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Integrated policy planning for accelerating and sustaining open defecation free (ODF) status: a bardach policy analysis

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ABSTRACT

Open defecation (OD) remains a multidimensional sanitation challenge in Palembang City because it is shaped not only by household behavior but also by access to clean water, geographic conditions, socioeconomic capacity, housing characteristics, sanitation facilities, knowledge, attitudes, and cross-sector governance. This study transforms empirical evidence on OD in Palembang into an integrated policy design for accelerating and sustaining Open Defecation Free (ODF) status. The analysis applies Bardach's policy evaluation framework using four criteria: technical feasibility, economic and financial possibility, political viability, and administrative operability. The empirical evidence underlying the analysis identified nine factors associated with OD behavior. Clean-water source was the most dominant factor (OR = 11.558; $p < 0.001$), followed by household geographic location (OR = 3.558; $p = 0.015$). At the end of 2023, 32.5% of respondents still practiced OD, while 67.5% were already ODF. Seven policy alternatives were examined, including cross-sector prioritization, inter-agency coordination, One Map ODF, inclusive sanitation and water access, area-specific interventions linked to poverty reduction, strengthened hygiene behavior assistance, and collaborative financing with post-declaration monitoring. The analysis indicates that the most coherent policy package combines One Map ODF as a technical planning instrument, continuous hygiene behavior education and assistance as an economically efficient intervention, formal establishment of P2-ODF as a cross-sector development priority, and collaborative financing supported by verification and post-declaration monitoring. The study contributes an area-based, evidence-informed planning model that links sanitation infrastructure, clean water, behavior change, poverty reduction, spatial targeting, financing, and governance within one policy architecture for Palembang City.

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Introduction

Sanitation is a fundamental component of human development and public health. Adequate sanitation is not limited to the physical availability of toilets or fecal-disposal facilities; it also reflects environmental quality, household welfare, and the capacity of government to provide inclusive and sustainable basic services (Green & Kreuter, 2000). When open defecation persists, the problem therefore cannot be reduced to individual behavior

alone. It reflects a broader interaction among socioeconomic conditions, environmental constraints, infrastructure, and governance (Raharyanti, 2013).

Open defecation has wide public-health consequences because it can increase environmental contamination and the transmission of environmentally mediated diseases while reducing quality of life (Dewi & Nahara, 2019). For this reason, eliminating OD through the achievement of Open Defecation Free (ODF) status should be understood as an integral part of health development, poverty reduction, basic-infrastructure provision, and improvement of the urban environment (Njuguna, 2017). In urban areas, however, these challenges are spatially heterogeneous. Neighborhoods with relatively good infrastructure may coexist with riverbank settlements, wetlands, dense settlements, land-constrained housing, and low-income communities. This heterogeneity limits the effectiveness of uniform sanitation interventions.

These conditions are directly relevant to Palembang City, where rivers, wetland areas, dense settlements, limited residential land, and unequal access to basic infrastructure create different sanitation constraints across communities. In this context, sanitation facilities need to be combined with reliable access to clean water, behavior change, community capacity building, and interventions that are responsive to household socioeconomic conditions and neighborhood characteristics.

The empirical evidence underlying this study shows that OD behavior in Palembang is associated with nine factors: income, education, availability of clean water, source of clean water, housing characteristics, defecation facilities, geographic location, knowledge, and attitudes. Multivariable analysis identified clean-water source as the most dominant factor (OR = 11.558; $p < 0.001$), followed by household geographic location (OR = 3.558; $p = 0.015$). At the end of 2023, 32.5% of respondents still practiced OD, whereas 67.5% had achieved ODF status. These findings indicate that the remaining policy challenge is not simply to start sanitation programs, but to accelerate ODF achievement in underserved locations while maintaining ODF status where it has already been achieved.

