were customized to meet local needs. Community involvement contributed both labor and materials while also facilitating the monitoring of

project progress. This is consistent with the findings of effective rural water service delivery relies on frontline collaboration between communities, local governments, and service providers.[10,20] The integration of technology in infrastructure development and the utilization of local materials enhanced workflow and resource management. The establishment of community-based management bodies, such as KKM and BPSPAMS, improved institutional efficiency by localizing responsibilities, minimizing bureaucratic delays, and strengthening program ownership.

Notwithstanding these advantages, obstacles persist. Delays in early-stage planning and restricted technical capacity at the village level were noted. These factors sometimes impeded the implementation process and necessitated that facilitators offer supplementary technical assistance.

There is a need for more accurate costing of WASH activities, focusing on both hardware and software components, with transparent financial planning essential for programs like PAMSIMAS to ensure efficient allocation of resources for infrastructure and community engagement.[1,3,21] Efficient budgeting and advocating for adequate funding are crucial to ensuring that water, sanitation, and hygiene (WASH) services are properly provided in healthcare facilities, supporting both community health and service sustainability.[21,1] Efficiency analysis by data envelopment analysis (DEA) allows the policymakers to define and develop policies and guidelines to improve their performance.[22] The PAMSIMAS program exhibited a high level of efficiency in Muruk Rian District through the integration of coordinated financial mechanisms, suitable technological tools, and active community involvement. The program successfully navigated budget constraints and optimized local resources to provide sustainable clean water and sanitation services.

3. Adequacy

In Muruk Rian District, the PAMSIMAS Program is carried out as part of the local government's endeavors to supply drinking water and sanitation services in compliance with Law Number 23 of 2014's requirement. Six villages in the Muruk Rian District are designated as areas for the construction of systems for supplying rural drinking water in the Tana Tidung Regency's Master Plan for the DrinkingDrinking Water System (RI-SPAM) for the years 2016–2036. Zone 2 includes the villages of Rian and Sapari, while Zone 6 includes the villages of Seputuk, Belayan Ari, Kapuak, and Rian Rayo. The topography, the distance between service locations, and the availability of raw water supplies are all considered while determining the zones.

According to the RI-RISPAM document and the community facilitator's report, these communities were chosen as PAMSIMAS program targets due to their location outside of the PDAM service coverage region. In such settlements, clean water and sanitation facilities have been progressively built and developed since 2018, and as of mid-2024, the local population is still using and enjoying the facilities.

"*So far, the government has been very supportive of the PAMSIMAS coverage by directing village heads to allocate funds and ensure 100% water access for the community*," said one of the technical officials, based on the results of the interview. One health-related source stated, "*Community support in the form of labor and cash can help expand the coverage of PAMSIMAS because it can save costs on labor*."

A village head who participated in the program stated, "*The success of PAMSIMAS development relies on the strict supervision provided by monitoring teams from the district level down to the village, covering all stages from planning to implementation of activities.*" According to field observations, inhabitants have made active use of the amenities that are provided and are no longer dependent on the river for domestic water.

The effectiveness of the PAMSIMAS program in Muruk Rian District can be evaluated based on its capacity to deliver adequate access to clean water and sanitation in underprivileged rural regions. Habicht et al.[23] stated that adequacy evaluation aims to assess whether program objectives have been achieved by comparing actual outcomes against predetermined standards or criteria, without the need for a comparison group.

The program's design, informed by regional policy instruments like RI-SPAM, primarily aimed at areas without access to PDAM infrastructure. Field observations and stakeholder interviews verified that facilities built by PAMSIMAS were completely functional and had diminished the community's dependence on dangerous water sources. A homeowner remarked, "*We can now obtain clean water without traversing great distances to the river*." This improvement illustrates how the program can meet essential service needs in areas with geographical challenges.

Assistance from several stakeholders—central and local government, community organizations, and business entities—has been essential. Government officials and community leaders regularly spoke about the importance of partnership in attaining fair service delivery. One official stated, "*We exerted considerable effort to guarantee that every family has access to clean water, and the results are evident*." While most households in the target locations had sufficient access, some informants indicated the necessity for continuous infrastructure maintenance and oversight to preserve these results. However, the general distribution of resources was considered equitable, revealing no significant social disparities in access.

