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Implementation challenges of community-based total sanitation in wetland areas: a case study from Tanjung Jabung Barat

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Abstract

Purpose: Community-Based Total Sanitation or STBM is an empowerment-based approach promoting hygienic behavior without subsidies. However, implementation in geographically challenging areas, such as wetlands, remains problematic, with limited research on context-specific adaptations. This study aimed to analyze the implementation of STBM in wetland areas by examining implementation protocols, monitoring mechanisms, and post-Open Defecation Free (ODF) sustainability in Tanjung Jabung Barat Regency, Indonesia. **Methods:** This qualitative case study employed purposive sampling to select 12 key informants across multiple sectors (health department, public works, primary health centers, village officials, and community members). Data were collected through in-depth interviews (25 to 80 minutes), participant observation, and document review. Thematic analysis, employing open coding, was conducted with source triangulation to ensure validity. **Results:** STBM implementation remains focused on Pillar 1 (Stop Open Defecation) with uneven achievement across subdistricts (ODF declaration in only 16.4% of villages despite 74.6% being triggered). Key implementation barriers included: (1) absence of village facilitators and formal STBM working groups; (2) weak post-triggering monitoring systems lacking formal community-to-health center reporting mechanisms; and (3) geographic constraints with conventional sanitation technologies proving unsuitable for wetland conditions. Additionally, a subsidy-oriented community culture hindered the adoption of behavior change. **Conclusion:** Effective CLTS implementation in wetland areas requires context-specific adaptations, including strengthened village-level institutions, locally adapted sanitation technologies, and formal post-ODF regulations. These findings contribute to understanding the geographical determinants of sanitation program effectiveness and highlight the importance of place-based approaches to achieve sustainable sanitation goals.

Keywords: ODF; sanitation behavior; STBM; village facilitator; wetlands

INTRODUCTION

Sanitation is a fundamental determinant of public health, significantly contributing to the prevention of diseases, particularly diarrhea and intestinal parasitic infections, which remain major causes of morbidity and mortality in developing countries [1,2]. The World Health Organization (WHO) reports that more than 1.7 billion cases of diarrheal disease occur annually worldwide, resulting in approximately 525,000 deaths among children under five years old, with the majority of these cases linked to inadequate sanitation [3]. In Indonesia, the prevalence of diarrhea reaches 11%, with significant variations between provinces, reflecting disparities in access to basic sanitation services [4].

Inadequate sanitation represents a significant public health issue in Indonesia, with broad impacts on health, the economy, and quality of life [5]. To address these challenges, the Community-Based Total Sanitation (Sanitasi Total Berbasis Masyarakat/STBM) approach has been developed as a national strategy to promote hygienic and sanitary behavior through community empowerment, without reliance on government subsidies [6]. Therefore, the approach is being implemented to achieve the Sustainable Development Goals (SDGs) in sanitation, particularly the target of Open Defecation Free (ODF) communities [7].

Since its national launch in 2008, the implementation of STBM has shown varied effectiveness across different regions due to diverse contextual factors [8]. Previous evaluations have indicated that the implementation of STBM Pillar 1 (elimination of open defecation) remains suboptimal. Persistent open defecation practices, weak monitoring and coordination mechanisms at the village level, and low post-declaration sustainability have been reported, often resulting from insufficient socialization, lack of community engagement, inadequate post-ODF facilitation, and absence of sanction enforcement to prevent relapse into open defecation behavior [9,10]. These implementation challenges are further compounded in areas with geographically, socially, and economically challenging conditions [11,12].

Tanjung Jabung Barat Regency in Jambi Province presents a unique geographical context, with 60% of its area consisting of wetlands influenced by tidal systems [13]. This poses significant technical and financial challenges for the construction and maintenance of conventional sanitation infrastructure [14]. Previous studies have identified that conventional sanitation technologies, such as standard septic tanks, are unsuitable in areas with high groundwater levels, frequent flooding, and peat soil structures [15,16]. Consequently, the achievement of basic sanitation in this region remains relatively low, with access reaching only 49.95% in 2022, well below the national target [17]. These conditions represent a major obstacle to achieving the STBM targets outlined in the National Medium-Term Development Plan (RPJMN) 2020–2024, which aims for 90% access to basic sanitation and 15% to safely managed sanitation service [18]. In addition to geographical challenges, socio-cultural factors play a crucial role in the adoption of sanitation practices in Tanjung Jabung Barat. The practice of open defecation in rivers or open drains has long been a social norm among communities living in coastal and riverside areas. This practice is considered more practical and affordable, particularly due to the continuous availability of water for personal hygiene [19]. Transforming such deeply ingrained behaviors and perceptions requires more than standard triggering methods [20,21]. Triggering methods that are effective in dryland areas may not yield the same results in wetland environments.

