

ADVANCING HEALTH INTEGRATION IN ENVIRONMENTAL IMPACT ASSESSMENTS: LESSONS FROM THE FREE STATE PROVINCE, SOUTH AFRICA

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ABSTRACT

Environmental impact assessments (EIAs) are central to sustainable development, yet the integration of community health within these processes remains inconsistent across South Africa. This study critically examines how health dimensions are incorporated into EIA practice in the Free State Province, identifying procedural and institutional gaps that limit the consideration of community well-being. Using a mixed-methods design grounded in the social determinants of health (SDH) framework, the research analysed 343 environmental authorisations issued between 2010/11 and 2014/15, and interviews with 15 environmental assessment practitioners (EAPs). Quantitative document analysis assessed the frequency and specificity of health-related content, while qualitative data explored perceptions of public participation and institutional coordination.

Findings reveal that only a minority of EIAs explicitly incorporated community health

risks, with references largely confined to pollution and occupational safety, rather than broader determinants such as water quality, cumulative exposures, or healthcare access. Public participation was found to be procedurally adequate but substantively weak: approximately 40% of community submissions raised health issues, yet few were reflected in final authorisations. Barriers included technical language, limited feedback loops, and minimal cross-sectoral collaboration between environmental and health authorities. These shortcomings mirror patterns observed in comparable low- and middle-income countries such as Kenya, Ghana, and Zambia, where fragmented mandates and inadequate guidance impede health integration.

The study concludes that without systematic incorporation of health impact assessment (HIA) within the EIA framework, community health will remain marginalised in environmental governance. It recommends institutionalising provincial HIA screening

tools, multilingual public engagement mechanisms, and interdepartmental accountability structures. Implementing these reforms would strengthen the legitimacy and equity of EIAs, aligning South Africa's environmental management system with the WHO (2024) and the World Bank (2024) guidance on health-inclusive sustainable development.

Keywords: Environmental impact assessment, Health impact assessment, Community health, Public participation, Social determinants of health, Free State Province, South Africa.

INTRODUCTION

Environmental impact assessments (EIAs) help support long-term sustainability by checking how new projects might affect nature and people's lives before they begin. In South Africa, laws such as the National Environmental Management Act (NEMA), 2014 require these checks to protect both ecosystems and community welfare. However, even with such rules in place, health concerns raised by local populations are rarely given proper attention during evaluations. Instead of focusing only on measurable factors such as pollution levels in air or water, assessors should also consider everyday conditions that shape residents' well-being (Retief, Sandham & Morrison-Saunders, 2023; Haigh *et al.*, 2025). Since this wider perspective is missing, decisions often reinforce existing inequalities across regions and groups.

Globally, more attention is now being paid to how omitting health aspects in environmental impact assessments leads to unfair distribution of environmental dangers, especially in lower- and middle-income nations.

Although procedural improvements have occurred in sub-Saharan Africa's EIA frameworks, research shows they still fall short when it comes to analysing key factors affecting well-being, such as living conditions, jobs, schooling, or medical services (Mauti *et al.*, 2022; Leuenberger *et al.*, 2019). According to the WHO (2024), these factors, although not directly linked to medicine, influence population health through the settings individuals grow up, reside, and work in. In South Africa, neglecting these aspects during assessment procedures worsens existing disadvantages faced by excluded groups, especially in less urbanised areas including the Free State Province, where weak infrastructure and insufficient governance reduce public involvement and monitoring effectiveness.

The basis of this research draws from the social determinants of health model, suggesting unequal health results stem from deep-rooted imbalances in policy and decision-making systems (Rasanathan *et al.*, 2020; Carey *et al.*, 2023). Viewing EIA processes through this perspective enables closer examination of how organisational setup, fair procedures, and local participation jointly shape environmental well-being effects. Specifically, it underscores the importance of combining ecological planning with population health strategies, a linkage still poorly established across South African regulations.

