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Beyond Landfill Expansion: Environmental Law and Administrative Reformulation of Sustainable Waste Management Policy at Segawe Landfill, Tulungagung Regency

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Highlights:

- Evaluating sustainable waste governance at Segawe Landfill
- Identifying legal and administrative gaps in waste management
- Highlighting institutional challenges in regional landfill governance
- Emphasizing circular economy in sustainable waste policy reform
- Proposing integrated environmental governance for local governments

Abstract: Waste management has become a critical environmental governance issue in Indonesia, particularly in regional landfill areas experiencing increasing waste accumulation and limited disposal capacity. This study aims to analyze the reformulation of sustainable waste management policy at the Segawe Final Disposal Site (TPA Segawe), Tulungagung Regency, through the perspectives of environmental law and public administration. The research employs a normative-empirical legal method by integrating statutory, conceptual, and case approaches with qualitative empirical analysis. Primary legal materials include Indonesian environmental regulations, regional waste management regulations, and administrative policies governing landfill operations, while empirical data were obtained through field observations, institutional documents, and interviews with stakeholders involved in waste governance. The findings reveal that although Tulungagung Regency has established legal instruments through Regional Regulation Number 19 of 2010 and Regent Regulation Number 22 of 2017, policy implementation remains predominantly landfill-oriented and has not fully incorporated sustainable environmental governance principles. The study further identifies institutional fragmentation, limited public participation, and inadequate waste reduction mechanisms as major challenges affecting policy

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effectiveness. Empirical analysis indicates that TPA Segawe is projected to reach overcapacity by 2030 despite the planned expansion of approximately 10–15 hectares, demonstrating that land expansion alone cannot ensure long-term sustainability. From the perspective of environmental administrative law, the study concludes that sustainable waste governance requires integrated legal-administrative reform emphasizing circular economy principles, collaborative governance, environmental accountability, and preventive waste reduction strategies. This research contributes to the development of environmental governance discourse by proposing a sustainable regional waste management policy model integrating environmental law and public administration frameworks within local government systems in Indonesia.

Keywords: Environmental law, Sustainable waste management, Landfill governance, Public administration.

1. Introduction

The escalation of municipal solid waste has become one of the most pressing environmental governance issues in developing countries, particularly in rapidly urbanizing regions where population growth, consumption patterns, and limited landfill capacity intersect with weak institutional coordination. In Indonesia, waste management remains structurally problematic due to fragmented regulations, inadequate infrastructure, limited public participation, and the dominance of end-of-pipe disposal systems that still rely heavily on landfills (Budiyarto et al., 2025). Although Law Number 18 of 2008 concerning Waste Management mandates environmentally sound and sustainable waste governance, empirical implementation at the regional level continues to reveal significant disparities between regulatory objectives and administrative practice.

Within this context, the Segawe Final Disposal Site (Tempat Pembuangan Akhir/TPA Segawe) in Tulungagung Regency represents an important case for examining the formulation of regional waste management policy from legal and public administration perspectives. TPA Segawe functions as the primary landfill infrastructure for Tulungagung Regency and currently faces increasing pressure due to the continuous growth of waste generation and the limited lifespan of landfill capacity. Empirical data from the Tulungagung Environmental Agency (Dinas Lingkungan Hidup/DLH) indicate that the local government has prepared an additional expansion area of approximately 10–15 hectares to extend the operational life of the landfill, which is projected to reach maximum capacity by 2030. Technically, the landfill still utilizes a piling system with monitored slope stability, where the waste mound reportedly reached approximately 23 meters in height by the end of 2023. Simultaneously, DLH Tulungagung continues to prioritize the improvement of temporary disposal facilities (TPS) and optimization of landfill land management. These conditions demonstrate that waste governance in Tulungagung is no longer merely a technical sanitation issue, but has evolved into a strategic legal-administrative problem involving sustainability, environmental protection, public accountability, and regional governance capacity.

Normatively, waste management in Tulungagung Regency is governed through Regional Regulation (Peraturan Daerah/Perda) Number 19 of 2010 concerning Waste Management and Regent Regulation (Peraturan Bupati/Perbup) Number 22 of 2017 concerning Technical Policies for Waste Management. However, despite the existence of these regional legal instruments, several governance challenges remain unresolved, particularly concerning landfill sustainability, institutional synchronization,

community participation, and long-term policy formulation. Previous studies have demonstrated that regional waste governance in Indonesia often suffers from inconsistencies between national environmental policy and local regulatory implementation (Maskun et al., 2025). Similarly, environmental governance failures at regional landfills are frequently associated with weak legal enforcement, inadequate institutional coordination, and insufficient policy integration between environmental and public service sectors (Shabarudin & Thamrin, 2025).

