The nexus between infrastructural development and sustainable peace and security in intercommunal conflict: Evidence from Baringo County, Kenya

Andrew Kipchumba Kapkomoi[1]
Lilian Machariah[2]
Gladys Rotich[3]

[1]kkapkomoi@gmail.com

[1,2] National Defence University, [3] Jomo Kenyatta University of Agriculture and Technology, [1,2,3] Kenya

https://doi.org/10.51867/ajernet.7.3.115

ABSTRACT

Intercommunal conflict in Kenya's North Rift region has long undermined livelihoods, social cohesion and local governance. Although infrastructure development is increasingly promoted as a pathway to peace, empirical evidence on its role in pastoralist, subnational settings remains limited. This study examined the relationship between infrastructural development and sustainable peace and security in Baringo County, Kenya. The study was underpinned by Human Needs Theory and the Conflict Transformation Framework, which explain how infrastructure may address structural deprivation and transform relationships and institutions that perpetuate conflict. Using a cross-sectional descriptive survey design and a convergent mixed-methods approach, data were collected from 252 household heads, 26 key informants and 72 focus group participants across the Tugen, Pokot, Ilchamus and Turkana communities in Baringo North and Tiaty sub-counties. Secondary conflict data covering 2010–2024 were used to triangulate the primary findings. Quantitative data were analysed using descriptive statistics and multiple linear regression, while qualitative data were analysed thematically. Recorded conflict events, fatalities, injuries and displacement declined between 2010–2014 and 2020–2024, coinciding with the reported expansion of roads, water systems, schools, health facilities and market centres. Respondents associated infrastructure development with faster security responses, reduced cattle raiding, improved access to markets and services, and stronger intercommunal trust. Infrastructure-driven economic activities were positively and significantly associated with sustainable peace and security ($B = 0.244$, $p < 0.001$), whereas governance challenges were negatively and significantly associated with sustainable peace and security ($B = -0.203$, $\beta = -0.469$, $p < 0.001$). Opportunities for intercommunal cooperation had a positive but non-significant independent relationship. The study concludes that infrastructure can contribute to peace when it is equitably distributed, effectively maintained and supported by transparent governance and meaningful community participation. It recommends conflict-sensitive planning, ring-fenced maintenance budgets, strengthened accountability, and the integration of infrastructure investment with community reconciliation programmes.

Keywords: Baringo County, Infrastructural Development, Intercommunal Conflict, Kenya, Sustainable Peace

I. INTRODUCTION

Conflict in the twenty-first century is predominantly internal and is frequently shaped by resource competition, political manipulation and socioeconomic inequality. In 2023, 59 state-based conflicts were recorded across 34 countries, the highest number since 1946 (Rustad, 2024). (Schouten, et al. ,2020) identifies infrastructure as a potential contributor to peacebuilding through inclusive service delivery, employment creation and economic development. Infrastructure is therefore increasingly understood not only as an engine of growth but also as a possible catalyst for sustainable peace in conflict-affected and fragile settings.

In Kenya, the North Rift region - including Turkana, West Pokot, Samburu, Baringo and Elgeyo Marakwet - has long experienced intercommunal violence associated with cattle rustling and competition over pasture, water and land (Marigat & Cheruiyot, 2022). Baringo County continues to experience recurrent conflict despite disarmament campaigns and security deployments. Between October 2023 and July 2024, the county recorded 48 fatalities, 36 injuries and 4,454 displaced households (International Federation of Red Cross and Red Crescent Societies [IFRC] (2025). These trends highlight the limits of security-led interventions that are not accompanied by development-oriented responses to marginalisation and resource competition.

Infrastructure investments may address some structural drivers of violence by improving connectivity, services and economic opportunities. Evidence from the Lamu Port-South Sudan-Ethiopia Transport (LAPSSET) corridor nevertheless shows that anticipated development benefits can coexist with concerns about land, compensation and unequal benefit sharing (Mkutu et al., 2021). Much of the existing evidence focuses on large-scale corridors, with limited attention to how locally delivered infrastructure shapes intercommunal relations and security at the subnational level.

This study focuses on two key variables. The independent variable is infrastructural development, operationalised through the expansion of roads, water systems, schools, health facilities, and market centres in Baringo County, and disaggregated into three dimensions: (i) infrastructure-driven economic activities, (ii) governance-related challenges in project delivery and maintenance, and (iii) opportunities for intercommunal cooperation created by shared infrastructure. The dependent variable is sustainable peace and security, measured through trends in conflict incidence, fatalities, injuries, and displacement, as well as community perceptions of safety, trust, and cooperation. Understanding how variation in infrastructural development is associated with variation in sustainable peace and security, and the conditions under which this relationship holds, is the central analytical task of this paper.

The study focused on selected conflict-affected wards and villages in Baringo North and Tiaty sub-counties. These locations combine recurrent insecurity with investments in transport, water, education, health and market infrastructure, providing an appropriate setting for examining whether and under what conditions infrastructure is associated with sustainable peace and security.

The study is significant for three reasons. First, it provides sub-national, micro-level evidence on the infrastructure–peace nexus in a pastoralist, conflict-affected context, thereby extending existing literature that has largely focused on national or corridor-level analyses. Second, it examines the respective contributions of infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation, offering a more nuanced understanding of when and how infrastructure contributes to peace. Third, the findings have direct policy relevance for county and national governments, development partners, and peace practitioners seeking to design conflict-sensitive infrastructure programmes that maximise peace dividends while minimising the risk of exacerbating local grievances.

1.1 Statement of the Problem

Baringo County continues to experience recurrent intercommunal conflict involving cattle rustling, competition over pasture and water, and the proliferation of small arms. These conflicts have disrupted livelihoods, displaced households and weakened social cohesion among communities, including the Pokot, Tugen and Ilchamus (Chelang'a, 2020). Despite disarmament operations, security deployments and community dialogue initiatives, the county recorded 48 fatalities, 36 injuries and 4,454 displaced households between October 2023 and July 2024 (IFRC, 2025). The persistence of insecurity indicates that security-led interventions alone have not adequately addressed the structural and relational conditions sustaining conflict.