This research looks at how public health is included in environmental impact assessments in South Africa's Free State Province from 2010/11 to 2014/15. Rather than focusing only on process, it explores barriers and enablers tied to structure, procedure, and local context affecting health integration. Using a mix of policy analysis, interviews

with professionals, and cross-country comparisons, especially cases from Kenya, Ghana, and Uganda, it builds practical insights for improving assessment systems. Instead of generic recommendations, findings aim to support more equitable and transparent decision-making. Through this approach, the work adds concrete value to international efforts linking health impact assessment ideas with EIA practices in low- and middle-income countries.

The study highlights:

- **Weak integration of health in EIA:** Findings reveal that health considerations are largely restricted to biophysical and occupational concerns, with minimal attention to broader social determinants of health such as access to healthcare, livelihoods, or psychosocial impacts.
- **Procedural inclusion but substantive exclusion:** Although 40% of public submissions referenced potential health risks, these were seldom reflected in final EIA authorisations, exposing persistent procedural inequities in environmental governance.
- **Structural and institutional barriers:** Limited interdepartmental coordination, lack of clear regulatory guidance, and inaccessible participation processes constrain meaningful community engagement, particularly in rural and low-income areas.
- **Regional policy relevance:** Comparative insights from Kenya, Ghana, Uganda, and Zambia demonstrate similar challenges in low- and middle-income contexts, reinforcing the need for institutional reforms

and capacity development to strengthen health-inclusive environmental assessment.

- **Actionable policy contribution:** The study proposes a provincial health impact assessment (HIA) screening tool and multilingual community participation model to operationalise the social determinants of health (SDH) framework within South Africa's EIA system, aligning with the WHO (2024) and World Bank (2024) guidance on equity-driven sustainability.

THEORETICAL FRAMEWORK

This study is supported by the SDH framework, which posits that the structural, social, and environmental conditions in which individuals live, work, and interact largely determine their health outcomes. Factors such as income, education, housing, environmental quality, employment, and access to healthcare collectively shape exposure to risk and access to protective resources. The SDH framework highlights that health inequities arise not from individual choice but from systemic and policy-driven inequalities that govern the distribution of resources and opportunities. This theoretical grounding shifts EIA from a narrow focus on biophysical parameters to a more holistic understanding of how social and environmental determinants interact to influence health, particularly in marginalised or resource-limited communities.

In the South African context, especially in the Free State Province, the SDH perspective is vital because development projects often intersect with existing social and environmental vulnerabilities. Communities affected by industrial or infrastructural developments experience cumulative exposures, including

poor air and water quality, displacement, and restricted access to healthcare and livelihoods. These conditions reflect structural determinants that EIA processes frequently overlook. Applying the SDH framework to this study provides a conceptual basis for examining whether and how current EIA practice identifies, assesses, and mitigates determinants influencing community health. Furthermore, it supports the justification for a HIA screening tool designed to institutionalise the evaluation of health determinants during EIA processes. By embedding SDH considerations into environmental governance, this framework aligns with recent international standards, such as the WHO's Compendium of Health and Environment Guidance (2024) and the World Bank Environmental and Social Framework (ESS4, 2024), which emphasise equitable, health-inclusive development planning.

METHODS

Design, Setting, Sampling and Data Sources

The study employed mixed-methods, and cross-sectional, exploratory design to evaluate how community health is integrated into EIA practice in the Free State Province, guided by a pragmatist stance for methodological fitness to purpose (Creswell & Plano Clark, 2018). A convergent parallel design was implemented, quantitative and qualitative strands were conducted in the same period, analysed independently, then aligned during integration to generate meta-inferences traceable to both strands (Fetters, Curry & Creswell, 2013; Creswell & Plano Clark, 2018).

Document corpus and period: We reviewed 343 environmental authorisations issued in

2010/11 to 2014/15, comprising 306 basic assessments (BARs), and 37 scoping and environmental impact reports (S&EIRs) covering 475 listed activities. Units of analysis were the authorised application files, main report plus annexures, linked participation records, and commenting authority inputs. The window reflects a stable regulatory period under the 2014 EIA Regulations issued in terms of the National Environmental Management Act; mining EIAs under national jurisdiction were excluded (Department of Environmental Affairs, 2014).

Participants and qualitative materials: We interviewed 15, three from each district municipality, Mangaung, Lejweleputswa, Thabo Mofutsanyana, Fezile Dabi, and Xhariep, using a semi-structured, open-ended questionnaire. We also reviewed participation artefacts from the same files, minutes, submissions, and comment-response reports, to enable case-level triangulation. EAPs were eligible if they had prepared or managed EIA applications in the study period and were active in the province.