From a public administration perspective, waste management policy cannot solely be interpreted as a technical governmental function, but must be understood as a form of collaborative environmental governance involving state institutions, communities, and private stakeholders. Contemporary governance theory emphasizes that sustainable waste management requires adaptive policy instruments, participatory governance, and institutional responsiveness (Rosi & Sandria, 2025). In practice, however, many regional governments in Indonesia continue to implement landfill-centered approaches without substantial transition toward circular economy models or integrated waste reduction systems. This condition contributes to the persistence of overcapacity problems in landfills and weak environmental sustainability outcomes (Fiani & Marzaniar, 2024).

Theoretically, this research is grounded in environmental law theory, welfare state theory, and public governance theory. Environmental law theory emphasizes the state's obligation to guarantee the constitutional right to a good and healthy environment through preventive and sustainable regulatory mechanisms. Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia explicitly guarantees environmental rights as fundamental constitutional rights. Consequently, local governments possess legal responsibility to formulate effective waste governance policies capable of ensuring ecological sustainability and public welfare. Furthermore, welfare state theory positions environmental management as an essential component of public service obligations performed by the state and regional governments. In this regard, the government is not merely a regulator but also an active administrator responsible for ensuring environmental justice and sustainable development. Meanwhile, public governance theory highlights the importance of institutional collaboration, accountability, policy integration, and stakeholder participation in addressing complex environmental problems such as landfill management.

Several previous studies have examined waste management from technical, sociological, and governance perspectives. Mukhlis et al. (2025), for example, analyzed stakeholder dynamics in sustainable waste management in peri urban Indonesia and found that weak inter-actor coordination significantly affects policy effectiveness. Budiyarto et al. (2025) also highlighted that Indonesian waste governance remains highly dependent on landfill systems with limited innovation in waste reduction mechanisms. In addition, Siagian et al. (2025) emphasized that local governments frequently face institutional and legal constraints in implementing sustainable landfill governance. However, existing studies generally focus on environmental management or technical operational aspects, while limited attention has been directed toward the formulation of regional waste management policy through an integrated normative empirical legal approach, particularly in relation to the synchronization between regional regulations, administrative governance, and landfill sustainability.

Therefore, the novelty of this study lies in its integrative analysis of waste management policy formulation at TPA Segawe through the intersection of environmental law and public administration approaches. Unlike previous studies that predominantly emphasize technical waste handling or

community behavior, this research specifically examines: (1) the adequacy and effectiveness of regional legal instruments governing TPA Segawe; (2) the compatibility between normative regulations and empirical governance realities; and (3) the formulation model of sustainable waste management policy capable of responding to landfill overcapacity, environmental sustainability, and institutional governance challenges in Tulungagung Regency. This study also contributes theoretically by strengthening the discourse on regional environmental governance within the framework of sustainable administrative law and collaborative public policy.

Accordingly, this article seeks to answer the fundamental question of how regional waste management policy should be formulated to ensure sustainable, accountable, and legally integrated governance at TPA Segawe, Tulungagung Regency. The study is expected to contribute both academically and practically by providing a legal-administrative policy model for regional landfill governance in Indonesia.

2. Methods

This study employs a normative-empirical legal research design integrated with a public administration approach to analyze the formulation of waste management policy at the Segawe Final Disposal Site (TPA Segawe) in Tulungagung Regency. The normative dimension of the research focuses on examining the legal structure, principles, and regulatory synchronization governing regional waste management, while the empirical dimension evaluates the implementation and effectiveness of those regulations within administrative practice. Such an approach is considered relevant because environmental governance problems in waste management cannot be understood solely through doctrinal legal analysis, but also require empirical examination of institutional behavior, policy implementation, and administrative capacity (Maskun et al., 2025). The combination of normative and empirical legal methods allows this study to assess both the legality and practicality of regional waste governance policies in achieving sustainable environmental administration.