Infrastructure investment offers a potential pathway for addressing these conditions by expanding access to services, markets, water and livelihood opportunities. Nevertheless, infrastructure is not inherently peace-promoting. The LAPSSET experience demonstrates that infrastructure can generate economic expectations while simultaneously provoking disputes over land, compensation and unequal benefit-sharing (Mkutu et al., 2021). Its contribution to peace therefore depends on equitable access, participatory governance, effective maintenance and the extent to which shared facilities promote constructive intercommunal interaction.

Despite growing evidence on the infrastructure–peace relationship, empirical research at the subnational and intercommunal levels remains limited, particularly in pastoralist settings such as Baringo County. Existing studies either examine the general drivers of conflict without systematically linking them to infrastructure investment or analyse large-scale corridors whose macro-level focus obscures the effects of locally delivered infrastructure. Consequently, insufficient evidence exists on how roads, water systems, schools, health facilities and market centres are associated with conflict incidence, fatalities, injuries, displacement and community perceptions of peace and security. This study therefore addresses this gap by integrating secondary conflict data, household survey findings and qualitative evidence to examine the relationship between infrastructural development and sustainable peace and security in Baringo County. Particular attention is given to infrastructure-driven economic activities, governance-related challenges and opportunities for intercommunal cooperation.

1.2 Research Objective

To determining the extent to which infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation predict sustainable peace and security outcomes in the study area.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study is grounded in Human Needs Theory and the Conflict-Transformation Framework. Together, they explain both the structural conditions that contribute to conflict and the relational and institutional processes through which infrastructure development may support sustainable peace.

2.1.1 Human Needs Theory

Burton's (1990) Human Needs Theory holds that protracted conflicts frequently arise from the denial of fundamental and non-negotiable human needs, particularly security, identity, recognition and participation. Because these needs cannot simply be suppressed or exchanged, sustainable conflict resolution requires addressing the underlying conditions that prevent individuals and communities from satisfying them. Infrastructural development may contribute to this process by expanding access to essential services, livelihoods and public institutions. Roads can improve mobility and market access; boreholes can reduce pressure on scarce water resources; and schools and health facilities can strengthen access to education, healthcare and state services. In Baringo County, where conflict has been associated with competition over water, pasture, livestock and economic opportunities, infrastructure may help address some of the structural deprivations that sustain insecurity. Infrastructure is therefore examined not merely as physical development but as a potential mechanism for addressing unmet needs and reducing conflict vulnerability.

2.1.2 Conflict-Transformation Framework

Lederach (1997) argues that sustainable peace requires more than resolving individual disputes or temporarily suppressing violence. It requires the transformation of the relationships, institutions and social structures that generate and reproduce conflict. Conflict transformation therefore focuses on long-term changes in patterns of interaction, power relations and institutions, while recognising the importance of locally grounded peacebuilding processes.

From this perspective, infrastructure can create opportunities for constructive intercommunal engagement. Shared roads, markets, water facilities, schools and health centres may increase interaction among communities and establish practical incentives for cooperation. Participatory planning and joint management of these facilities may also strengthen trust, dialogue and collective responsibility. In Baringo County, such processes could encourage cooperation among Pokot, Tugen, Ilchamus and Turkana communities. However, infrastructure can produce the opposite effect when its location, ownership and benefits are perceived as inequitable. Its peacebuilding contribution therefore depends on inclusive planning, equitable access and accountable governance. Together, the theories provide a complementary analytical framework. Human Needs Theory explains how infrastructure may address structural deprivation and resource scarcity, while conflict transformation explains how shared infrastructure and inclusive governance may reshape intercommunal relationships and institutions over time.

2.2 Empirical Review

2.2.1 Infrastructural Development

Infrastructure is increasingly understood as more than physical capital. Roads, markets, water systems, schools and health facilities can affect livelihoods, access to services, state legitimacy and interactions among communities. However, empirical evidence indicates that infrastructure does not produce peace automatically. Its influence depends on how projects are planned, distributed, governed and maintained.

Mkutu et al. (2021) examined community expectations and conflicts surrounding the Lamu Port-South Sudan-Ethiopia Transport Corridor in northern Kenya. Using qualitative evidence, the study established that anticipated infrastructure investment generated expectations of employment, business development and improved connectivity. At the same time, concerns over land acquisition, compensation, displacement and unequal access to benefits contributed to ethnicised political mobilisation and local tensions. The findings demonstrate that infrastructure can create economic opportunities while simultaneously generating conflict when communities perceive its benefits and costs as being distributed inequitably. The study is particularly relevant because it shows that the relationship between infrastructure and peace is shaped by local political and distributive conditions. However, its focus is a large regional corridor rather than locally delivered roads, water facilities, schools, markets and health centres. It also does not quantitatively test the relationship between infrastructure-driven economic activities and peace outcomes at household or sub-county level.

Muya and Onyango (2025) investigated the effectiveness of county-government economic strategies in promoting sustainable peace in Baringo County. Using questionnaires and oral interviews, the study found that economic empowerment initiatives - including livelihood support and development-oriented interventions - were perceived as important in reducing vulnerability and supporting peaceful coexistence. Nevertheless, their effectiveness was constrained by unequal access, limited funding and implementation weaknesses. Although the study provides locally relevant evidence, its principal focus is economic empowerment rather than physical infrastructure. It therefore does not isolate the contribution of roads, boreholes, schools, health facilities and markets or statistically examine the extent to which infrastructure-generated economic activities predict sustainable peace and security. Overall, the evidence suggests that infrastructure can support peace by improving market access, employment and livelihood opportunities. However, poorly distributed benefits can deepen marginalisation and create new grievances. The present study therefore examines whether infrastructure-driven economic activities are significantly associated with sustainable peace and security in Baringo County.

Governance determines who participates in infrastructure decisions, where projects are located, who benefits from them and whether facilities remain operational. Mkutu et al. (2021) found that inadequate consultation and

uncertainty over compensation and benefit-sharing surrounding the LAPSSET corridor contributed to mistrust and conflict. This finding demonstrates that even economically valuable infrastructure can become a source of tension when governance arrangements are perceived as exclusionary or inequitable.