While several studies have examined the implementation of STBM in Indonesia, most have focused on areas with stable and accessible terrain, leaving a gap in understanding how the program performs in geographically distinct and environmentally vulnerable regions such as wetlands [15,22]. Tanjung Jabung Barat confronted unique hydrogeological and socio-cultural challenges that limit the effectiveness of conventional sanitation strategies. Previous literature has also paid limited attention to how implementation protocols, monitoring mechanisms, and post-ODF sustainability should be adapted to such local context [9]. Even national assessments reveal a lack of detailed behavior-based monitoring frameworks for ecologically diverse areas [23]. Therefore, a comprehensive analysis of STBM implementation in the Tanjung Jabung Barat Regency wetland region is critical for generating context-specific insights. This study addresses that gap by examining structural barriers to sustainability, and contributes to how STBM strategies can be better adapted to geographically challenging contexts. Moreover, this study is also relevant to achieving the Universal Access 2030 target and SDG 6, which emphasizes universal access to safe and adequate sanitation [5,24].

Therefore, this study aims to analyze the implementation of the STBM program in Tanjung Jabung Barat Regency, focusing on three key aspects: the implementation protocol of STBM Pillar 1 (Stop Open Defecation), monitoring and coordination

mechanisms, and the sustainability of post-Open Defecation Free (ODF) declaration.

The findings are expected to contribute to the development of more adaptive and context-specific STBM strategies for regions with unique geographical characteristics, and to strengthen the knowledge base on sanitation program implementation in wetland areas.

METHODS

This study employed a qualitative approach with an exploratory case study design to analyze the implementation of the Community-Based Total Sanitation (STBM) program in Tanjung Jabung Barat Regency, carried out in 2022. The research focused on three main aspects: (1) the implementation protocol of STBM Pillar 1, (2) monitoring and coordination mechanisms, and (3) post-Open Defecation Free (ODF) declaration sustainability.

Informants were selected through purposive sampling based on the principles of relevance and data sufficiency. A total of 12 informants were involved, representing various stakeholders: the Regional Development Planning Agency (Bappeda) (n=1), Health Office (n=2), Department of Public Works and Spatial Planning (n=1), Primary Health Center (Puskesmas) heads (n=2), sanitarians (n=2), the Housing and Settlement Working Group (Pokja PKP) (n=1), and community members (n=3).

Primary data were collected through in-depth semi-structured interviews using an interview guide developed based on the Community-Led Total Sanitation Rapid Assessment Protocol (CLTS-RAP) framework. Interviews lasted between 25 and 80 minutes, were audio-recorded with the informants' consent, and have been transcripted verbatim. Additionally, participatory observation was conducted using a structured observation sheet to examine sanitation conditions, community behaviors, and existing infrastructure at the study sites. Secondary data were obtained through document review, including policy documents, program reports, and monitoring data from the e-STBM platform.

Data analysis was conducted thematically through several stages: (1) transcription of interview recordings, (2) open coding, (3) grouping of codes into categories and themes, (4) construction of a findings matrix based on the research variables, and (5) thematic interpretation. To ensure data validity, triangulation of sources was performed by comparing information from different types of informants, triangulation of methods was achieved by using various data collection techniques, and member checking was conducted by confirming the findings with key informants.

This study received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada (Approval No: KE/FK/0386/EC/2022), as well as research permission from the local government authorities. All informants were informed about the study objectives and signed an informed consent form prior to participation. The confidentiality of informants' identities and research data was maintained following research ethics principles.

RESULTS

STBM implementation outcomes

Tanjung Jabung Barat Regency comprises 13 sub-districts and 134 villages/urban wards. Since 2016, the region has been implementing the Community-Based Total Sanitation (STBM) program, with a primary focus on the first pillar: Stop Open Defecation (SBS). This continued emphasis on the first pillar is due to the incomplete elimination of open defecation practices (OD) across the regency, indicating that fundamental challenges related to sanitation behavior and infrastructure remain central concerns in the initial phase of STBM implementation.