The normative legal analysis in this research is conducted through statutory, conceptual, and case approaches. The statutory approach examines the hierarchy and harmonization of regulations related to waste management, including Law Number 18 of 2008 concerning Waste Management, Law Number 32 of 2009 concerning Environmental Protection and Management, Government Regulation Number 81 of 2012 concerning Household Waste Management, Regional Regulation of Tulungagung Regency Number 19 of 2010 concerning Waste Management, and Regent Regulation Number 22 of 2017 concerning Technical Waste Management Policies. Through this approach, the study analyzes the consistency, legal adequacy, and regulatory coherence between national environmental law and regional administrative regulations governing TPA Segawe. Meanwhile, the conceptual approach is used to examine theoretical frameworks related to environmental law, sustainable governance, welfare state theory, collaborative governance, and public administration theory. The case approach focuses specifically on the governance practices and policy formulation related to TPA Segawe as the primary landfill facility in Tulungagung Regency.

From a theoretical perspective, this research applies the theory of environmental administrative law and collaborative governance theory. Environmental administrative law theory is utilized to evaluate the legal responsibilities of regional governments in fulfilling constitutional environmental rights through

regulatory instruments, supervision mechanisms, and public service obligations. This theory emphasizes that environmental governance is inseparable from state administrative accountability and the principle of sustainable development (Nilsson, 2011). In addition, collaborative governance theory is employed to analyze the interaction among governmental institutions, local communities, environmental agencies, and waste management stakeholders in formulating sustainable landfill policies. The application of collaborative governance is important because waste management constitutes a multidimensional public policy issue requiring institutional coordination and stakeholder participation rather than solely bureaucratic control (Buck, 2013).

The empirical legal component of this study examines how regional waste management regulations are implemented within administrative practice at TPA Segawe. Empirical data are obtained through qualitative methods, including semi-structured interviews, direct observation, and document analysis. Interviews are conducted with officials from the Environmental Agency (DLH) of Tulungagung Regency, landfill managers, local government policymakers, and community representatives residing near the landfill area. These interviews aim to identify administrative challenges, institutional coordination patterns, regulatory obstacles, and policy effectiveness related to landfill governance. Direct observation is conducted at TPA Segawe to assess the technical and environmental conditions of the landfill, including waste accumulation patterns, slope stability management, temporary disposal infrastructure, and land optimization measures. The empirical findings are further supported by administrative reports, regional planning documents, environmental policy records, and statistical data concerning landfill capacity and waste generation in Tulungagung Regency.

The data analysis technique in this study uses qualitative juridical analysis combined with interactive policy analysis. Legal materials are analyzed through legal interpretation methods, including grammatical interpretation, systematic interpretation, and teleological interpretation, to evaluate the objectives and effectiveness of regional waste regulations. Empirical findings are analyzed using an interactive qualitative model consisting of data reduction, data categorization, interpretation, and conclusion verification. This analytical model enables the research to identify the relationship between normative legal frameworks and empirical governance realities in TPA Segawe. Furthermore, triangulation techniques are applied to ensure data validity through cross-verification among interview results, regulatory documents, field observations, and institutional reports.

This research also adopts a sustainable governance framework in analyzing policy formulation. The framework emphasizes three primary indicators: regulatory sustainability, institutional effectiveness, and environmental accountability. Regulatory sustainability refers to the adaptability and coherence of regional legal instruments in responding to landfill overcapacity and environmental risks. Institutional effectiveness examines administrative coordination, policy implementation capacity, and public service performance within waste governance systems. Environmental accountability focuses on the extent to which local government policies protect environmental rights and support sustainable waste management practices.

The selection of TPA Segawe as the research object is based on several strategic considerations. First, the landfill represents the primary waste disposal infrastructure in Tulungagung Regency and currently faces increasing pressure due to projected overcapacity conditions by 2030. Second, the ongoing expansion of landfill land by approximately 10–15 hectares demonstrates the urgency of sustainable policy formulation in regional waste governance. Third, the technical condition of the landfill, including

the waste pile height reaching approximately 23 meters by the end of 2023, indicates the necessity for stronger environmental and administrative policy intervention. These empirical conditions make TPA Segawe an important case study for examining the intersection between environmental law, regional governance, and public administration in Indonesia.