Mitra et al. (2017) examined slum-upgrading interventions in Kibera, Nairobi, and found that infrastructure improvements were more likely to reduce insecurity and strengthen resilience when they incorporated meaningful community consultation, social-accountability mechanisms and measures that built trust across groups. Conversely, interventions that failed to address local social and institutional relationships risked reinforcing existing divisions. Although the study concerns an urban informal settlement rather than a pastoralist setting, it provides important empirical evidence that the social effects of infrastructure depend on inclusive governance and accountability. Githaiga (2020) examined Kenya's institutional infrastructure for peace through interviews, participant observation and documentary analysis. The study found that formalisation strengthened national and local peacebuilding capacities but could also weaken local agency and threaten the sustainability of community-based peace processes. While the study concerns peacebuilding institutions rather than physical infrastructure, its findings reinforce the importance of local ownership, participation and institutional sustainability.

These studies establish that participation, accountability, equitable benefit-sharing and institutional ownership are critical to the relationship between infrastructure and peace. However, they do not quantitatively assess how governance challenges in delivering and maintaining particular infrastructure projects influence household perceptions of peace and security in Baringo County. The present study addresses this limitation by examining governance challenges as a distinct explanatory variable. Shared infrastructure may create spaces in which previously divided communities interact, trade and manage resources collectively. Such interaction can increase interdependence and provide practical incentives for peaceful coexistence. Nevertheless, cooperation depends on equitable access, trusted governance arrangements and community participation.

The International Organization for Migration (IOM, 2023) assessed natural-resource-based conflicts in north-western Kenya. The assessment identified competition over water, pasture and land, together with weak resource-governance arrangements, as significant drivers of conflict. It emphasised the importance of negotiated resource-sharing, inclusive local institutions and cross-community mechanisms for managing access to scarce resources. These findings suggest that shared water and livelihood infrastructure can support cooperation when accompanied by legitimate management arrangements. Similarly, the Security Research and Information Centre (SRIC, 2023) found that conflict in Kenya's pastoralist regions is driven by overlapping pressures, including resource scarcity, poverty, contested boundaries, cattle rustling, political influence and the proliferation of firearms. Its assessment highlighted community dialogue, local peace structures, resource-sharing mechanisms and livelihood support as necessary components of sustainable peacebuilding. The evidence indicates that infrastructure should be integrated with social and institutional interventions rather than treated as an independent technical solution.

Githaiga (2020) further demonstrates that community participation and local ownership are essential for sustaining peacebuilding institutions. Applied to physical infrastructure, this finding suggests that jointly planned and managed roads, markets, water facilities, schools and health centres may strengthen cooperation when communities regard the institutions governing them as legitimate. However, the reviewed studies provide limited quantitative evidence on whether opportunities for intercommunal cooperation arising from shared infrastructure significantly improve peace and security outcomes. The present study addresses this gap by testing the relationship between infrastructure-enabled cooperation and sustainable peace and security in Baringo County.

2.2.2 Sustainable Peace and Security as the Dependent Variable

Sustainable peace and security extend beyond the temporary absence of violence. They include declining conflict incidents, improved perceptions of safety, strengthened intercommunal trust, freedom of movement, continued access to public services and the ability of communities to resolve disputes without violence. Accordingly, this study examines both objective conflict trends and subjective community perceptions.

Safari and Wambua (2024) examined the relationship between water scarcity and violent conflict among pastoralist communities in Tiaty Sub-County, Baringo County. Their empirical findings showed that environmental degradation, depletion of water sources, competition over scarce resources and climate-related pressures were widely perceived as contributing to conflict escalation. The study is highly relevant because it links inadequate water access to violent conflict in the study area. However, it concentrates on water scarcity and does not examine how multiple forms of infrastructure jointly affect wider peace and security outcomes.

The SRIC (2023) assessment found that pastoralist regions of Kenya experience recurring banditry, cattle rustling, retaliatory attacks, deaths, injuries and displacement. It also established that conflict is shaped by interconnected economic, political, environmental and security factors. This supports the use of objective measures - such as the number, frequency and severity of conflict incidents—alongside community perceptions when assessing sustainable peace. The IOM (2023) assessment similarly identified water and pasture scarcity, contested access to natural resources, cross-border mobility and weaknesses in resource governance as drivers of conflict in north-western

Kenya. Its findings demonstrate that security outcomes are influenced not only by the availability of infrastructure but also by the rules and institutions governing access to the resources that infrastructure makes available.

Muya and Onyango (2025) found that economic interventions in Baringo County were perceived as contributing to sustainable peace, although their effectiveness was affected by implementation and resource limitations. The study supports the proposition that livelihood improvement can strengthen peace. However, its research design does not establish the independent contribution of different infrastructure dimensions to conflict trends and community security perceptions. Collectively, these studies demonstrate that sustainable peace in pastoralist settings is multidimensional. It involves reductions in violent incidents as well as improvements in perceived safety, trust, mobility, access to services and intercommunal cooperation. Nevertheless, the existing literature rarely integrates secondary conflict-event data with household survey evidence or uses regression analysis to determine whether infrastructure-related factors predict peace and security outcomes.

2.3 Summary of Empirical Literature and Identified Gap

The reviewed literature establishes that infrastructure can influence peace and security through several interconnected pathways. It can stimulate livelihoods and trade, reduce isolation, expand access to services and create opportunities for communities to interact and manage shared resources. However, infrastructure can also generate displacement, unequal benefits, competition, mistrust and conflict when projects are poorly governed or perceived as exclusionary.

Four principal gaps remain. First, much of the existing research examines regional corridors, institutional peace structures or resource scarcity rather than multiple forms of locally delivered physical infrastructure. Second, few studies focus specifically on the infrastructure–peace nexus across conflict-affected sub-counties of Baringo County. Third, much of the available evidence is qualitative or descriptive and does not statistically test the predictive influence of infrastructure-related variables on sustainable peace and security. Fourth, limited research integrates objective conflict trends with household perceptions of safety, trust and cooperation.

This study addresses these gaps by employing a mixed-methods design that integrates secondary conflict data, household surveys, key-informant evidence and community narratives. It specifically examines how infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation influence sustainable peace and security in Baringo County. Regression analysis was used to establish the direction and strength of these relationships, while qualitative evidence explained the social and institutional processes underlying the observed patterns.