Measures, Analysis and Integration

Quantitative document analysis: A structured codebook captured presence and specificity of health considerations, air and water quality, noise, hazardous exposures, cumulative effects, vulnerable groups, and mitigation and monitoring. Coding followed operational definitions and inclusion and exclusion rules, with a 10% audit and reconciliation. Descriptive statistics summarised counts and proportions by year, sector, and district, and cross-tabulations assessed mitigation adequacy versus treatment of vulnerability. Microsoft Excel and IBM SPSS Statistics were used for data management and analysis. Qualitative analysis:

interviews were audio-recorded with consent and transcribed verbatim. Thematic analysis combined deductive and inductive coding, using an initial framework linked to objectives and iterative refinement across transcripts and artefacts. Constant comparison was used to check internal coherence and external heterogeneity of themes, with matrices to align themes to EIA stages.

Comparative LMIC benchmarks: To contextualise findings and guide feasible recommendations, we conducted a focused systematic review of multilateral safeguards influential in low- and middle-income settings, World Bank Environmental and Social Framework ESS4 and related guidance, and their relevance to provincial EIA practice. Screening, selection, and reporting followed PRISMA 2020, and outputs were summarised in a comparative matrix used to specify a practical screening tool and to interpret local results, for example, triggers for vulnerable groups, emergency preparedness, and communicable disease management (Page *et al.*, 2021; World Bank, 2024).

Integration and meta-inferences: Strands were merged using side-by-side joint displays that mapped quantitative indicators, frequency and specificity of health content, to qualitative themes, participation quality and translation into authorisation conditions. Interpretation followed convergence, complementarity, and discrepancy logics, with discrepant cases re-inspected and coding decisions sensitivity-checked (Fetters *et al.*, 2013).

Rigour and Ethics

Methodological coherence was maintained by aligning the pragmatist rationale, convergent

design, and mixed data sources. Dependability was supported through a fixed indicator set, coder training and a 10% audit for documents, an audit trail and analyst triangulation for qualitative coding, and for across sources and strands. Ethical clearance was granted by the Cape Peninsula University of Technology, Faculty of Applied Sciences Research Ethics Committee. Gatekeeper permission was obtained from the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Written informed consent was secured for all 15 interviews. Data protection complied with applicable law and institutional requirements.

COMPARATIVE LITERATURE REVIEW

Environmental impact assessment remains central to project governance, yet recent studies show that filed EIAs still treat human health inconsistently, practice often privileges biophysical emissions and permitting, not explicit health indicators, vulnerability analysis, cumulative pathways, or enforceable conditions (Smith & Morrison-Saunders, 2025). This pattern is especially visible in low- and middle-income settings where capacity is uneven and mandates are fragmented, conditions comparable to the Free State context (Asongu & Odhiambo, 2021). Contemporary analyses emphasise that system performance turns on institutional capacities, participation quality, and the translation of comments into measurable authorisation conditions, rather than statutory text alone (Smith & Morrison-Saunders, 2025; Asongu & Odhiambo, 2021). These findings justify the focus on practical tools that operate inside existing procedures and support near term improvements for provincial authorities.

Global guidance released in 2024 provides immediately implementable direction. The WHO's updated compendium consolidates operational prompts and sector methods for key exposure pathways, including air, water, transport, and waste, and highlights the need to identify vulnerable groups and to specify communicable disease control, emergency preparedness, and monitorable mitigation and monitoring requirements (World Health Organization, 2024a). Complementing this, the WHO HIA resources set out screening questions and scoping elements that can be embedded directly in EIA documentation, for example, prompts that ensure vulnerability analysis and cumulative exposure appraisal are not omitted during scoping and review (World Health Organization, 2024b). In parallel, the World Bank's environmental and social framework, particularly ESS4 on community health and safety, requires structured analysis and management of community health risks and offers template language and checklists that align well with provincial EIA conditions and compliance monitoring in low- and middle-income contexts (World Bank, 2024).