Palembang City has implemented sanitation-related interventions through health, public works, and other local-government sectors. Existing activities include sanitation infrastructure, clean-water access, health education, behavior-triggering activities, and community empowerment. Nevertheless, implementation continues to face constraints in financing, program execution, cross-sector coordination, collaboration, and public communication. The central policy gap is therefore not the complete absence of government programs, but the incomplete integration of policy design and policy implementation across target groups, data systems, financing mechanisms, operational arrangements, and performance indicators.

National and local policy frameworks provide a sufficient normative basis for stronger action. Indonesia's Community-Based Total Sanitation (Sanitasi Total Berbasis Masyarakat, STBM) policy places the elimination of open defecation as a core sanitation pillar. National policies on drinking water and sanitation, stunting reduction, and minimum service standards also support integrated local action. The remaining challenge is to translate those frameworks into interventions that are sensitive to the geographic, socioeconomic, and settlement characteristics of Palembang.

This study therefore addresses the following policy problem: the integration of sanitation planning and implementation, access to clean water, behavior change, and cross-sector coordination has not yet been optimized to accelerate and sustain ODF achievement in Palembang City. The study aims to evaluate policy alternatives using Bardach's framework and formulate an integrated policy package that can operationalize empirical findings into a cross-sector planning strategy. Its contribution lies in connecting household-level determinants of OD with spatial targeting, behavior change, collaborative financing, and institutional coordination in a single area-based policy architecture.

Theoretical and Policy Framework

Public health, socioeconomic, and environmental perspectives

Public-health theory emphasizes that health status is determined not only by health services but also by social, economic, behavioral, and environmental conditions. In sanitation, safe fecal management, clean water, household waste management, and wastewater management work together to interrupt disease-transmission pathways and improve quality of life (Glanz et al., 2008). Within the STBM approach, behavior change is central because toilet ownership does not automatically ensure consistent use. Knowledge, attitudes, social support, and sustained community engagement are therefore essential for maintaining healthy sanitation practices (Faidah, 2020; Erna et al., 2021).

Socioeconomic conditions affect the capacity of households to invest in sanitation and housing improvements. Low-income households may prioritize immediate consumption needs over toilet construction, water access, or housing improvements, which can sustain sanitation deprivation (Ayadi, 2020). Educational

attainment also affects the ability to receive health information and adopt healthier practices. In this sense, sanitation deprivation is multidimensional rather than purely infrastructural, involving income, education, housing, service access, and behavioral capacity (Bari & Hidayat, 2022; Yolanda et al., 2022).

Environmental conditions are particularly important in Palembang because clean-water access and geographic characteristics influence the feasibility and continued use of sanitation facilities. Riverbanks, wetlands, densely built areas, and land-constrained settlements may face technical barriers to conventional septic systems. This helps explain why sanitation policy must be adapted to physical context rather than implemented through one uniform model (Malik, 2021). The interaction between poverty and environmental quality also supports an integrated policy approach: limited sanitation access can worsen environmental risk, while environmental degradation can increase disease burden and reduce household productivity.

Planning and policy-analysis perspective

Rational planning emphasizes systematic problem identification, goal setting, data collection, evaluation of alternatives, and implementation (Silmi et al., 2024). Participatory and advocacy perspectives complement this approach by recognizing that public policy must represent different community needs and secure social acceptance. Contingency planning further suggests that no single intervention is appropriate for every context; planning must be adjusted to environmental conditions, social characteristics, and available resources (Fatimah, 2020).

This study uses Bardach's policy-analysis approach to translate empirical sanitation findings into actionable alternatives (Bardach, 2012). Four evaluation criteria are used: technical feasibility, economic and financial possibility, political viability, and administrative operability. Together, these criteria enable an assessment of whether an alternative can be technically implemented, sustainably financed, politically supported, and administratively executed through available institutions and procedures.