III. METHODOLOGY

3.1 Research Design

The study adopted a cross-sectional descriptive survey design using mixed-methods approach. Quantitative and qualitative data were collected concurrently, analysed separately and integrated during interpretation (Creswell & Creswell, 2018). Quantitative data established associations between infrastructural development and sustainable peace and security, while qualitative data explained the underlying social and institutional processes. Findings were interpreted as associations.

3.2 Study Area

The study was conducted in selected conflict-affected wards and villages in Baringo North and Tiaty sub-counties, Baringo County, Kenya. The areas have experienced recurrent cattle rustling, banditry and competition over water, pasture and other resources. They were purposively selected because of their exposure to conflict and investments in transport, water, education, health and market infrastructure.

3.3 Target Population

The household sampling frame comprised 1,235 eligible household heads identified from local administrative records. The study also targeted 12 local administrators, four county officials, 20 security and peace-committee representatives, and 72 FGD participants drawn from women, youth, pastoralist elders and traders. These groups were selected because of their experience with infrastructure, conflict and peacebuilding interventions.

3.4 Sampling Techniques and Sample Size

The household sample was calculated using Yamane's (1967) finite-population formula:

$n=N/(1+N(e)^2)$;

Where: n = required sample size; N = total study population; and

e = acceptable margin of error at the 95% confidence level.

Using N=1,235 and e = 0.05;

$n = 1,235 \div [1 + 1,235 (0.05)^2] = 301.83 \approx 302$

The target sample was therefore 302 household heads.

A multistage sampling procedure was used. Baringo North and Tiaty were purposively selected before the study locations were stratified by sub-county, ward and resident community. Villages and household samples were allocated proportionately to their eligible household populations. Systematic random sampling was then used to select household heads from village registers. All 36 key informants were purposively selected based on their responsibilities and knowledge. Eight FGDs, each comprising nine participants, were conducted across the two sub-counties. Of the 302 targeted household heads, 252 returned usable questionnaires, representing an 83.4% response rate. Twenty-six key informants were interviewed, representing 72.2% of the targeted 36. All 72 FGD participants participated. For Likert-scale analyses, 240 questionnaires with complete responses were included.

3.5 Data Collection Procedures

Data were collected using semi-structured household questionnaires, key-informant interview guides and FGD guides. The instruments covered infrastructure-driven economic activities, governance challenges, opportunities for intercommunal cooperation and sustainable peace and security. Content validity was established through expert review, while a pilot study was conducted in Keiyo South Sub-County. Internal consistency was assessed using Cronbach's alpha, with .70 adopted as the minimum acceptable coefficient. Trained research assistants administered the instruments in English, Kiswahili or the relevant local language. Research authorisation was obtained from NACOSTI and the relevant county and local authorities before fieldwork commenced.

3.6 Measurement of Variables

Infrastructural development was the independent variable and comprised three dimensions: Infrastructure-driven economic activities; Governance challenges; and Opportunities for intercommunal cooperation. Sustainable peace and security was the dependent variable. It was measured through perceived safety, conflict frequency, freedom of movement, continuity of livelihoods and services, intercommunal trust and cooperation.

3.7 Data Analysis

Quantitative data were analysed using IBM SPSS Statistics Version 29. Frequencies, percentages, means and standard deviations were used for descriptive analysis. Multiple linear regression was used to examine relationships among the study variables at a 0.05 significance level.

The regression model was: $SPS=\beta_0 +\beta_1 EA+\beta_2 GC+\beta_3 ICO+\varepsilon$

where SPS represented sustainable peace and security, EA infrastructure-driven economic activities, GC governance challenges, and ICO opportunities for intercommunal cooperation. Regression assumptions - including linearity, normality of residuals, homoscedasticity, independence of errors and multicollinearity - were assessed before analysis. Interview and FGD data were analysed thematically and integrated with the quantitative findings. Secondary conflict data from ACLED, the Kenya National Commission on Human Rights and Baringo County Government records were used to corroborate reported conflict patterns.

3.8 Ethical Considerations

The research authorisation was obtained from NACOSTI and relevant county authorities. Participants provided informed consent and were informed of their right to withdraw without penalty. Personal identifiers were excluded, and data were securely stored. Conflict-sensitive interviews were conducted in safe locations, and participants were not required to disclose information that could expose them to harm. FGD participants were asked to respect group privacy, although absolute confidentiality among participants could not be guaranteed.

IV. FINDINGS & DISCUSSION

4.1 Infrastructural Development

This section provides findings on infrastructure-driven economic activities, governance challenges, and opportunities for intercommunal cooperation as sub-variables for Infrastructure development.

4.1.1 Infrastructure-Driven Economic Activities

Household heads were asked to assess how infrastructure has influenced livelihoods, market access, employment and related economic opportunities, and how these changes are associated with security.

Table 1

Perceptions of Infrastructure-Driven Economic Activities

Item Statement	Frequency					Mean
	5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree	
Improved roads have enhanced access to markets and social services.	176 (73.3%)	64 (26.7%)	0 (0%)	0 (0%)	0 (0%)	4.7

As shown in Table 1, all respondents agreed that improved roads had enhanced access to markets and social services. Specifically, 73.3% strongly agreed and 26.7% agreed, resulting in a mean score of 4.7. This finding indicates a strong consensus that improved road connectivity has expanded access to markets and essential services. Improved connectivity may support livelihoods by facilitating the movement of people, livestock and goods while reducing the isolation of remote communities. Focus group evidence further indicated that improved roads were perceived to generate security benefits by enabling faster police response and increasing the risks faced by potential attackers. One youth participant explained:

> *"Now the police could come in cars and respond quickly because the road was tarmacked. The raiders knew it. They faced a greater risk, so the attacks became less frequent."* (FGD-Y1, Youth Group, Tiaty, male, age 24, 4th January, 2026)

The quantitative and qualitative findings therefore suggest that improved roads may contribute to peace through interconnected economic and security pathways. Better connectivity expands access to markets and services while also improving the mobility and responsiveness of security personnel.