Overall, this methodological framework is designed to produce comprehensive legal and administrative analysis regarding the formulation of sustainable waste management policy at TPA Segawe. By integrating normative legal examination with empirical governance analysis, this study aims to generate a policy formulation model capable of strengthening environmental governance, improving regional administrative accountability, and supporting sustainable landfill management within the Indonesian local government system.

3. Results

The results of this study demonstrate that the formulation of waste management policy at TPA Segawe, Tulungagung Regency, has not yet fully achieved regulatory integration, environmental sustainability, and institutional effectiveness. Although the regional government has established legal instruments through Regional Regulation Number 19 of 2010 and Regent Regulation Number 22 of 2017, empirical findings indicate that policy implementation remains predominantly oriented toward conventional landfill accumulation rather than integrated sustainable waste governance. The study further reveals a significant disparity between normative legal expectations and empirical administrative realities, particularly regarding landfill capacity management, institutional coordination, and environmental risk mitigation.

Empirical findings indicate that TPA Segawe continues to experience increasing waste accumulation due to rising municipal waste generation and limited waste reduction mechanisms at the source level. The landfill's waste mound reached approximately 23 meters by the end of 2023, while the projected operational lifespan is estimated to end by 2030 if no substantial policy reform is implemented. To address this issue, the Tulungagung Regency Government has prepared additional landfill expansion land covering approximately 10–15 hectares. However, the expansion policy is considered temporary and reactive because it does not fundamentally resolve structural problems related to waste reduction, recycling systems, and integrated governance mechanisms.

From a legal perspective, the analysis demonstrates that regional regulations governing waste management remain largely administrative-procedural and have not comprehensively incorporated sustainable environmental governance principles such as circular economy approaches, precautionary principles, and collaborative governance mechanisms. The legal framework also shows limited normative emphasis on public participation, inter-agency coordination, and environmental accountability. Consequently, policy implementation tends to prioritize technical landfill operations rather than systemic waste reduction strategies.

The study additionally identifies institutional fragmentation within waste governance administration. Although the Environmental Agency (DLH) possesses formal authority over waste management operations, empirical evidence indicates limited coordination between regional planning institutions, environmental supervision agencies, and community-based waste management actors. This institutional condition affects policy effectiveness and contributes to weak implementation of sustainable waste governance programs.

3.1. Equations

To analyze the sustainability level of landfill capacity at TPA Segawe, this study applies a simplified waste accumulation projection model adapted from environmental management analysis. The equation is formulated as follows:

$$LC = \frac{A + E}{WG - WR} \quad (1)$$

Where:

- LC = Estimated landfill lifespan (years)
- A = Existing landfill capacity
- E = Additional landfill expansion area
- WG = Annual waste generation rate
- WR = Annual waste reduction rate

The equation demonstrates that the sustainability of landfill operations depends not only on land expansion but also on the effectiveness of waste reduction policies. If waste reduction remains minimal, landfill expansion alone will only temporarily postpone overcapacity conditions. This finding confirms that sustainable waste governance requires integrated legal and administrative policy reform rather than solely infrastructural expansion.

3.2. Tables

Table 1. Regulatory and Empirical Conditions of Waste Management at TPA Segawe

Regulatory Aspect	Normative Regulation	Empirical Condition
Waste Management System	Perda No. 19 of 2010 regulates integrated waste management	Waste management remains landfill-centered
Landfill Capacity	Sustainable environmental management mandated	Landfill projected to reach full capacity by 2030
Institutional Coordination	DLH designated as primary authority	Coordination among institutions remains limited
Environmental Protection	Environmental sustainability principles recognized	Waste pile reached approximately 23 meters in 2023
Land Optimization	Perbup No. 22 of 2017 regulates technical management	Additional 10–15 hectares prepared for expansion

a. Regional regulations emphasize environmental sustainability principles but lack comprehensive implementation mechanisms.
b. Empirical data obtained from field observations and DLH Tulungagung administrative reports.