Regulatory and institutional

The policy context includes the Ministry of Health Regulation No. 3 of 2014 on Community-Based Total Sanitation (STBM), Palembang Mayor Decree No. 288 of 2020 on the STBM Program Implementation Team, Presidential Regulation No. 185 of 2014 on the Acceleration of Drinking Water and Sanitation Provision, Palembang Mayor Decree No. 292/KPTS/BAPPEDA LITBANG/2021 on the poverty-reduction coordination team, Presidential Regulation No. 72 of 2021 on stunting reduction, and Ministry of Home Affairs Regulation No. 59 of 2021 on minimum service standards. These regulations provide a basis for integrating sanitation, clean water, health, poverty reduction, planning, budgeting, and local service delivery.

Method

This study is an evidence-informed policy analysis that converts empirical findings on OD in Palembang City into a structured set of policy options. The evidence base originates from the research underlying the policy paper, which combined quantitative, qualitative, and SWOT approaches to examine the factors associated with OD behavior in Palembang. The policy-analysis stage reported here does not alter those empirical results; instead, it uses them as the basis for problem diagnosis, alternative development, and policy evaluation.

The empirical component identified nine factors related to OD behavior: income, education, availability of clean water, source of clean water, housing characteristics, defecation facilities, geographic location, knowledge, and attitudes. The source document reports multivariable results for the two strongest factors clean-water source and geographic location and reports the proportion of respondents practicing OD and those already ODF at the end of 2023. No additional sample size, sampling procedure, or unreported statistical result is reconstructed in this article.

Problem formulation was developed by distinguishing major issues, controversies, implementation gaps, and inconsistencies in ODF achievement. The diagnosis covered incomplete ODF coverage, clean-water access, geographic and settlement constraints, socioeconomic inequality, behavior change, cross-sector coordination, financing, community empowerment, and post-declaration sustainability. These problem dimensions were then used to formulate policy alternatives that were responsive to both household-level determinants and local-government implementation constraints.

Seven policy alternatives were evaluated using four Bardach criteria: (1) technical feasibility, referring to the availability of technical resources, infrastructure, expertise, and implementation practicality; (2) economic and financial possibility, referring to affordability, resource efficiency, financing sustainability, and expected benefits relative to cost; (3) political viability, referring to alignment with policy priorities and support from government, communities, and other stakeholders; and (4) administrative operability, referring to institutional capacity, division of roles, procedures, reporting, and coordination mechanisms.

The analytical sequence consisted of five steps: identifying the core policy problem; mapping the issue-gap-inconsistency structure; formulating seven alternatives; evaluating each alternative against the four criteria; and synthesizing the evaluation into a combined policy package. The analysis is qualitative and comparative rather than score-based. This is consistent with the source document, which does not provide numerical weights or composite scores for the Bardach criteria.

Results and Discussions

Empirical Profile of the ODF Problem

The empirical findings demonstrate that OD in Palembang is multidimensional. Nine factors were identified as being related to OD behavior: income, education, availability of clean water, source of clean water, housing characteristics, defecation facilities, geographic location, knowledge, and attitudes. Among these, source of clean water emerged as the strongest factor in the multivariable analysis, with an odds ratio of 11.558 and $p < 0.001$. Geographic location was the next dominant factor, with an odds ratio of 3.558 and $p = 0.015$. These results place water access and spatial context at the center of ODF policy design rather than treating them as secondary supporting variables.

At the end of 2023, 32.5% of respondents still practiced open defecation, while 67.5% were already ODF. This distribution indicates that Palembang is simultaneously facing two policy tasks: accelerating interventions for households and areas that remain non-ODF, and sustaining behavior and sanitation performance in areas that have already achieved ODF. The policy objective must therefore combine acceleration and consolidation rather than focusing only on initial ODF declarations.