4.1.2 Governance Challenges in Infrastructure Development

Focus group discussions and key-informant interviews highlighted how political influence, limited community participation, inequitable project distribution and inadequate maintenance affected the peacebuilding contribution of infrastructure. Participants particularly expressed concern that project selection and allocation were sometimes influenced by political considerations rather than demonstrated community needs.

One key informant observed:

> *"The government has tried, but sometimes the projects are politically influenced."* (KI 2, 6th January, 2026)

Inclusive planning was identified as an important condition for ensuring that infrastructure benefits different communities and contributes to peace. As another key informant explained:

> *"Where leaders involve all communities in planning, projects promote peace."* (KI 9, 6th January, 2026)

Focus group participants also described cases in which inadequate maintenance undermined earlier peace gains. In Tiaty, a borehole constructed in 2019 reportedly fell into disrepair after one year, forcing residents to return to a contested water source:

> *"The borehole they constructed in 2019 broke after one year. No one fixed it. Again, the old waterhole became the object of competition in the community. In 2023, a fight over water left two men injured."*(FGD-W3, Women's Group, Tiaty, age 39, 9th January, 2026)

Participants further raised concerns about the inequitable distribution of projects, particularly where allocation appeared to follow political considerations rather than community needs. In ethnically divided areas, such decisions were sometimes interpreted as deliberate exclusion, creating resentment and weakening social cohesion. Overall, the findings indicate that infrastructure's contribution to peace depends not only on project delivery but also on how projects are selected, distributed, maintained and governed. Transparent allocation, inclusive planning, equitable access and effective maintenance are therefore important for sustaining infrastructure-related peace gains.

4.1.3 Opportunities for Intercommunal Cooperation

Shared infrastructure can create spaces in which previously divided communities interact, trade and manage resources collectively. Respondents were therefore asked to assess whether infrastructure had created opportunities for intercommunal cooperation. Table 2 presents the findings.

Table 2

Opportunities for Intercommunal Cooperation

Item Statement	Frequency					Mean
	5 Strongly Agree	4 Agree	3 Neutral	2 Disagree	1 Strongly Disagree	
Infrastructure projects have reduced intercommunal tensions by improving connectivity.	80 (33.3%)	160 (66.7%)	0 (0%)	0 (0%)	0 (0%)	4.3
Availability of schools, health centres, and water projects promotes peaceful coexistence.	192 (80.0%)	32 (13.3%)	16 (6.7%)	0 (0%)	0 (0%)	4.7
Infrastructural development has increased cooperation between rival communities.	48 (20.0%)	160 (66.7%)	16 (6.7%)	16 (6.7%)	0 (0%)	4.0

The results indicate positive perceptions of infrastructure's contribution to intercommunal cooperation, with an overall mean score of 4.3. All respondents agreed that infrastructure projects had reduced intercommunal tensions by improving connectivity: 33.3% strongly agreed and 66.7% agreed, producing a mean score of 4.3. The availability of schools, health centres and water projects recorded the highest mean score of 4.7. Most respondents (80.0%) strongly agreed that these facilities promoted peaceful coexistence, while 13.3% agreed and 6.7% were neutral. This suggests that shared social infrastructure creates opportunities for interaction and peaceful resource use.

The qualitative findings reinforced this result. Key informants identified shared water projects as important sites of cooperation:

> *"Shared water projects have forced communities to cooperate."* (KI 5, 10th January, 2026)

Focus group participants similarly described the peacebuilding effects of shared facilities. A borehole constructed in 2018 for joint use by the Pokot and Ilchamus communities was cited as the first resource the two communities had shared peacefully. Its co-management arrangements reportedly created mutual accountability and encouraged cooperation in resource use. Schools were also identified as instruments of long-term social cohesion by bringing children and families from different communities into sustained contact. As one key informant explained:

> *"Schools bring children from different communities together, and that promotes understanding."* (KI 14, 11th January, 2026).

Respondents also generally agreed that infrastructural development had increased cooperation between rival communities. The statement recorded a mean score of 4.0, with 20.0% strongly agreeing and 66.7% agreeing. However, 6.7% were neutral and another 6.7% disagreed. Compared with the other statements, this result indicates that infrastructure's contribution to direct cooperation between rival communities was positive but less uniformly perceived. Overall, the findings suggest that improved connectivity and shared access to schools, health centres and water facilities are associated with reduced tensions, peaceful coexistence and intercommunal cooperation. Nevertheless, the comparatively lower rating for cooperation between rival communities indicates that infrastructure alone may not transform historically strained relationships. Its peacebuilding contribution is likely to be stronger when shared facilities are supported by inclusive governance, co-management arrangements and sustained intercommunal dialogue.

4.2 Sustainable Peace and Security as the Dependent Variable

4.2.1 Objective Conflict Trends (2010 - 2024)

To assess changes in conflict over time, the study drew on conflict-event data from the Armed Conflict Location & Event Data project (ACLED, 2024), Baringo County Government administrative records and contextual evidence from the Kenya National Commission on Human Rights (KNCHR, 2017). Table 3 presents the recorded conflict events, fatalities, injuries and displaced households across three five-year periods.

Table 3

Recorded Conflict Indicators in the Study Area, 2010–2024

Period	Conflict events	Fatalities	Injuries	Displaced households
2010–2014	87	134	211	6,420
2015–2019	63	91	147	3,810
2020–2024	41	58	83	2,190
Change: 2010–2014 to 2020–2024	−53.0%	−56.7%	−60.7%	−65.9%

Sources: Conflict events and fatalities ACLED (2024)); Contextual evidence KNCHR (2017)

The findings show a progressive decline across all four conflict indicators. Between 2010 - 2014 and 2020 - 2024, recorded conflict events declined by 53.0%, fatalities by 56.7%, injuries by 60.7% and displaced households by 65.9%. The largest reduction was recorded in displacement, followed by injuries and fatalities. The downward trend

coincided with the expansion of road, water, education, health and market infrastructure in the study area. However, the observed changes cannot be attributed exclusively to infrastructure. Other influences included security deployments, disarmament initiatives, peace committees and community-dialogue interventions. The results should therefore be interpreted as a temporal association rather than evidence of a direct causal effect. The trend complements SRIC's (2023) documentation of banditry, cattle rustling, retaliatory attacks, fatalities, injuries and displacement in Kenya's pastoralist regions. It also supports the use of objective conflict indicators alongside community perceptions when assessing sustainable peace and security (IOM, 2023; SRIC, 2023).