Based on the analysis of STBM achievement data (Table 1), significant variation was observed among sub-districts in terms of reductions in open defecation practices and the coverage of basic sanitation services. Some sub-districts have demonstrated substantial progress, particularly in the upstream areas such as Tungkal Ulu, Merlung, Renah Mendaluh, and Tebing Tinggi. Tungkal Ulu recorded the highest reduction in open defecation, at 68.38%, with access to basic sanitation reaching 93.61%. Meanwhile, Merlung and Tebing Tinggi also showed favorable outcomes, with sanitation coverage exceeding 90%.

These achievements are most probably influenced by more stable geographical conditions (non-inundated areas), better logistical access, and more effective program facilitation. Upstream areas also have community structures that are more responsive to environmental health interventions. Conversely, several sub-districts showed stagnant or even regressive outcomes. In Seberang Kota, the prevalence of open defecation increased from 22.16% to 50.40%, accompanied by low basic sanitation coverage (33.06%). Similar trends were observed in Pengabuan and Muara Papalik, where open defecation practices increased despite relatively high sanitation coverage (>90%). This phenomenon indicates that the mere presence of infrastructure does not automatically result

in behavior change, especially in the absence of behavior monitoring systems, facility quality control, and sustained post-ODF interventions.

Table 1. Sanitation conditions before and after STBM implementation

Sub-district	% OD 2023	% OD *baseline*	% reduction in OD	% access to basic sanitation 2023	% safely managed sanitation coverage 2023
Tungkal Ulu	6.39	74.77	68.38	93.61	0
Renah Mendaluh	19.35	51.79	32.44	78.72	0
Merlung	4.83	22.05	17.22	95.17	0
Betara	9.56	20.15	10.59	78.53	0
Tebing Tinggi	0.00	10.10	10.10	91.35	0
Kuala Betara	63.48	67.21	3.73	26.42	0
Senyerang	9.83	12.37	2.54	58.92	0
Bram Itam	10.68	12.37	1.69	72.88	0
Tungkal Ilir	26.38	27.96	1.58	62.60	0
Batang Asam	11.82	13.09	1.27	85.37	0
Muara Papalik	3.10	2.08	-1.02	94.77	0
Pengabuan	4.25	0.00	-4.25	93.53	0
Seberang Kota	50.40	22.16	-28.24	33.06	0

Source: STBM E-Monitoring and Tanjung Jabung Barat District Health Profile, 2023

Most sub-districts with low performance were located in wetland areas, reinforcing the assumption that geographic characteristics significantly influence the effectiveness of the STBM program. Challenges such as unstable soil, frequent waterlogging, and technical difficulties in constructing durable latrines were major barriers. Additionally, the absence of adaptive sanitation technologies for wetlands and weak intersectoral coordination have further exacerbated poor outcomes in these regions. Table 2 presents findings related to the implementation of STBM Pillar 1 in Tanjung Jabung Barat Regency.

STBM protocol

The implementation of the first pillar of Community-Based Total Sanitation (STBM) in Tanjung Jabung Barat Regency has generally followed the technical guidelines for the use of non-physical Special Allocation Funds (DAK) in the health sector. This protocol encompasses several stages, including STBM triggering, problem identification and situational analysis (IMAS), post-triggering monitoring, development and updating of sanitation maps, handwashing with soap campaigns, water quality surveys, as well as ODF (Open Defecation Free) verification and declaration.

In-depth interviews revealed that program implementers understood the flow of activities as outlined in the guidelines. However, in practice, several activities were not fully implemented. One major weakness lies in the planning stage, where not all villages appointed village facilitators. As a result, triggering was often conducted solely by sanitarians or facilitated by district-level facilitators (faskab), which limited local capacity and hindered post-triggering sustainability.

> *"Usually, triggering is done by sanitarians accompanied by the faskab. But if it's the senior sanitarians, they already have experience and don't need to be accompanied, especially in the upstream areas." (Informant 4)*

Nearly all triggered villages did not form a dedicated STBM task force at the village level. As a result, there were no clear community work plans to support program sustainability. In the absence of a village institutional structure, post-triggering monitoring became the sole responsibility of village heads and health cadres, who often lacked technical support and intensive mentoring.