Policy Problem Diagnosis

Table 1. Policy problem diagnosis for accelerating and sustaining ODF in Palembang City

Issue	Policy tension	Implementation gap	Observed inconsistency
Incomplete citywide ODF achievement	Physical sanitation facilities versus behavior change	Programs exist, but not all households have reached ODF	ODF achievement differs across areas and population groups
Access to clean water	Priority for toilet construction versus fulfillment of clean-water access	Sanitation interventions are not always accompanied by adequate water interventions	Areas with sanitation facilities do not necessarily have adequate water access
Geographic and settlement characteristics	Uniform sanitation development versus area-based intervention	Intervention models are not fully adapted to geographic and settlement conditions	The same intervention can produce different outcomes across areas
Socioeconomic conditions	Government assistance versus household capacity for self-provision	Households have unequal economic capacity to meet sanitation standards	Capacity to provide and maintain sanitation facilities varies
Behavior change	Infrastructure provision versus sustained behavior change	Facility construction is not always followed by sustainable behavior change	Facility use does not always remain consistent with healthy sanitation behavior
Cross-sector coordination	Sectoral approach versus cross-sector collaboration	Health, sanitation, water, housing, and empowerment programs are not fully integrated	Interventions may proceed according to separate sectoral mandates
Financing	Limited public budget versus sanitation investment needs	Financing needs exceed available intervention capacity	Financial support is uneven relative to area-level needs
Socialization and community empowerment	One-way communication versus community empowerment	Sanitation information does not always produce permanent behavior change	Intensity and effectiveness of community support vary across areas
ODF sustainability	ODF declaration versus consolidation and maintenance	Achievement targets are not always followed by post-achievement surveillance	ODF areas still require monitoring to prevent regression

The diagnosis shows that Palembang's policy gap is primarily integrative. Infrastructure, water access, socioeconomic support, behavior change, financing, and monitoring are already represented in separate programs, but they are not yet consistently connected through a common targeting system, shared indicators, synchronized financing, and joint accountability. This explains why program existence does not automatically translate into uniform and sustainable ODF achievement.

Evaluation of Policy Alternatives Using Bardach Criteria

Table 2. Qualitative evaluation of seven policy alternatives

Policy alternative	Technical feasibility	Economic/financial possibility	Political viability	Administrative operability	Synthesis
Establish P2-ODF as a cross-sector priority	Can be integrated into regional planning documents	Requires relatively limited coordination costs	Aligned with STBM and stunting-reduction priorities	Can be implemented through formal policy and inter-agency commitments	Long-term success depends on consistent commitment and coordination
Formal cross-agency coordination mechanism	Uses existing government structures	Efficient because it optimizes existing agency resources	Strengthens institutional synergy and stakeholder support	Roles, indicators, and reporting can be formalized through a mayoral decision	Effectiveness depends on clear roles, common targets, and implementation consistency
Develop One Map ODF	Technically feasible through GIS integration of sanitation, water, poverty, and geographic data	Requires investment in information systems and data updating	Supports transparent and evidence-based decision making	Requires designated data management and inter-agency data-sharing procedures	Effective when data are accurate, integrated, and periodically updated
Expand inclusive sanitation and clean-water access	Solutions can be adapted to dense settlements and areas with land constraints	Requires collaborative financing through local budget, government programs, private sector, and other legal sources	Provides high social and health benefits	Requires integrated implementation by health, public works, housing, subdistrict, village, and primary-health-care units	Success depends on area-appropriate technology and priority for households with the greatest need
Area-specific intervention integrated with poverty reduction	Interventions can be adjusted to local needs and characteristics	Can optimize existing poverty-reduction programs	Aligned with health and welfare improvement	Requires integrated targeting data and cross-agency coordination	Effectiveness depends on accurate targeting and contextual fit
Strengthen hygiene education and PHBS assistance	Can use STBM, health centers, cadres, and community networks	Relatively lower cost than physical infrastructure	Supports health improvement and public awareness	Can be sustained through health centers, subdistricts, villages, and cadres	ODF sustainability depends on continuous behavior change and community assistance
Collaborative financing plus	Verification and monitoring	Diversifies funding and reduces exclusive	Requires sustained government	Needs clear role allocation, reporting,	Sustainability requires diversified

Policy alternative	Technical feasibility	Economic/financial possibility	Political viability	Administrative operability	Synthesis
verification and post-ODF monitoring	can build on existing systems	dependence on the local budget	and stakeholder commitment	monitoring, and follow-up procedures	financing and consistent post-declaration monitoring

The evaluation indicates that no single alternative is sufficient. The problem structure requires a combined package in which spatial evidence, behavior change, formal political commitment, operational coordination, and diversified financing reinforce one another. The source analysis therefore identifies an integrated combination rather than a stand-alone intervention as the most appropriate response.