The PAMSIMAS initiative effectively addressed water and sanitation requirements at the village level. This was accomplished via precise targeting, agile execution, and synchronized stakeholder engagement.

4. Equity

According to the findings of the observations, clean water facilities have been constructed and are currently being used at different locations across the town. A technical informant said, "*The continuous flow of water and the absence of social jealousy in certain areas are due to the equitable distribution of water access at PAMSIMAS locations*."The source further stated, "*The implementation of PAMSIMAS in the Muruk Rian District has already reached many marginalized and minority communities*."

A local leader said, "*PAMSIMAS is very helpful in increasing the use of clean water, both in urban and rural areas, because all residents are allowed to access water from PAMSIMAS facilities*.""*The PAMSIMAS assistance allocation is going well because it targets communities that do not have access to PDAM services*," said a member of the Muruk Rian District's PAMSIMAS Task Force. He further stated, "*This program adopts a community-based approach, which takes into account the needs and aspirations of the residents, including marginalized groups.*"

According to a health sector informant, "*The PAMSIMAS policy has reached many communities in remote areas, and the continuous flow of clean water to households has helped minimize social jealousy in the village*.""*The water facilities and infrastructure that have been built have greatly helped us obtain clean water, because our village is in an area not served by PDAM water services*," said a village head and a resident in the recipient area. According to the researchers' observations, the community in the Muruk Rian District continues to actively use the water and sanitation facilities that have been provided at various specific points in accordance with the Pamsimas report on activity accountability.

Equity refers to the concept of fairness and justice in the distribution of resources and opportunities. It encompasses the idea of providing individuals with what they need to achieve similar outcomes, taking into account their varying circumstances and starting points. The Tana Tidung Regency Government has shown a significant commitment to enhancing the population's access to adequate and sustainable drinking water and sanitation services in Muruk Rian District.

Research findings demonstrate that the establishment and enhancement of Drinking Water facilities in the villages of Muruk Rian District have notably influenced the local community, enabling improved access to clean water and supporting daily activities. An informant reported that the introduction of new water facilities has significantly enhanced daily life, eliminating the struggle to access clean water. Governments must take a human rights-based approach (HRBA) to water and sanitation improvements, so that no one gets left behind.[24]

The PAMSIMAS program has facilitated equitable access to water in rural areas, ensuring that all households receive services without regional bias. A local official further emphasized this sentiment, stating, "*We have actively worked to ensure that every community member, regardless of their location, has access to clean water*." The successful implementation of the PAMSIMAS program in Muruk Rian District shows a dedication to reducing differences in water access, with resources fairly given to those who do not have PDAM services. The program has effectively targeted both rural areas and low-income communities, focusing on overcoming systemic barriers that have historically restricted access to essential services. Daniel et al.[25] highlight that the success and sustainability of the PAMSIMAS program depend not only on infrastructure and financing, but also on equitable community participation, where all members—including marginalized groups—are actively involved in planning, implementation, and monitoring processes.

The PAMSIMAS initiative has not only improved water access but also enhanced coordination among local stakeholders, facilitating active participation from various community groups in the process. A study by Plan International Indonesia[13] found that water and sanitation programs in eastern Indonesia must prioritize cultural inclusion and gender-sensitive participation to ensure equitable outcomes. This inclusive approach has reduced social inequalities by prompting community members to invest their labor and finances, thereby emphasizing an additional dimension of community involvement. A community leader remarked, "*Collaborative efforts within this program foster unity and purpose, enabling us to assist those most in need*."

The initiatives of the Tana Tidung Regency Government to equalize access to drinking water and sanitation via the PAMSIMAS program have produced favorable outcomes. This program addresses immediate requirements for clean water and sanitation while promoting community engagement and social cohesion, thus contributing to the overarching objective of ensuring equitable access to basic services for all residents of the Muruk Rian District.