South Africa's framework already contains entry points for health integration. The EIA Regulations, consolidated to February 2025, reaffirm scoping, specialist input, and public participation provisions, each of which can carry explicit health content without statutory overhaul, for example, scoping triggers for vulnerable groups, minimum content for specialist inputs, and measurable health-related authorisation conditions (Department of Environmental Affairs, 2014, consolidated 2025). Regional policy guidance recommends institutionalising HIA functions within ESIA systems and adopting

practical checklists and communicable disease measures at subnational level, a path directly relevant to provincial departments in South Africa (EQUINET, 2024). Within this 2024-2025 landscape, the present paper is relevant because it focuses on a provincial system where the health gap is likely to be most visible, significant because it translates current WHO and ESS4 requirements into implementable checks aligned with South African procedures, and novel because it links a large provincial document corpus with environmental assessment practitioner interviews and participation records to specify a screening tool that regulators and practitioners can apply within current rules (World Health Organization, 2024a; World Bank, 2024).

RESULTS

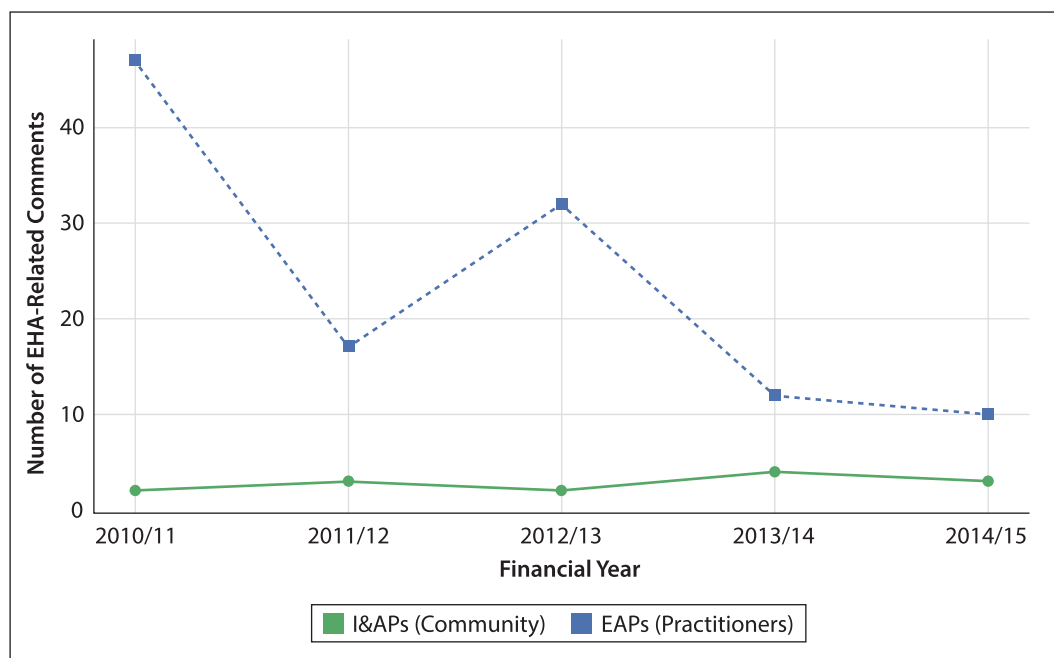
The study results focused on health considerations and public participations without an EIA process as detailed below:

Health Considerations in EIAs

Figure 1 on the next page presents a comparative analysis of the annual number of community health-related comments, specifically those linked to the International Finance Corporation's (IFC) Environmental Health Areas (EHAs) raised by EAPs, interested and affected parties (I&APs) during EIA processes across five financial years (2010/11 to 2014/15) in the Free State Province, South Africa.