> *"Actually there was a plan, but we didn't set it up again. We only made an agreement, for example how many households would build latrines in a year. But for us to go back into the field, that hasn't happened. So we build commitment among community members, but we can't really demand them to build within the same year. Because they still have to think about the cost. Later they'll ask, 'where's the money coming from?'"(Informant 8)*

In some cases, community commitment was limited to informal agreements or self-initiated efforts, such as latrine-saving groups ("arisan jamban"). However, these initiatives were typically short-lived due to a lack of institutional support.

> *"After triggering, we didn't really form a special STBM group—maybe just some initiative from the village head. Community responses vary. Sometimes after triggering, they'll ask, 'Are there any subsidies?' Such as in Makmur Jaya village, they did a latrine-saving initiative. It lasted for one cycle only. It was organized as a group though." Informant 6*

Table 2. Implementation of STBM pillar 1 in Tanjung Jabung Barat Regency

Pillar	Indicator	Field findings	Recommendation
STBM protocol	Socialization about ODF, verification, certification	Conducted by District Health Office and sanitarians, but not all village officials understand the process and ODF criteria	Special training is needed for village officials
	Verification & certification process	Verification and certification were carried out according to procedure, but the number was minimal because more villages were declared ODF than verified	Encourage increased ODF achievements in line with the ongoing certification process
	Capacity of verification implementers	Sanitarians and health center staff were trained, but not all villages have trained facilitators	Recruitment and training of village facilitators needed
Monitoring & coordination	Monitoring mechanism from community to district	No formal mechanism; village reports are submitted directly to health centers	Develop a reporting system based on the community and local health workers (cadres)
	Monitoring indicators according to post-ODF behavior	Indicators are inconsistent; more focused on toilet infrastructure than behavior change	Revise indicators to capture post-ODF behavior more effectively
	Use of data in cross-sectoral coordination	STBM data is rarely used in multi-sector coordination	Integrate STBM data into multi-sectoral development planning documents
Post-ODF sustainability	Mechanism for post-ODF technology development	No local innovation initiatives for sustainable technology in wetland areas	Develop appropriate technology for wetland sanitation
	Private sector involvement	No visible involvement from private sector/CSR	Initiate collaboration with local businesses or CSR programs
	Post-ODF monitoring system	No formal system; no regular follow-up monitoring after ODF declaration	Build a post-ODF monitoring system involving community and health center staff

In the absence of a village-level STBM team, the triggering activities typically concluded with an informal agreement on behavior change targets between the Puskesmas and the village head. The monitoring of community behavior change was conducted by health cadres and midwives; however, implementation lacked consistency, resulting in no noticeable behavior change. Puskesmas staff conduct semiannual monitoring, but without routine mentoring.

"Sometimes we lose continuity. Okay, we do the triggering, we engage the community, we check the water quality—but once the results come out, the process just ends there." Informant 7

By 2021, only 22 out of 134 villages/urban wards in Tanjung Jabung Barat Regency had been declared ODF, mostly located in dryland areas unaffected by tidal flooding. The verification process was conducted in stages by designated teams from the district, sub-district, and other villages. However, the certification process was often delayed due to a lack of reports on ODF achievements. Many triggered villages showed little progress toward ODF, making them ineligible for further verification. The lack of reporting and formal submissions from villages also contributed to delays in certification.

There was an apparent disparity between the number of triggered villages and those achieving ODF. In 2021, 74.6% of villages had been triggered, but only 16.4% reached ODF status. This gap highlights the low effectiveness of post-triggering sustainability efforts. Interviews revealed that the primary barriers were social, cultural, geographic, and economic in nature.

"The cultural norms are deeply rooted—Malay culture tends to wait for help, if I may say. It's different from Javanese culture, which has a stronger fighting spirit." Informant 9

"If you look at the number of triggered villages and those that are ODF, the gap is huge. So now we're discussing with the environmental health team—what exactly is the problem? Is it that the tools used during triggering aren't effective, or is it the low economic status of the communities?" Informant 3

"I've often said at the national level—don't generalize this program. For our region, they usually just create a one-size-fits-all prototype. For example, this is how

the septic tank should look—but the foundation here doesn't support that kind of structure. You can't apply the same standards as in cities." Informant 2

In summary, although the implementation of the first STBM pillar in Tanjung Jabung Barat has adhered to national protocols, its effectiveness remains suboptimal. Weaknesses in village-level institutions, minimal behavior monitoring, and the lack of technology adaptation to specific geographic conditions are the key factors behind the unmet ODF targets across the region.