5.Responsiveness

According to Tana Tidung Regency's Master Plan Document for the DrinkingDrinking Water System (RI-SPAM) for the years 2016–2036, Muruk Rian District is among the regions without PDAM services because of access issues. According to the information in the document, PDAM Kabupaten Tana Tidung currently oversees just five SPAM service units, none of which serve the Muruk Rian region. A village official in the recipient region said, "*To maintain the PAMSIMAS facilities that have been built and developed, the village government allocates an operational maintenance budget of Rp20 million each year, so the facilities are still functioning until now.*" A technical officer said, "*The government strongly supports the sustainability of PAMSIMAS by directing*

village heads to allocate funds and ensure 100% water access for the community."

"*The implementation of the PAMSIMAS policy has already reached many communities in the remote areas*," an insider from the local health sector continued. Social jealousy in the community is also less likely when homes have access to water that runs continually. In one of the target regions, the village head and residents expressed that "*The water facilities that have been built greatly help the community obtain clean water because our area is not served by the PDAM*."

Responsiveness in policy implementation denotes the degree to which a program identifies and meets the changing needs and aspirations of its target communities.[26,27] Findings from the PAMSIMAS program in Muruk Rian District demonstrate a notable level of responsiveness, especially in addressing the needs of underserved communities with restricted access to infrastructure. Informants consistently indicated that the program fulfilled enduring requirements for clean water and sanitation.

A village leader stated, "*The government has acknowledged our needs and prioritized water access in previously neglected areas.*" This statement indicates a change in development priorities that increasingly incorporates community input. The program's responsiveness is evident in its approach to infrastructure delivery. Facilities were established in villages beyond PDAM service areas, directly addressing local issues associated with waterborne diseases and sanitation. A health officer stated, "*Clean water is now an accessible reality rather than a distant aspiration.*"

Active community engagement enhanced responsiveness. Community consultations and structured feedback mechanisms enabled residents to impact program design and prioritization. A community facilitator noted, "*When individuals feel acknowledged, their commitment to sustaining what they contributed increases.*" Gao et al.28 found that government responsiveness to citizen reports significantly enhances future civic engagement, regardless of the speed or quality of the response. The sustainability of drinking water supply programs in rural areas is positively impacted by human factors, including the effectiveness of water managers and the community's support and responsiveness.[20]

Several informants identified ongoing challenges, particularly regarding access to program-related information and the consistency of follow-up actions. In certain instances, local program managers exhibited a lack of proactivity in engaging residents, thereby restricting opportunities for ongoing improvement. The identified limitations indicate that, although the program demonstrates responsiveness in various areas, there remains potential for enhancing communication flows and local capacity. The PAMSIMAS program in Muruk Rian District effectively addresses community needs via adaptive infrastructure development and inclusive planning. Although implementation has effectively aligned with local priorities, maintaining this responsiveness necessitates ongoing community engagement and enhanced local facilitation.

6. Appropriateness

The government's PAMSIMAS initiative aims to increase access to safe drinking water and proper sanitation, particularly in rural and suburban regions. The PAMSIMAS initiative has been implemented in six target communities in the Muruk Rian District from 2018 to 2021. The data from the program accountability report indicates that the actual use of the disbursed funds and the planned budget allocation are consistent. The entire budget allotted has gone toward building and developing clean water and sanitation facilities, which the community now uses for domestic purposes. The PAMSIMAS program's structured budget allocation and phased fund disbursement ensured that financial resources were effectively utilized for the construction and development of clean water and sanitation facilities in rural communities.[17,25,29]

According to field observations, the community has made active use of the facilities constructed under the PAMSIMAS initiative. Human resource management that is founded on community empowerment supports the implementation's success in addition to its financial aspects. A technical informant said, "*One of the factors for the success of development that can be directly enjoyed by the residents is because it arises from the community's own efforts*." Maintaining facilities to keep them operating is made easier by community independence and the efficient use of already-existing resources. According to one health sector source, "*PAMSIMAS funds are directly managed by the Community Working Group or POKMAS, which are formed through community meetings and approved by the village head*." The POKMAS treasurer reports each disbursement, and the money is managed using structured bookkeeping with a facilitator present.