EAPs demonstrated a consistent and substantially higher volume of EHA-related commentary over the period of study. In the 2010/11 financial year, EAPs raised 47

FIGURE 1: Trends in Community Health Concern Comments Raised by EAPs and I&APs During the EIA Process (2010/11-2014/15)



Source: Authors

comments, the highest in the five-year range. These concerns included issues such as visual impacts (22 comments), air pollution (5), noise (3), water pollution (6), job opportunities (10), and one comment linked to HIV/AIDS. The subsequent years revealed a gradual decline in health-related commentary: 17 in 2011/12, 32 in 2012/13, 12 in 2013/14, and 10 in 2014/15. The types of issue raised evolved slightly, with 2012/13 including zoonotic and vector-related diseases, and accident risks increasingly emphasised in later years. Despite this, the dominant focus remained on air, water, and noise pollution, and socio-economic considerations (such as employment), which align primarily with EHA7 (Accidents and injuries), 8 (Exposure to potentially hazardous materials), and 9

(Social determinants of health). One environmental assessment practitioner explained:

"Health is often mentioned in our reports, but it's more of a checkbox exercise. There's no clear guideline on how to assess or quantify health impacts, so most EAPs just focus on pollution or safety issues." (EAP, Lejweleputswa District)

In stark contrast, comments from I&APs (communities, individuals, NGOs, and local representatives) remained very low throughout the period. In 2010/11, only two health-related comments were recorded: one concerning road safety and the other on public mast safety. In 2011/12, I&APs raised three comments related to odours and water

pollution due to poultry manure and one on employment, linking to EHAs 8 and 9. The number dropped to two comments dealing with livestock exposure to contaminated water and job opportunities in 2012/13. During 2013/14, four comments were received covering pollution concerns, employment, and construction safety, while in 2014/15, I&APs raised three comments, focusing on road dust, relocation, and socio-economic impacts. Notably, no comments from I&APs in any year explicitly referenced communicable or non-communicable diseases, suggesting a gap in health risk awareness or insufficient facilitation of health discourse during public participation. A practitioner from Thabo Mofutsanyana District noted:

"We hardly see collaboration between the Environmental and Health Departments. Each one assumes the other will handle health issues, so in the end, no one takes ownership."

Public Participation and Health Issues

Qualitative and document-based analysis revealed that public participation processes in the EIA system in the Free State Province frequently included community-raised health concerns, although their integration into final decision-making remained inadequate. Approximately 40% of reviewed public submissions referenced potential health risks, particularly those associated with deteriorating air quality, water contamination, and inadequate access to healthcare services. Common themes included respiratory distress linked to industrial emissions and concerns about unsafe drinking water caused by agricultural runoff. Despite these recurring concerns, the corresponding final

EIA reports often failed to reflect them in a substantive form, revealing a disconnect between community engagement and regulatory outcomes. EAP from Fezile Dabi District noted:

"Communities keep raising health issues about dust, odours, and water contamination, but when the final reports come out, it's as if those comments never existed."

This gap in representation highlights structural limitations within the consultation framework. Barriers to effective participation were especially prominent for rural and marginalised groups, who are disproportionately affected by environmental health risks. Geographic isolation, lack of transport infrastructure, and consultations held in inaccessible venues were frequently cited impediments. Additionally, materials provided for public review were often highly technical and published exclusively in English, making them inaccessible to participants with limited education or those who speak other South African languages. These constraints reflect similar concerns to those raised by Retief *et al.* (2011) regarding procedural justice within EIAs and illustrate how socio-spatial exclusion perpetuates health inequities.

Further compounding these limitations was the absence of feedback mechanisms during these consultations processes. Even when communities successfully raised health-related concerns, there was limited evidence of these influencing authorisation conditions or mitigation strategies. For instance, repeated reports of air quality issues near poultry facilities, particularly in districts such as Fezile Dabi and Xhariep, were

acknowledged in summary forms but lacked corresponding health interventions in final assessments. This tokenistic approach to consultation undermines public trust and reduces the perceived legitimacy of the EIA process as a tool for protection of human well-being.