4.2.2 Community Perceptions of Safety, Trust and Cooperation

Household heads (N=240) were asked to assess perceived changes in security following infrastructure interventions in their areas. Responses were recorded on a five-point scale ranging from 1, *much worse*, to 5, *much better*. Table 4 presents the findings.

Table 4

Perceived Security Changes Associated with Infrastructure Interventions

Statement	Much worse	Slightly worse	No change	Better	Much better	Mean
Security situation following road improvements	0 (0%)	0 (0%)	14 (5.8%)	96 (40.0%)	130 (54.2%)	4.48
Cattle raiding following construction of water projects	0 (0%)	6 (2.5%)	24 (10.0%)	120 (50.0%)	90 (37.5%)	4.23
Frequency of community clashes following construction of market centres	6 (2.5%)	12 (5.0%)	30 (12.5%)	114 (47.5%)	78 (32.5%)	4.03
Speed of security-force response following road improvements	0 (0%)	0 (0%)	12 (5.0%)	72 (30.0%)	156 (65.0%)	4.60
Youth involvement in conflict following increased employment	12 (5.0%)	18 (7.5%)	36 (15.0%)	96 (40.0%)	78 (32.5%)	3.87
Intercommunal trust following construction of schools and health centres	0 (0%)	6 (2.5%)	18 (7.5%)	108 (45.0%)	108 (45.0%)	4.33

The mean scores ranged from 3.87 to 4.60, indicating generally positive perceptions of security following infrastructure interventions. The strongest perceived improvement concerned the speed of security-force response following road improvements, which recorded a mean of 4.60. In total, 95.0% of respondents rated security response as either better or much better. Improvement in the general security situation following road development recorded a mean of 4.48, with 94.2% reporting that conditions were better or much better. Intercommunal trust following the construction of schools and health centres also received a high rating, with 90.0% reporting improvement and a mean of 4.33. Respondents further reported reductions in cattle raiding following water projects (mean = 4.23) and fewer community clashes following the establishment of market centres (mean = 4.03).

The lowest mean related to reduced youth involvement in conflict following increased employment (mean = 3.87). Although 72.5% perceived an improvement, 15.0% reported no change and 12.5% indicated that the situation had worsened. This suggests that employment opportunities may contribute to reduced youth participation in conflict but are insufficient on their own to address all the factors influencing such involvement. The qualitative evidence reinforced the importance of road accessibility. Pastoralist elders recalled that poor roads had previously enabled raiders to leave affected areas before security personnel could respond:

> *"Before the road came, if raiders came at night, by the next morning they had already gone over the hills with our cattle. The police had to walk, or ride on camels. We'd bury our dead before help arrived."*
> (FGD-E1, Pastoralist Elder, Tiaty, male, age 63, 12th January, 2026)

Women participants described how insecurity and poor accessibility had constrained access to water, firewood and health services:

> *"When my child was sick, I had to make a decision: do I risk the road to Chemolingot where raiders are waiting, or do I let the child die at home?"*(FGD-W1, Women's Group, Tiaty, age 34, 13th January, 2026)

Across the focus groups, participants commonly associated improved road connectivity with faster security response, greater freedom of movement and more reliable access to services. They also reported improved interaction and trust among communities using shared facilities. Overall, the findings show that sustainable peace and security in the study area are multidimensional. They encompass not only reductions in conflict incidents, fatalities, injuries and displacement but also improvements in perceived safety, security response, mobility, access to services, intercommunal trust and cooperation. Nevertheless, the findings indicate associations rather than proof that infrastructure alone caused the observed improvements.

4.3 Regression Analysis

Multiple linear regression analysis was employed to test the joint and individual effects of the three dimensions of infrastructural development - infrastructure-driven economic activities, governance challenges in infrastructure development, and opportunities for intercommunal cooperation - on sustainable peace and security. The model was specified as:

$SPS = \beta_0 + \beta_1 EA + \beta_2 GC + \beta_3 ICO + \varepsilon$

$SPS = 7.284 + 0.244EA - 0.203GC + 0.067ICO + \varepsilon$

Table 5

Multiple Regression Results Predicting Sustainable Peace and Security

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.758	.575	.569	.29084
a. Predictors: (Constant), Infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	P
1	Regression	26.970	3	8.990	106.279	< .001
	Residual	19.963	236	.0846		
	Total	46.933	239			
a. Dependent Variable: Sustainable peace and Security						
b. Predictors: (Constant), Infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation.						

Regression Coefficients						
Predictor		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.284	.312	-	23.351	< .001
	Infrastructure-driven economic activities	.244	.044	.260	5.537	< .001
	Governance challenges	-.203	.022	-.469	-9.043	< .001
	Opportunities for Intercommunal Cooperation	.067	.041	.074	1.615	.108

a. Dependent Variable: Sustainable peace and Security N=240

The multiple regression model was statistically significant, $F(3,236) = 106.279$, $p < 0.001$. The three dimensions of infrastructural development collectively explained 57.5% of the variation in sustainable peace and security ($R^2 = 0.575$, adjusted $R^2 = 0.569$). This indicates that infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation jointly provide substantial explanatory power for peace and security outcomes in Baringo County. The remaining 42.5% may be attributable to factors outside the model, including security interventions, political conditions, resource availability and community peacebuilding initiatives.

Infrastructure-driven economic activities had a positive and statistically significant relationship with sustainable peace and security ($B = 0.244$, $\beta = 0.260$, $t = 5.537$, $p < 0.001$). Holding the other predictors constant, a one-unit increase in infrastructure-driven economic activities was associated with a 0.244-unit increase in sustainable peace and security. This suggests that improved market access, mobility, trade and livelihood opportunities arising from infrastructure are associated with improved peace and security outcomes.

Governance challenges had a negative and statistically significant relationship with sustainable peace and security ($B = -0.203$, $\beta = -0.469$, $t = -9.043$, $p < 0.001$). A one-unit increase in governance challenges was associated with a 0.203-unit decline in sustainable peace and security, controlling for the other predictors. Governance challenges also recorded the largest standardised coefficient in absolute terms, indicating the strongest unique relationship with the dependent variable. Political interference, inequitable project distribution, limited community participation and inadequate maintenance may therefore weaken the peacebuilding benefits of infrastructure.