The program implementation document also mentions that, given the local geography, the development aims are focused on villages that are not served by PDAM services. According to the RI-SPAM document, all beneficiary villages are those that are included in the drinking water development region and do not currently have access to piped water from PDAM. The suitability of the PAMSIMAS program in Muruk Rian District is evident in its correspondence with the community's actual needs and priorities. Dunn[15] defines appropriateness as the assessment of the alignment between policy actions and the values, expectations, or situational realities of stakeholders. The program's focus on villages beyond PDAM service areas illustrates a data-informed strategy for prioritizing underserved populations.

An informant highlighted the critical role of accurate data in identifying villages requiring immediate assistance, enabling efficient service to those most in need. This illustrates the extent to which planning processes were rooted in local contexts and actual conditions. The alignment of budget allocations with actual expenditures further enhanced the program's appropriateness from a financial perspective. Reports show that we allocated disbursements from national and local funding sources based on implementation stages, ensuring transparency. A local official emphasized, "*Our financial transparency has been a priority*," highlighting the relationship between accountability and community trust. Additionally, community participation enhanced program alignment considerably. Residents contributed to decision-making through the establishment of local management groups, such as KKM and BPSPAMS, which facilitated context-specific solutions. A community leader stated, "*When community members participate, the solutions are more pertinent to our specific circumstances.*"

Adaptive management reinforced the suitability of the approach. The program facilitated adjustments during its course in response to monitoring outcomes and emerging challenges in the field. This dynamic responsiveness ensured that interventions stayed pertinent, particularly in light of geographic or logistical challenges prevalent in rural Kalimantan. The PAMSIMAS program exhibited a high degree of appropriateness by prioritizing data-driven decisions, promoting participatory governance, and aligning financial and operational strategies with community contexts. This ensured that the program achieved technical objectives while also aligning with the experiences of its intended beneficiaries. Recent evidence also supports that tailoring sanitation programs to local governance capacity enhances program suitability and acceptance.[10,25]

Table 1. Summary of PAMSIMAS Implementation Evaluation in Muruk Rian District Based on Dunn's Framework

No	Evaluation Dimension	Indicators	Findings	Interpretation
1	Effectiveness	Access to water and sanitation	Achieved in 6 villages; reduced waterborne diseases and open defecation	Goal achievement is strong despite PDAM absence
2	Efficiency	Fund absorption, technology use, planning	On target; community involvement enhanced outcomes	Input-output ratio is favorable
3	Adequacy	Services meet Minimum Service Standards (MSS)	Access improved, but some areas remain underserved	Partial adequacy achieved
4	Equity	Equal access among all villages	Fair distribution, including remote and rural hamlets	Strong equity performance
5	Responsiveness	Inclusion of community input	Community feedback used to adjust program implementation	Responsive governance evident
6	Appropriateness	Use of reliable data in planning	Village-level data applied; transparent budgeting and local involvement	Planning aligns with needs; appropriateness is high

Note: Dimensions adapted from William N. Dunn's policy evaluation model.[15]

The evaluation of the PAMSIMAS program in Muruk Rian District, based on Dunn's six policy criteria, indicates that it is a generally effective and responsive public service intervention. The program exhibited strengths in enhancing access to clean water, fostering behavioral change, and involving communities in planning and resource management. Efficiency and appropriateness were facilitated by transparent financial mechanisms and data-driven targeting, whereas equity was addressed through outreach to remote and underserved areas.

Challenges persist in attaining complete infrastructure adequacy and maintaining consistent responsiveness, especially regarding technical maintenance and service continuity. The findings indicate a requirement for ongoing support in local capacity building and adaptive management. The program is a well-aligned initiative that has made significant progress but necessitates continuous refinement to improve its long-term sustainability and effectiveness.

b). Impact on Public Health

In addition to enhancing infrastructure and service delivery, the PAMSIMAS program's implementation in Muruk Rian District has yielded quantifiable public health results. Reduced disease incidence, better hygiene practices, and more equitable access to clean water across communities are all indicators of these effects.