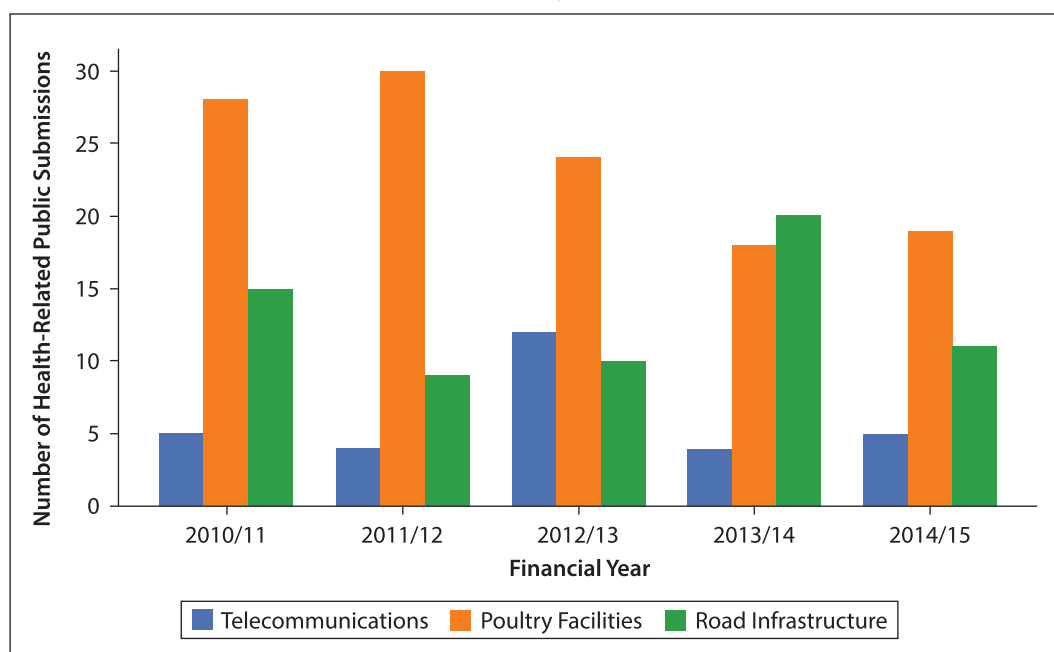
"People in rural areas feel like they are invited to tick a box, not to change anything. After every meeting, they expect feedback, but nothing ever comes back to the community." (Community liaison participant from Xhariep District)

Furthermore, Figure 2 below illustrates the proportion of public submissions that raised health concerns across different types of project activities. The figure demonstrates a

high frequency of health-related comments associated with poultry projects, followed by industrial and road infrastructure developments. By contrast, projects involving telecommunications infrastructure received comparatively few health-related comments, likely due to low public awareness of the risks associated with electromagnetic field (EMF) exposure.

The lack of systematic integration of these health-related insights into final EIAs indicates that community participation, while procedurally fulfilled, often fails to meet the threshold for meaningful inclusion. The omission of affected party (community) concerns reflects the ambiguity of an EIA's processes within the study area and in other under-resourced communities in South Africa.

FIGURE 2: Health Concerns by Sector and Financial Year



Source: Authors

Addressing this requires reforms aimed at improving both accessibility and impact. These may include translating consultation documents into local languages, deploying plain-language summaries of EIA findings, facilitating transport to meeting venues, and using digital tools to enhance participation among younger or remote populations. More fundamentally, procedural mandates should be introduced to ensure that community-raised health concerns are not only recorded but are demonstrably addressed in final decisions.

These findings underscore the need to move beyond superficial compliance and toward a rights-based approach to EIA practice that recognises the centrality of community health. In doing so, public participation could evolve into a powerful mechanism for advancing environmental and social justice and promoting sustainable development rooted in local priorities for the benefit of all.

DISCUSSION

This study reveals persistent limitations in how community health is integrated into EIA processes within South Africa's Free State Province. The evidence indicates that health issues are treated as peripheral, appearing mainly as descriptive references to pollution or employment rather than as systematically assessed determinants of wellbeing. Such findings mirror the broader trend across many low- and middle-income countries (LMICs), where environmental regulation prioritises biophysical impacts and compliance metrics over holistic health equity concerns (EQUINET, 2024; Haigh *et al.*, 2025). The absence of defined indicators, standardised methodologies, and cross-sectoral collaboration mechanisms reinforces a fragmented governance structure

that limits EIA effectiveness in addressing social determinants of health.