Opportunities for intercommunal cooperation had a positive but statistically non-significant coefficient ($B = 0.067$, $\beta = 0.074$, $t = 1.615$, $p = 0.108$). Although shared infrastructure may facilitate interaction and cooperation, its independent relationship with sustainable peace and security was not statistically significant after economic activities

and governance challenges were controlled for. This suggests that cooperation may produce stronger peace outcomes when supported by inclusive governance, equitable access and shared economic interests. Overall, the results demonstrate that infrastructure investment is most strongly associated with sustainable peace when it generates economic opportunities and is implemented through inclusive and accountable governance. Infrastructure alone may create favourable conditions for cooperation, but its peacebuilding contribution depends on how projects are planned, distributed, managed and maintained.

4.4 Discussion

The findings demonstrate that infrastructural development is significantly associated with sustainable peace and security in Baringo County, although its contribution depends on the economic, governance and social conditions surrounding project delivery. The regression model explained 57.5% of the variation in sustainable peace and security, indicating that infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation collectively have substantial explanatory value. However, given the cross-sectional design, the findings represent associations rather than causal effects.

Objective conflict data showed that, between 2010 - 2014 and 2020 - 2024, conflict events declined by 53.0%, fatalities by 56.7%, injuries by 60.7% and displaced households by 65.9%. These declines coincided with expanded road, water, education, health and market infrastructure. Household perceptions were consistent with this trend: respondents reported improved security, faster security-force response, reduced cattle raiding and fewer community clashes following infrastructure interventions. Nevertheless, these changes cannot be attributed to infrastructure alone, as security deployments, disarmament initiatives, peace committees and community dialogue may also have contributed.

The findings support Human Needs Theory, which links persistent conflict to unmet needs for security, livelihoods, recognition and participation (Burton, 1990). Improved roads reduced isolation and expanded access to markets and services, while water projects reduced pressure on contested resources. Schools and health facilities also improved access to essential services and provided shared spaces for interaction. Infrastructure may therefore contribute to peace by addressing structural deprivation and resource competition. This interpretation is consistent with evidence linking water scarcity, resource competition and weak governance to conflict in pastoralist areas (IOM, 2023; Safari & Wambua, 2024; SRIC, 2023).

Infrastructure-driven economic activities had a positive and statistically significant relationship with sustainable peace and security ($B = 0.244$, $\beta = 0.260$, $p < 0.001$). Respondents agreed that improved roads had enhanced access to markets and social services, while qualitative accounts showed that better connectivity facilitated movement, trade and security response. These findings are consistent with Mkutu et al. (2021), who linked infrastructure to expectations of employment, business development and connectivity, and Muya and Onyango (2025), who found that economic empowerment reduced vulnerability and supported peaceful coexistence in Baringo County.

Governance challenges recorded the strongest unique relationship with sustainable peace and security ($B = -0.203$, $\beta = -0.469$, $p < 0.001$). Political influence, inequitable project distribution, limited community participation and inadequate maintenance were identified as factors that weakened infrastructure's peacebuilding contribution. The reported case of a borehole that fell into disrepair illustrates how maintenance failures can reverse earlier gains and renew competition over scarce resources. This finding aligns with studies showing that inadequate consultation, unequal benefit-sharing and limited local ownership can generate mistrust and undermine the sustainability of infrastructure and peacebuilding interventions (Githaiga, 2020; Mitra et al., 2017; Mkutu et al., 2021).

Opportunities for intercommunal cooperation were positively perceived at the descriptive level. Respondents indicated that shared roads, schools, health facilities and water projects reduced tensions, promoted peaceful coexistence and increased cooperation. Qualitative evidence similarly showed that shared water facilities encouraged co-management and mutual accountability, while schools brought different communities into sustained contact. These findings support Conflict Transformation Theory, which emphasises changes in relationships, institutions and patterns of interaction underlying conflict (Lederach, 1997).

However, opportunities for intercommunal cooperation did not make a statistically significant unique contribution in the regression model ($B = 0.067$, $\beta = 0.074$, $p = 0.108$). This does not mean that cooperation is unimportant. Rather, shared infrastructure may create opportunities for interaction without automatically transforming historically strained relationships. Its peacebuilding contribution is likely to depend on equitable access, inclusive planning, trusted co-management and sustained intercommunal dialogue, consistent with IOM (2023), SRIC (2023) and Githaiga (2020).

The study shows that infrastructure creates enabling conditions for peace rather than providing an independent solution to conflict. Its contribution is strongest when it expands economic opportunities, improves access and security response, and is supported by transparent, inclusive and accountable governance. The study contributes subnational mixed-methods evidence by integrating recorded conflict trends, household perceptions and community narratives in examining the infrastructure–peace relationship in a pastoralist, conflict-affected setting.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study examined the relationship between infrastructural development and sustainable peace and security in Baringo North and Tiaty sub-counties. Infrastructural development was assessed through infrastructure-driven economic activities, governance challenges and opportunities for intercommunal cooperation, while sustainable peace and security were examined using recorded conflict trends and community perceptions of safety, trust, mobility and cooperation. The findings indicate that infrastructure-driven economic activities were positively and significantly associated with sustainable peace and security. Improved roads expanded access to markets and social services, facilitated the movement of people and goods, and enhanced the responsiveness of security personnel. Water projects, schools, health facilities and markets also supported livelihoods, service access and peaceful interaction among communities.

Governance challenges had the strongest unique relationship with sustainable peace and security. Political influence in project allocation, inequitable distribution, limited community participation and inadequate maintenance weakened the peacebuilding contribution of infrastructure. Although shared infrastructure was positively perceived as promoting interaction and peaceful coexistence, opportunities for intercommunal cooperation did not make a statistically significant independent contribution after economic activities and governance challenges were controlled for. Shared facilities may therefore create opportunities for interaction, but their contribution to sustained reconciliation depends on inclusive governance, co-management and complementary peacebuilding processes.