1). Reduction in Waterborne Diseases

The PAMSIMAS program in Muruk Rian District has resulted in a notable decrease in waterborne diseases, including diarrhea and dermatological infections. Before the intervention,

numerous residents depended on untreated river water, leading to recurrent instances of gastrointestinal sickness. A health officer from the local Puskesmas stated, "*Prior to PAMSIMAS, instances of diarrhea in children were prevalent, particularly following heavy rainfall when river water became turbid and contaminated*." Currently, those cases have evidently diminished.

This discovery corresponds with the World Health Organization's[3] assertion that access to potable water and fundamental sanitation can decrease diarrhea incidence by as much as 30%. Successful water, sanitation, and hygiene (WASH) initiatives in rural communities significantly correlate with reduced infection rates, as noted by Bartram et al.[30] Vollaard et al.[31] reported that in Indonesian urban areas with access to piped water, the risk of waterborne infections was significantly lower due to reduced fecal contamination compared to groundwater sources. The experience in Muruk Rian exemplifies these global and national trends, underscoring the public health significance of focused rural sanitation initiatives.

2). Changes in Hygiene Behavior

The PAMSIMAS program has not only improved health outcomes but also facilitated a change in community hygiene behavior, notably in decreasing the incidence of open defecation (BABS). Interviews with local residents revealed a significant rise in the utilization of household toilets and handwashing practices. A female informant stated, "*We used to go to the river, particularly at night, but now nearly every household has a toilet*." My children understand the necessity of handwashing prior to meals. Open defecation has decreased in rural Indonesia as a result of the PAMSIMAS program's community-driven strategy, which has significantly improved hygiene practices such as frequent handwashing and increased usage of household toilets.[2,13,32] The STBM program's emphasis on community empowerment and education has significantly contributed to the reduction of open defecation and the promotion of handwashing practices in rural Indonesian communities.[33]

The behavioral change was enabled by infrastructure, as well as community outreach and educational initiatives conducted in conjunction with the physical construction of water facilities. Community Working Groups (Kelompok Keswadayaan Masyarakat/KKM) and PAMSIMAS facilitators conducted hygiene promotion sessions and implemented door-to-door education campaigns. Eliminating open defecation (BABS) and encouraging handwashing with soap are two of the five pillars of the Community-Based Total Sanitation (STBM) method, which seeks to empower communities to alter their sanitation and hygiene practices.[32,33]

The findings indicate that the PAMSIMAS model in Muruk Rian successfully combines infrastructure provision with participatory hygiene education, fostering sustainable enhancements in public health practices.

3). Unequal Impact Due to Inconsistent Access

Despite these advancements, not all villages in Muruk Rian District equally benefited from them. Multiple informants indicated that remote or less accessible hamlets have not yet been fully connected to clean water pipelines. A community leader stated, "*Some residents continue to rely on rainwater or the river due to the absence of piped water access in our part of the village*." Challenges arise during the dry season. The restricted reach led to health disparities between central and peripheral regions. BPS Tana Tidung[6] reported that approximately 73% of households in Muruk Rian had access to safe drinking water by 2021; however, coverage was uneven, especially in upland or forest-edge settlements. Saputra[19] highlighted that stunting in Indonesian toddlers is significantly influenced by infectious diseases and socioeconomic disparities, reflecting the unequal health outcomes driven by inconsistent access to essential resources across urban and rural areas. The findings indicate that although PAMSIMAS demonstrates a positive overall impact, its effectiveness is influenced by geographical and infrastructural limitations that may intensify pre-existing disparities in health and well-being.

CONCLUSION

This study set out to answer the research question of how the PAMSIMAS program was implemented and what impact it had on public health in Muruk Rian District. Using William N. Dunn's six policy evaluation criteria, the findings indicate that the program was generally effective and appropriate in expanding access to clean water, improving hygiene practices, and promoting equity through community-based approaches. However, gaps remain in infrastructure maintenance and consistent behavioral change, reflecting limitations in adequacy and responsiveness. These results indicate that securing long-term benefits requires stronger institutional capacity, inclusive community participation, and sustainable local governance mechanisms. The study thus confirms the relevance of Dunn's framework in evaluating rural water and sanitation programs and provides policy lessons to support Indonesia's commitment to SDG 6.

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