Integrated Policy Package

Table 3. Selected integrated policy package and its principal function

Policy function	Selected component	Operational role
Technical planning instrument	One Map ODF	Integrates OD status, sanitation access, clean water, poverty, settlement density, geography, and land status into a shared spatial database for targeting, resource allocation, and monitoring.
Economic and behavioral intervention	Strengthened PHBS education and household/community assistance	Uses existing health centers, cadres, schools, villages, and community networks to sustain sanitation behavior at lower cost than infrastructure-only strategies.
Political and institutional commitment	Formal establishment of P2-ODF as a cross-sector development priority	Makes ODF a shared target across sectors responsible for health, water, sanitation, housing, poverty reduction, planning, and community empowerment.
Administrative and financial sustainability	Collaborative financing, verification, and post-declaration monitoring	Combines local budget, government programs, CSR/private support, and other legal funding sources while ensuring follow-up when ODF status deteriorates.

One Map ODF is positioned as the central technical instrument because it enables a shared, spatially explicit evidence base. The system should map households or areas that still practice OD together with toilet and sanitation access, clean-water availability, poverty conditions, settlement density, geographic constraints, and land-tenure status. The information can be organized by subdistrict and urban village to identify priority areas and match interventions to specific sanitation constraints. Periodic updating and formalized inter-agency data sharing are essential to avoid program duplication and improve targeting.

Strengthened PHBS education and assistance is the principal low-cost behavioral component. Education should cover healthy toilet use, handwashing with soap, safe drinking-water and food management, and environmental cleanliness. Delivery can use health centers, integrated service posts, schools, cadres, village administration, and community activities. Direct household and community assistance is important for converting knowledge into routine practice and for sustaining ODF after formal declaration.

Formal establishment of P2-ODF as a cross-sector priority provides the political and institutional basis for collective responsibility. ODF should not be treated as the responsibility of the health sector alone; it requires agencies responsible for water, sanitation, housing, settlements, poverty reduction, planning, and community empowerment. Shared targets, indicators, and action plans should guide agencies, subdistricts, villages, health centers, and the STBM implementation team.

Collaborative financing and post-declaration monitoring provide administrative continuity. Financing should combine the regional budget with government programs, CSR/private-sector participation, and other lawful sources. Funds should be directed to sanitation infrastructure, education, assistance, verification, and monitoring. Periodic post-declaration verification is necessary so that areas showing signs of regression can receive follow-up intervention.

Clean-water access and geographic context as core policy determinants

The strongest empirical implication of the study is that ODF policy cannot be reduced to toilet construction. Clean-water source, with OR = 11.558, was the dominant factor in the multivariable analysis, while geographic location, with OR = 3.558, was the next strongest factor. These findings are consistent with the broader public-health understanding that sanitation behavior depends on enabling environmental conditions as well as

knowledge and motivation. Where water is difficult to access or where physical conditions complicate conventional sanitation systems, household behavior is constrained by structural conditions.

The policy implication is that sanitation planning should identify not only households without adequate toilets but also the specific reason why sanitation remains inadequate. In a dense settlement, the central constraint may be land and septic-system feasibility; in a wetland or riverbank area, it may be geographic and technical; in a low-income household, affordability may dominate; and in other areas, continued OD may persist despite physical access because of behavioral norms. One Map ODF provides the mechanism for translating these differences into spatially differentiated policy.