Table 2. Analysis of Policy Gaps in TPA Segawe Governance

Indicator	Normative Target	Empirical Findings	Policy Implication
Waste Reduction	Reduction at source level	Minimal implementation	Increased landfill burden
Public Participation	Community involvement required	Participation remains limited	Weak collaborative governance
Institutional Integration	Inter-agency coordination mandated	Administrative fragmentation persists	Policy inefficiency
Environmental Sustainability	Sustainable landfill management	Predominantly accumulation-based system	Environmental risk escalation
Long-Term Planning	Strategic sustainability planning	Reactive land expansion policy	Unsustainable governance model

3.3. Figures

Figure 1. Institutional Structure of Waste Management Governance at TPA Segawe.
The figure illustrates the interaction between regional government institutions, the Environmental Agency (DLH), temporary disposal facilities (TPS), local communities, and TPA Segawe management within the waste governance system of Tulungagung Regency. The governance structure demonstrates that policy implementation remains highly centralized within the administrative authority of DLH, while community participation and inter-agency collaboration remain relatively limited. Adapted from regional environmental governance analysis (Mukhlis et al., 2025).

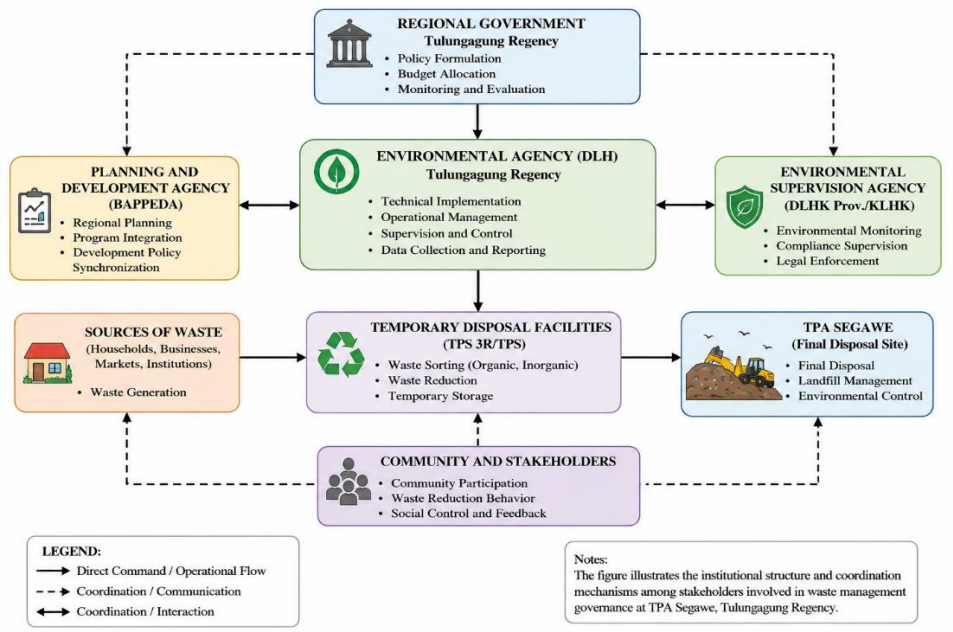
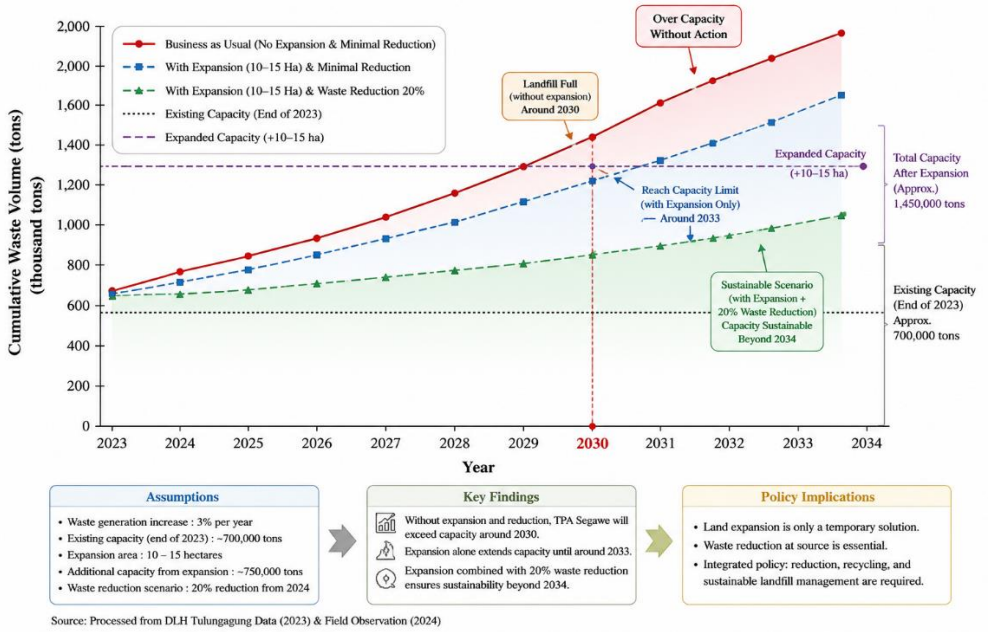


Figure 2. Projection of Landfill Capacity and Expansion Policy at TPA Segawe.