Monitoring and coordination

The monitoring of the Community-Based Total Sanitation (STBM) program in Tanjung Jabung Barat Regency is conducted in a top-down manner, led by the District Health Office at the regency level and by Puskesmas (primary health centers) at the sub-district level. Monitoring is conducted on a biannual basis and primarily targets villages where triggering activities have been implemented.

However, to date, there is no formal reporting mechanism from the community to the Puskesmas. Monitoring activities remain largely incidental and depend heavily on the initiative of village health cadres, who use checklist forms to observe progress on the five STBM pillars. The collected data is then submitted to the District Health Office through the national STBM SMART system. At the village level, monitoring results serve merely as reporting material, without being integrated into formal evaluation processes by local governments.

"Every six months we monitor the villages that have undergone triggering. Usually, we have to proactively ask for updates—'Is there any progress?'—and then we prepare the data format and send it back to the cadres.."Informant 6

"Yes, we already have a system for the Puskesmas. We check it through STBM SMART, which is a national platform. We can view the progress for Jambi Province and Tanjung Jabung Barat there—that's the result of our monitoring."Informant 4

Coordination activities are conducted through biannual mini-workshops between the District Health Office and the Puskesmas, where monitoring results and implementation evaluations of environmental health programs are discussed. However, there remains a lack of comprehensive and regular feedback mechanisms, and monitoring data have yet to be fully utilized for strategic planning or budgeting purposes. Intersectoral coordination also remains weak, with inconsistent involvement from key agencies, including the Public Works Office (PUPR), the Housing and Settlement Agency (Perkim), and the Regional Development Planning Agency (Bappeda).

"Usually during STBM meetings, we evaluate the monitoring results. All the Puskesmas participate, and we discuss things together." (Informant 4)

"My principle is this: don't present beautiful data if the reality is poor. If that's what we've got, then that's what we report. I don't want just a 'nice-looking' report. In the end, the district level will be confused about how to follow up." Informant 7

The coordination forum Pokja PKP, intended to serve as a multi-sectoral platform for water and sanitation, has not yet operated optimally. Meetings are often ad hoc and have not become part of a regular decision-making system, typically only taking place at the end of the year to develop action plans. Interviews with stakeholders across sectors suggest a shared understanding that sanitation issues cannot be resolved by the health sector alone. Ideally, the Pokja forum should facilitate coordinated action. It was also emphasized that collaboration should extend down to the community level, ensuring that efforts are not solely driven by government institutions, but involve a broader movement.

"Sanitation efforts must be collaborative—every government agency (OPD) should be involved. There needs to be local-level mobilization. As the regent says, we need to build a sense of responsibility and sensitivity." Informant 2

"The Health Office cannot act alone. We need support from various sectors. That's the purpose of the Pokja PKP: to plan joint action for the future." Informant 3

Therefore, the Pokja PKP forum must strengthen its role as a coordination mechanism for the drinking water and sanitation sectors. At the same time, the Health Office, as the lead sector for STBM, should also enhance collaboration with other program stakeholders.

"Going forward, there must be a massive movement. Programs must be concrete, and budgets must be strong, so that meaningful results can be achieved. But of course, this will take time—it's not something that happens overnight." Informant 9

Post-ODF sustainability

The post-declaration sustainability of the Open Defecation Free (ODF) status in Tanjung Jabung Barat Regency continues to face several challenges. Although villages that have been declared ODF are considered

free from open defecation practices, no formal mechanism exists to ensure that this condition remains sustainable over time. Agreements made between the primary health centers (Puskesmas) and village authorities after ODF declaration are typically informal. They are not reinforced through official documents such as a Village Head Decree (Surat Keputusan), which limits their binding power.

"There's nothing written yet—no formal village-level sanctions. At most, we just put up posters or carry out some health education sessions." Informant 6

Post-ODF monitoring is generally integrated with other cross-sectoral programs such as health promotion and maternal and child health (MCH), typically relying on existing village health cadres. Due to the absence of a dedicated STBM team at the village level, this monitoring remains limited and lacks systematic structure.