The qualitative data provided additional insight into institutional and procedural weaknesses. EAPs noted a lack of clear guidance for integrating health within environmental reporting, while community participants described engagement processes as tokenistic and inaccessible. These findings correspond with research from Kenya and Ghana that highlights how health issues in EIAs are often excluded because sectoral policies assign ambiguous responsibility between environmental and health agencies (Mauti *et al.*, 2022; Tutu, Ottie-Boakye & Bulley, 2025). Similarly, studies from Nigeria and Tanzania report that language barriers, limited technical literacy, and exclusionary consultation venues undermine community participation and perpetuate inequitable health outcomes (Bristol-Alagbariya, 2022; Mketi *et al.*, 2022). In this context, South Africa's current EIA framework, though legislatively advanced, exhibits comparable operational challenges in translating participation into meaningful influence on project authorisations.

Importantly, the Free State case underscores that the procedural fulfilment of participation requirements is not synonymous with substantive engagement. Although approximately 40% of submissions referenced health concerns, few were reflected in authorisation conditions or mitigation plans. This weak translation of public input into regulatory outcomes exposes the procedural justice deficit inherent in current EIA practice. The disconnect between consultation and decision-making erodes public trust, particularly among rural and marginalised communities that bear disproportionate environmental

burdens. Evidence from Zambia and Uganda indicates that integrating social and health equity metrics within EIA frameworks enhances both procedural legitimacy and monitoring efficiency (Leuenberger *et al.*, 2019; George, Karatu & Edward, 2022). These examples demonstrate the feasibility of embedding community health accountability mechanisms within LMIC regulatory systems.

Grounding these findings in the SDH framework illuminates how structural factors, poverty, inadequate housing, poor sanitation, and environmental degradation, interact to shape cumulative vulnerability in Free State communities. The limited institutional recognition of these determinants reflects a persistent divide between environmental management and public health governance. By operationalising SDH principles through a standardised HIA screening tool, provincial authorities can institutionalise the routine assessment of health dimensions within EIAs. This aligns with recent World Health Organization (2024) and World Bank (2024) calls for embedding health equity considerations within environmental decision-making, especially in LMICs pursuing rapid industrialisation and infrastructure growth.

Overall, the study demonstrates that South Africa's EIA system achieves procedural compliance but fails to ensure substantive protection of community health. Addressing this gap requires: (i) integrating structured health indicators into EIA templates, (ii) institutionalising cross-sectoral collaboration between environmental and health authorities, and (iii) strengthening participatory mechanisms to ensure that community-raised concerns demonstrably influence outcomes. Such reforms would advance the dual objectives

of environmental justice and public health equity, aligning provincial practice with global sustainable development commitments.

RECOMMENDATIONS

Based on the evidence from this study and contextual analyses from other low- and middle-income countries, a multi-level set of recommendations is proposed to strengthen the substantive integration of community health into EIAs in South Africa, with specific focus on the Free State Province. These recommendations are structured around four strategic domains: (1) institutional integration of HIA, (2) inclusive and effective public participation, (3) regulatory and policy realignment, and (4) capacity development and monitoring.

Institutionalising Health Impact Assessment Within the Environment Assessment Process

The empirical findings demonstrate that health considerations in the Free State's EIA processes remain incidental rather than systematic. To address this, a provincial HIA screening and scoping tool should be institutionalised under the National Environmental Management Act (NEMA) framework. The tool must include:

- Standardised health indicators, covering air and water quality, occupational hazards, communicable diseases, and psychosocial stressors linked to project development.
- Baseline community health profiles generated through district-level epidemiological data to contextualise vulnerability.

- Cumulative exposure and risk assessment protocols that extend beyond single-project evaluations to account for long-term and multiple-source impacts.

Adopting such a framework mirrors successful models implemented in Kenya and Ghana, where health-inclusive screening checklists and cross-sectoral reviews improved both compliance and community health outcomes (Mauti *et al.*, 2022; Tutu *et al.*, 2025). Mandating these tools at the scoping stage would ensure health is assessed early and inform mitigation design before project approval.