Recorded conflict events, fatalities, injuries and displaced households declined between 2010 - 2014 and 2020 - 2024. Household respondents also reported improvements in safety, security response, mobility, intercommunal trust and access to services. Although these trends coincided with infrastructure expansion, they cannot be attributed exclusively to infrastructure because security deployments, disarmament initiatives, peace committees and community dialogue may also have contributed. The study concludes that infrastructure creates enabling conditions for sustainable peace and security when it addresses structural deprivation, generates shared economic benefits and is delivered through transparent, equitable and accountable governance. Infrastructure should therefore be understood as one component of an integrated peacebuilding strategy rather than as an independent technical solution to intercommunal conflict.

5.2 Recommendations

The national and Baringo County governments should institutionalise conflict-sensitive infrastructure planning within county development plans and sector investment programmes. Project identification, location, design and benefit distribution should be informed by transparent needs assessments, conflict analysis and meaningful participation by all affected communities. Proposed projects in conflict-affected areas should also undergo peace-impact assessments to determine their potential effects on resource access, livelihoods, intercommunal relations and marginalised groups. Governance and accountability should be strengthened throughout the infrastructure project cycle. Communities should participate in project identification, implementation, monitoring and evaluation, while information on selection criteria, budgets, contractors and implementation schedules should be publicly accessible. Infrastructure maintenance should be supported through ring-fenced budgets, routine inspections, clearly assigned institutional responsibilities and community-based monitoring arrangements.

Infrastructure projects should be deliberately linked to local economic development. Implementing agencies should promote local employment, skills development, community enterprises and procurement from local suppliers. Roads and markets should be complemented by measures that strengthen livestock trade, small businesses and cross-community economic exchange, thereby expanding the shared economic benefits associated with peace. Shared water points, markets, schools and health facilities should have inclusive co-management structures representing all beneficiary communities, including women, youth, elders and minority groups. These structures should establish clear rules for access, maintenance and dispute resolution. Infrastructure investment should also be accompanied by intercommunal dialogue, peace education, joint livelihood initiatives and community-based conflict-resolution mechanisms to convert increased interaction into trust and durable cooperation.

County and national institutions should establish an integrated monitoring framework linking infrastructure investment to conflict incidents, displacement, service access, livelihoods and community perceptions of security. This will enable periodic assessment of whether infrastructure projects are reducing vulnerability, distributing benefits equitably and strengthening peaceful intercommunal relations. Future research should employ longitudinal or quasi-experimental designs to assess changes before and after specific infrastructure interventions. Studies should also examine roads, water systems, schools, health facilities and markets separately to determine their respective effects on peace and security. Comparative research across other conflict-affected pastoralist counties is recommended, together with studies examining how governance quality, gender, age, livelihood group and community identity shape access to infrastructure and its peacebuilding outcomes.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding Declaration

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

Armed Conflict Location & Event Data. (2024). *Armed Conflict Location & Event Data: Conflict events in Baringo County, Kenya, 2010–2024*.

Burton, J. W. (Ed.). (1990). *Conflict: Human needs theory*. Palgrave Macmillan. https://doi.org/10.1007/978-1-349-21000-8

Chelang'a, J. K. (2020). Conflict dynamics between the pastoral Tugen and Pokot communities of Baringo County, Kenya. *Journal of African Interdisciplinary Studies, 4*(2), 47–61.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Githaiga, N. (2020). When institutionalisation threatens peacebuilding: The case of Kenya's infrastructure for peace. *Journal of Peacebuilding & Development, 15*(3), 316–330. https://doi.org/10.1177/1542316620945681

International Federation of Red Cross and Red Crescent Societies. (2025). *Kenya: Baringo social unrest—DREF final report (MDRKE059)*.

International Organization for Migration Kenya Country Office. (2023). *Assessment on natural resource-based conflicts in north-western Kenya*. IOM Kenya.

Kenya National Commission on Human Rights. (2017). *Mending the rift: Public inquiry on insecurity and its impact on the enjoyment of fundamental human rights in the North Rift region of Kenya*.

Lederach, J. P. (1997). *Building peace: Sustainable reconciliation in divided societies*. United States Institute of Peace Press.

Marigat, S. K., & Cheruiyot, J. C. (2022). Managing the menace of cattle rustling and banditry in North Rift Kenya: The role of Pokot women. *European Journal of Conflict Management, 3*(1), 19–30. https://doi.org/10.47672/ejcm.1128

Mitra, S., Mulligan, J., Schilling, J., Harper, J., Vivekananda, J., & Krause, L. (2017). Developing risk or resilience? Effects of slum upgrading on the social contract and social cohesion in Kibera, Nairobi. *Environment and Urbanization, 29*(1), 103–122. https://doi.org/10.1177/0956247816689218

Mkutu, K., Müller-Koné, M., & Owino, E. A. (2021). Future visions, present conflicts: The ethnicized politics of anticipation surrounding an infrastructure corridor in northern Kenya. *Journal of Eastern African Studies, 15*(4), 707–727. https://doi.org/10.1080/17531055.2021.1987700

Muya, R. N., & Onyango, E. (2025). Effectiveness with county government economic strategies in promoting sustainable peace: A case study of Baringo County, Kenya. *Journal of Humanities and Social Sciences, 4*(1), 72–83. https://doi.org/10.51317/jhss.v4i1.810

Rustad, S. A. (2024). *Conflict trends: A global overview, 1946–2023* (PRIO Paper). Peace Research Institute Oslo. https://www.prio.org/publications/14006

Safari, S. N., & Wambua, P. P. (2024). Water scarcity role on violent conflicts amongst pastoralist communities in Tiaty Sub-County, Baringo County, Kenya. *Reviewed Journal of Social Science & Humanities, 5*(1), 137–163. https://doi.org/10.61426/rjssh.v5i1.182

Schouten, P., Fantini, C., Morgan, G., Kumar, S., Adeoti, T., Reese, A., Crosskey, S., & O'Regan, N. (2020). *Infrastructure for peacebuilding: The role of infrastructure in tackling the underlying drivers of fragility*. UNOPS.

Security Research and Information Centre. (2023). *Assessment of peace and conflict dynamics in pastoralist regions of Kenya: A case of Baringo, Elgeyo Marakwet, Isiolo and Samburu counties*.

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.