Integrating infrastructure and behavior change

The policy diagnosis shows a persistent tension between infrastructure provision and behavior change. Physical facilities can be measured and delivered relatively quickly, but facility availability does not guarantee sustained use. Conversely, behavior-change campaigns cannot fully overcome the absence of water, land, or technically feasible sanitation. The evidence therefore supports simultaneous investment in enabling infrastructure and sustained PHBS assistance rather than treating them as competing approaches.

This integrated approach is consistent with the principle of community-based sanitation, in which behavior change is central but must be supported by enabling conditions. Continued assistance after ODF declaration is especially important because sustainability is a separate policy challenge from initial achievement. Monitoring should therefore measure not only whether a facility exists but whether it is used consistently, supported by adequate water, and maintained over time.

Cross-sector governance and area-based targeting

The policy gap in Palembang is primarily one of integration across sectors. Health agencies, public works, housing, planning, poverty-reduction institutions, subdistricts, villages, and community health services may each perform relevant functions, but separate sectoral implementation can leave unresolved dependencies between water, sanitation, poverty, and behavior. A household can receive a sanitation intervention yet remain constrained by water access; an area can receive infrastructure yet lack sustained community support; and a declared ODF area can regress without follow-up monitoring.

Formal P2-ODF designation as a crosscutting development program can address this fragmentation by creating shared targets and joint accountability. The proposed model does not require creating an entirely new institutional system. Instead, it emphasizes strengthening coordination among existing structures, clarifying roles, synchronizing indicators, and using a common spatial evidence base. This improves administrative feasibility while preserving the responsibilities of existing agencies.

Financing and sustainability beyond declaration

Financial constraints are a recurring implementation problem because sanitation needs are greater than the resources available through a single budget source. Collaborative financing can reduce this constraint by aligning regional budgets, government programs, private-sector or CSR support, and other lawful sources with clearly mapped needs. The One Map ODF system is therefore not only a technical tool; it can also support more defensible budget prioritization and reduce duplication.

Sustainability requires shifting the performance focus from one-time ODF declaration to continued sanitation behavior and service functionality. Post-declaration verification should be institutionalized as a routine process, with monitoring results linked to follow-up action. This is particularly important in high-risk areas where water access, settlement change, household poverty, or infrastructure deterioration can reverse previous gains.

Contribution to sanitation policy planning

The main contribution of this study is an evidence-informed planning model that links empirical household determinants with local-government policy architecture. Rather than proposing a single sanitation intervention, the model connects One Map ODF, area-specific targeting, PHBS assistance, cross-sector P2-ODF commitment, collaborative financing, and post-declaration monitoring. The model is therefore both spatial and institutional: spatial because it recognizes that sanitation constraints differ among locations, and institutional because sustained ODF requires coordinated planning, financing, implementation, and monitoring across sectors.

Conclusions

Palembang City has made substantial progress toward ODF, yet the persistence of OD among 32.5% of respondents at the end of 2023 indicates that citywide achievement remains incomplete. The strongest empirical

determinants reported in the source study clean-water source and geographic location show that ODF policy must address structural and spatial constraints in addition to individual behavior. The Bardach analysis supports an integrated policy package rather than a single intervention. First, One Map ODF should be developed as a shared spatial database for targeting, prioritization, resource allocation, and monitoring. Second, PHBS education and continuous community assistance should be strengthened to sustain behavior change. Third, P2-ODF should be formally established as a cross-sector development priority so that responsibility is shared across health, water, sanitation, housing, poverty reduction, planning, and community-empowerment sectors. Fourth, collaborative financing should be combined with verification and post-declaration monitoring to ensure both implementation capacity and long-term sustainability. The resulting policy direction is a shift from fragmented sanitation programs toward an integrated, area-based, data-informed, and cross-sector ODF system. The policy recommendation derived from the original analysis is the establishment of a Palembang Mayor Decision on the Acceleration and Consolidation of Open Defecation Free (P2-ODF) as a crosscutting regional development program, including strategy, measurable indicators and targets, financing arrangements, and monitoring and evaluation.

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