Enhancing Inclusive Public Participation

The study highlights procedural participation without substantive influence, disproportionately excluding rural and vulnerable populations. Reforming participation processes requires a transition from symbolic consultation to genuine co-production of environmental decisions. Three key strategies are proposed:

1. Multilingual and accessible communication: Public notices, executive summaries, and comment-response reports should be available in all dominant local languages and simplified formats to overcome literacy and language barriers.
2. Digital engagement platforms: Provincial departments should deploy hybrid participation platforms that combine physical and virtual consultations, ensuring continuity during logistical or geographic constraints (EQUINET, 2024).
3. Community liaison frameworks: Locally trained representatives should facilitate

two-way communication between EAPs and affected communities, ensuring feedback loops and monitoring compliance.

These measures will align South Africa's EIA practice with equity-focused participation models already in use in Zambia and Uganda, where integrating community health priorities into participatory frameworks has improved legitimacy and compliance (Leuenberger *et al.*, 2019; George *et al.*, 2022).

Regulatory and Policy Alignment

To institutionalise sustained integration of health in EIAs, legislative and policy frameworks must be updated to ensure consistency and accountability across sectors. Recommended measures include:

- amending NEMA regulations to explicitly mandate health risk assessment and reporting for all listed activities with potential community health impacts.
- formalising cross-sectoral coordination through interdepartmental agreements between environmental, health, labour, and local government authorities to prevent duplication and clarify accountability.
- embedding health performance indicators in environmental authorisations and monitoring reports, linking them to national health targets and SDG metrics.

These reforms should draw on current WHO (2024a) and World Bank (2024) frameworks that emphasise integrating the social determinants of health into environmental governance systems in low- and middle-income economies.

Capacity Development & Monitoring

The research underscores that both EAPs and reviewing authorities lack sufficient training and methodological capacity to integrate health considerations effectively. To address this, a national and provincial capacity-building programme should be developed focusing on:

- targeted HIA training and certification for practitioners, regulators, and local health officers.
- cross-disciplinary workshops combining environmental science, epidemiology, and social policy to strengthen analytical competence.
- establishment of a national HIA resource hub, providing open-access templates, databases, and learning materials for continuous professional development.

Furthermore, post-implementation monitoring should be strengthened through community-based surveillance models that track health outcomes after project commissioning. This participatory monitoring approach, demonstrated in Tanzania and Zambia, enhances accountability and ensures early detection of emerging risks (Mketo *et al.*, 2022; Leuenberger *et al.*, 2019).

CONCLUSION

The study provides robust evidence that the integration of community health within environmental impact assessment (EIA) practice in South Africa's Free State Province remains inadequate and inconsistent, both procedurally and substantively. Despite the legislative

and policy commitments embedded in the National Environmental Management Act (NEMA), health considerations are treated as secondary to biophysical and economic factors. EEAPs frequently reference pollution and occupational risks, yet the assessments rarely address cumulative exposures or social determinants of health that shape vulnerability across communities. Public participation, though formally included, is characterised by linguistic, geographic, and procedural barriers that prevent meaningful engagement and dilute the influence of affected communities in final decision-making.

By situating these findings within the Social Determinants of Health (SDH) framework, the study underscores how institutional fragmentation, weak intersectoral coordination, and the absence of structured health screening tools perpetuate inequities in environmental governance. The convergence of document analysis and qualitative insights reveals that procedural compliance without substantive accountability fails to protect community health, particularly in rural and low-income districts. Comparative insights from other low- and middle-income countries, such as Kenya, Ghana, Zambia, and Uganda, confirm that these challenges are systemic across sub-Saharan Africa, where fragmented mandates and limited technical capacity hinder the integration of health equity into environmental regulation (EQUINET, 2024; Tutu *et al.*, 2025; George *et al.*, 2022).

To move forward, EIA systems in South Africa must evolve from descriptive compliance instruments to evidence-based policy tools that embed measurable health indicators, community participation standards, and interdepartmental accountability.

Institutionalising a provincial Health Impact Assessment (HIA) screening mechanism would provide a structured pathway for operationalising the SDH principles within EIA practice. Such reform would enhance procedural justice, ensure equitable participation, and strengthen the legitimacy of environmental decision-making. Ultimately,

integrating health as a core dimension of environmental governance is both a constitutional and developmental imperative – one that aligns with South Africa's National Development Plan, Sustainable Development Goal 3 on health and well-being, and the World Health Organization's 2024 agenda for equity-oriented environmental management.

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