The District Health Office has initiated efforts to guide ODF-declared villages toward implementing the remaining four pillars of STBM. However, as of 2022, only 9 out of the 21 ODF villages had received continued support. These efforts have been concentrated primarily in the upstream regions, which are geographically more stable.

"Only 9 villages have received support so far, all located in the upstream areas since those are the only regions that have reached ODF. The remaining task is to implement the other four pillars, which the Ministry of Health aims to support." Informant 3

Post-ODF sanitation improvement initiatives include the construction of safe latrines equipped with sealed septic tanks. However, the absence of a Fecal Sludge Treatment Plant (FSTP) in the regency presents a major barrier to managing household wastewater. The establishment of such a facility has been hindered by high capital investment requirements, land availability issues, and complex maintenance—particularly given the area's wetlands context. In parallel, the development of other sanitation infrastructure, such as village-level piped water systems, has begun to support the remaining STBM pillars.

Innovative technologies such as *Tripikon*—designed specifically for riverine and wetland communities—have yet to be widely implemented, mainly due to funding constraints and limited technical support.

"As for development plans, actually, we've considered Tripikon systems for riverbank areas, but they haven't been realized yet. Tripikon is designed for areas located near rivers." Informant 6

In summary, post-ODF sustainability in Tanjung Jabung Barat remains fragile due to the absence of formal mechanisms, limited monitoring, and a lack of adaptive technological support. Strengthening village-level institutional frameworks, introducing innovative funding schemes, and improving cross-sector collaboration are essential to maintaining ODF status and scaling up the implementation of all five STBM pillars.

DISCUSSION

The implementation of Community-Based Total Sanitation (STBM) in Tanjung Jabung Barat District faces complex and interrelated structural, cultural, and geographical challenges. Although the program has followed national protocols procedurally, several key factors significantly hinder its effectiveness, such as the shortage of village facilitators and the absence of community-based working groups, which have resulted in uneven achievement of Open Defecation Free (ODF) status across regions.

The lack of village facilitators and community-level STBM teams has broad implications for program sustainability. Findings indicate that the failure to establish natural leaders and develop Community Action Plans has resulted in weak continuity of interventions following triggering activities. This aligns with the Ministry of Health's (2012) emphasis on natural leaders as vital agents of change within communities [25]. The absence of dedicated village-level STBM teams results in unsustained activities and poorly directed monitoring efforts. These findings reinforce earlier studies that highlight the importance of strong local institutional support in improving access to sanitation [26,27]. Robust institutional structures at the village level have been shown to sustain behavior change and expand sanitation coverage, as demonstrated in experimental studies conducted in Ghana [8].

Triggering sessions that are conducted only once, without comprehensive follow-up, can produce suboptimal behavior change. This study supports the notion that changing sanitation behavior requires repetitive and long-term engagement, rather than one-off events [28,29]. A longitudinal study in Indonesia found that, without post-triggering follow-up visits, behavior changes tend to be short-lived and communities often revert to previous practices [30]. The program's reliance on health center staff rather than on community empowerment also contradicts the core principles of STBM as a community-led approach [6]. From a cultural standpoint, this study reveals a prevailing reliance on external aid among

communities, which contradicts the STBM's non-subsidy principle. Previous studies found that communities with long histories of aid dependency often resist non-subsidized sanitation approaches.[20] Socio-cultural factors have consistently been identified as barriers to the adoption of sanitation behavior in similar contexts [31,32].

Geographical challenges—especially in the downstream wetland areas of the district—pose technical difficulties. Conventional sanitation technologies are often unsuitable in hydrogeologically sensitive areas, such as those with high water tables or peat soils.[15] Building latrines that meet technical standards requires greater financial investment and context-specific technological adaptation. Technologies such as *Tripikon-S* or decentralized communal waste treatment systems have yet to be optimally integrated into STBM implementation. High groundwater levels, unstable building foundations, and limited access to clean water further exacerbate the community's ability to establish safe sanitation facilities [33,34]. Economic constraints also present significant barriers. With a poverty rate of 10.75%, household sanitation remains a low priority for many families. This finding is consistent with studies demonstrating that socioeconomic status has a strong influence on household decisions to invest in latrines [35,36].