The figure presents projected landfill capacity trends at TPA Segawe based on waste accumulation rates and planned land expansion policies. The projection indicates that without significant waste reduction strategies, the landfill may reach overcapacity despite the planned addition of 10–15 hectares of land.



3.4. Enumerate

3.4.1. Main Findings

The principal findings of this study may be summarized as follows:

(1) The regional waste management policy framework in Tulungagung Regency formally complies with national environmental regulations but remains weak in implementation effectiveness.

(2) The governance model at TPA Segawe continues to rely predominantly on landfill accumulation mechanisms rather than sustainable waste reduction systems.

(3) Land expansion policies represent short-term administrative solutions and do not comprehensively address structural environmental governance problems.

(4) Institutional fragmentation and limited stakeholder participation reduce the effectiveness of regional waste management policies.

(5) Sustainable waste governance requires stronger integration between environmental law principles, administrative accountability, and collaborative governance mechanisms.

Another analytical classification may be presented as follows:

(1) Legal Dimension

(a) Limited regulatory synchronization between normative principles and implementation mechanisms

(b) Weak environmental accountability provisions in regional regulations

(2) Administrative Dimension

(a) Centralized institutional authority within DLH
(b) Limited coordination among governmental stakeholders
(3) Environmental Dimension
(a) Increasing landfill pressure due to rising waste generation
(b) Potential environmental risks resulting from landfill overcapacity

4. Conclusion

This study concludes that the formulation of waste management policy at TPA Segawe, Tulungagung Regency, has not yet fully reflected an integrated and sustainable environmental governance model despite the existence of Regional Regulation Number 19 of 2010 and Regent Regulation Number 22 of 2017 as normative legal foundations. Empirical findings demonstrate that waste governance remains predominantly landfill-oriented, while institutional coordination, public participation, and waste reduction mechanisms are still limited in implementation. The projected overcapacity of TPA Segawe by 2030 and the necessity for additional land expansion indicate that current policies are largely reactive rather than preventive and sustainable. From the perspective of environmental administrative law and collaborative governance theory, the study confirms that effective waste management requires stronger regulatory synchronization, institutional integration, and environmentally oriented policy reform that prioritizes waste reduction, recycling systems, and public accountability. Although the planned expansion of 10–15 hectares may temporarily extend landfill capacity, sustainable governance can only be achieved through comprehensive legal-administrative reform integrating environmental protection principles, circular economy approaches, and participatory governance mechanisms. Therefore, this research contributes to the development of contemporary environmental law discourse by emphasizing that regional waste governance should move beyond conventional disposal paradigms toward adaptive, collaborative, and sustainability-based policy frameworks within local government administration.

Supplementary data

The authors confirm that the supplementary data are available within this article.

Data Availability Statement

During the preparation of this manuscript, the authors used generative AI tools only for language improvement, grammar correction, and readability enhancement. The authors take full responsibility for the content, interpretation, and originality of the manuscript.

Declaration of Generative AI and AI-assisted Technologies

Authors must disclose any use of generative AI or AI-assisted tools (such as large language models) in the preparation of this manuscript. Such tools are permitted only for language or copy editing purposes. Authors remain fully responsible for the integrity, originality, and accuracy of the content.

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Authors' contribution

Conceptualization, S.W. and R.C.; methodology, R.C.; formal analysis, D.A. and L.D.M.; investigation, S.W., D.A., and R.C.; data curation, R.C.; writing original draft preparation, R.C.; writing review and editing, S.W., D.A., and L.D.M.; supervision, S.W. All authors have read and agreed to the published version of the manuscript.

Conflicts of interests

The authors declare no conflict of interest.

Ethical statement

Ethical approval was not required for this study because the research did not involve medical experiments, clinical trials, or sensitive personal data. All interviews and field observations were conducted in accordance with applicable research ethics principles.

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