In terms of monitoring, this study found that program oversight tends to focus more on administrative data collection rather than on evaluating actual behavior change, reflecting a narrow and incomplete approach. Post-triggering monitoring has not been leveraged to design follow-up interventions or strengthen village institutions. These observations are consistent with findings that highlight weaknesses in evaluation and feedback mechanisms within STBM program management [37,38]. Participatory evaluation, which engages communities in data interpretation, has been shown to enhance the sustainability of community-based health programs [37].

Weak inter-sectoral coordination—particularly through the underperforming District Working Group on Drinking Water and Sanitation (Pokja PKP)—reflects structural governance challenges in sanitation management. Coordination meetings remain irregular and are not integrated into routine multi-sectoral planning processes, indicating a weak commitment across government sectors to treating sanitation as a shared responsibility [39].

Although some villages have achieved ODF status, post-ODF sustainability remains a critical issue due to the lack of formal mechanisms to uphold the status—such as monitoring systems enforced through regulation or sanctions. In fact, sustainable ODF outcomes require the reinforcement of social norms, village regulations, and behavior monitoring systems [6,25,40]. Villages with formal regulations and social sanctions demonstrate more sustained ODF outcomes compared to those relying solely on individual awareness [41].

Progress toward achieving safe sanitation access, as targeted in Indonesia's National Medium-Term Development Plan (RPJMN) (90% basic, 15% safely managed), remains hindered by the lack of infrastructure, such as fecal sludge treatment plants (FSTPs), suitable for wetland areas.[18] The development of appropriate sanitation technologies such as *Tripikon-S* should be facilitated and adapted to local capacities. Cross-sectoral support and public-private partnerships are critical to advancing STBM sustainability, particularly in regions facing significant geographical challenges [42].

Beyond the technical and institutional factors, this study highlights the critical role of social dynamics and cultural perceptions in shaping sanitation outcomes. Communities in wetland areas, such as Tanjung Jabung Barat, often operate within long-standing norms of open defecation, shaped by geography, economic hardship, and a historical reliance on subsidies. These socio-cultural legacies undermine behavior change efforts and challenge the core tenets of STBM as a non-subsidy, community-led program [20,22]. Evidence also shows that participatory behavior change is only effective when embedded in inclusive decision-making and when reinforced by social accountability mechanisms [19,41]. Therefore, addressing the social determinants of sanitation—particularly equity, empowerment, and local leadership—is essential to ensuring that STBM contributes to the broader social goals of SDG 6, especially for populations in geographically and socially disadvantaged contexts.

This study contributes to the STBM implementation literature by highlighting the role of geography as a significant determinant of program success. The findings underscore the importance of place-based approaches in STBM programming, emphasizing the need to adapt interventions to local contexts and to integrate geographically appropriate sanitation technologies. This study has several limitations. First, the observation area did not fully capture the district's geographical diversity. Second, the perspectives of some key stakeholders, such as private sector actors, were not adequately represented. Future studies with broader geographic coverage and mixed methods—including quantitative approaches—would help further validate and enrich the current findings.

CONCLUSION

The implementation of the Community-Based Total Sanitation (STBM) program in Tanjung Jabung Barat District has yet to achieve optimal effectiveness in attaining equitable Open Defecation Free (ODF) status. This study identifies three fundamental barriers: first, structural deficiencies—specifically, the absence of village-level facilitators and STBM working groups—resulting in a lack of post-triggering continuity; second, a weak monitoring system focused primarily on administrative reporting without substantive feedback mechanisms; and third, the lack of technological adaptation to the wetland geographic context. Socio-cultural factors, including community dependence on external subsidies and the normalization of open defecation practices, further undermine the program's effectiveness.

These findings underscore the critical importance of context-specific approaches in sanitation interventions, highlighting geography as a significant determinant of program success. A place-based approach that considers local geographic characteristics can serve as a key strategy for implementing effective and sustainable sanitation.

Strategic reformulation of the STBM program is thus necessary. This includes strengthening village-level institutions through the training and empowerment of local facilitators, developing adaptive sanitation technologies suitable for wetland environments, formalizing post-ODF regulations through village-level legal instruments, and integrating behavior-based monitoring systems. Enhanced cross-sectoral coordination is also essential to ensure sustained technical and financial support.

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