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**Assessment of the Socio-Economic and Environmental Impacts of
Resettlement Programs on Relocated Communities in Bugesera and
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Assessment of the Socio-Economic and Environmental Impacts of Resettlement Programs on Relocated Communities in Bugesera and Ngoma Districts: A Case Study of the Ngoma-Ramiro Road Project

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Abstract

This study assessed the socio-economic and environmental impacts of the Ngoma–Ramiro Road Project resettlement in Bugesera and Ngoma Districts, Rwanda. Using a mixed-methods design, data were collected from 227 respondents in Gashora, Rukumberi, Sake, Gashanda, Kazo, and Kibungo sectors through questionnaires, interviews, field observations, and document review. Quantitative data were analyzed using SPSS and qualitative data thematically. Findings show mixed outcomes of resettlement. About 68% of respondents reported improved housing conditions, and 64% experienced better access to water, sanitation, roads, education, and healthcare. However, 92.1% did not receive livelihood restoration support, while 57% reported inadequate compensation. In addition, 61% experienced declining income and employment, and 54% reported reduced access to farmland and natural resources, affecting food security and agricultural productivity. Environmental outcomes were also mixed, with 59% reporting improved sanitation and settlement safety, while 46% noted challenges such as soil erosion, drainage problems, and land degradation. The study concludes that although physical living conditions improved, livelihood restoration remained weak, requiring stronger compensation systems, effective livelihood support, environmental planning, and long-term monitoring to ensure sustainable resettlement outcomes.

Keywords: *Environmental impacts, compensation, infrastructure development, livelihood restoration, socio-economic impacts, resettlement, and Rwanda.*

1. Introduction

The Government of Rwanda has invested heavily in road infrastructure projects such as the Ngoma-Ramiro Road Project to improve transport connectivity, stimulate economic growth, and enhance access to markets and social services (Minecofin, 2018; RTDA, 2017). Although these projects are expected to contribute to national and regional development, their implementation has resulted in the displacement and resettlement of households due to land acquisition for road construction. Affected communities have lost

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land, crops, trees, houses, and other livelihood resources, creating significant socio-economic and environmental challenges (Cernea, 1997). Existing studies have largely focused on the economic benefits of road infrastructure development, with limited attention given to the actual post-resettlement conditions and welfare outcomes of affected communities (Sackey, 2023; Emeka, 2014).

Despite the existence of Resettlement Action Plans (RAPs) and legal frameworks that provide for compensation and livelihood restoration, there is limited evidence on whether affected households have fully recovered their livelihoods and living standards after relocation. In many cases, delayed or inadequate compensation, loss of productive land, reduced employment opportunities, and weak livelihood restoration support may leave households economically vulnerable and increase poverty and food insecurity among relocated populations (African Development Bank Group, 2013). In addition, resettlement and road construction activities may contribute to environmental problems such as land degradation, soil erosion, vegetation loss, ecosystem disruption, and changes in water flow patterns, which negatively affect the sustainability of relocated communities (World Bank, 2017).

While the Ngoma-Ramiro Road Project is expected to generate long-term development benefits, including improved regional connectivity, trade facilitation, and better access to public services (Kunaka, 2023; Quang, 2021), it remains unclear whether the resettlement program has effectively achieved its socio-economic and environmental restoration objectives for displaced households in Bugesera and Ngoma Districts. Therefore, this study seeks to assess the socio-economic and environmental impacts of the resettlement program on relocated communities under the Ngoma-Ramiro Road Project and determine whether the interventions implemented have improved or restored the welfare and environmental conditions of affected households.

1.2 Objectives of the Research

1.2.1 General objective

The general objective of the study was to assess the socio-economic and environmental impacts of the resettlement program on relocated communities in Bugesera and Ngoma District.

1.2.2. Specific objectives

- (i) To examine the implementation quality of the resettlement Program for communities relocated under the Ngoma-Ramiro Road Project.
- (ii) To assess the historical and current socio-economic conditions and environmental conditions of the relocated communities in Bugesera and Ngoma Districts.
- (iii) To determine the relationship between the resettlement program interventions and the socio-economic and environmental outcomes of the relocated communities in Bugesera and Ngoma Districts.

2. Research methods

2.1 Description of the study area

The Road Ngoma-Ramiro comprises approximately 52.8km and crosses 2 districts (Bugesera and Ngoma). The project is located in the plains of Eastern Province. The cross-section of the road is between 4 and 6 meters, depending on the population density and

water and water resources; in densely populated areas and near Wetlands, the width is reduced to four meters. The starting point (Ramiro) is located in Bugesera District, Gashora Sector, in a forested area; it passes through Gashora Sector and Akagera Wetland to Rukumberi, Sake, Gashanda, Kazo Sectors, and ends at Kibung of Ngoma District. The altitude of this region is estimated between 1500m and 1300m; the relief is dominated by depressions generally at altitudes between 1500m and 1100m. The drainage in this area is in the Nile Basin, where the Akagera Sub-basin is located. The western part of the Ngoma district is made up of vast wetlands constituted by depressions of fluvial lakes of the Akagera that offer a typical landscape of lakes and swamps. Bugesera district hydrographical network is mainly characterized by 3 rivers, namely Akanyaru, Akagera, and Nyabarongo. Besides rivers, Bugesera has 9 lakes; however, these have little effect on rainfall. But they can be exploited for fishing, tourism, power generation, agricultural irrigation, and farming, among others.

The vegetation is savannas, which are dry and made up of short grasses, short trees and shrubs in semi-arid and arid regions; it also comprises the thick natural woodland in Ramiro, where Gako Military Domain is based.

This research was conducted in Bugesera and Ngoma Districts in 6 sectors through which the project passes, and construction activities are carried out, namely Gashora, Rukumberi, Sake, Gashanda, Kazo, and Kibungo. The population growth in this area is high, as reported by NISR in 2022. Where in Gashora Sector the total population is 32,251 people; Rukumberi Sector the total population is 39,420 people, in Sake sector the total population is 28,822 people, in Gashanda sector the total population is 19,345 people, in Kazo sector the total population is 32,450 people, and in Kibungo sector the total population is 31,445 people (NISR ,2022).

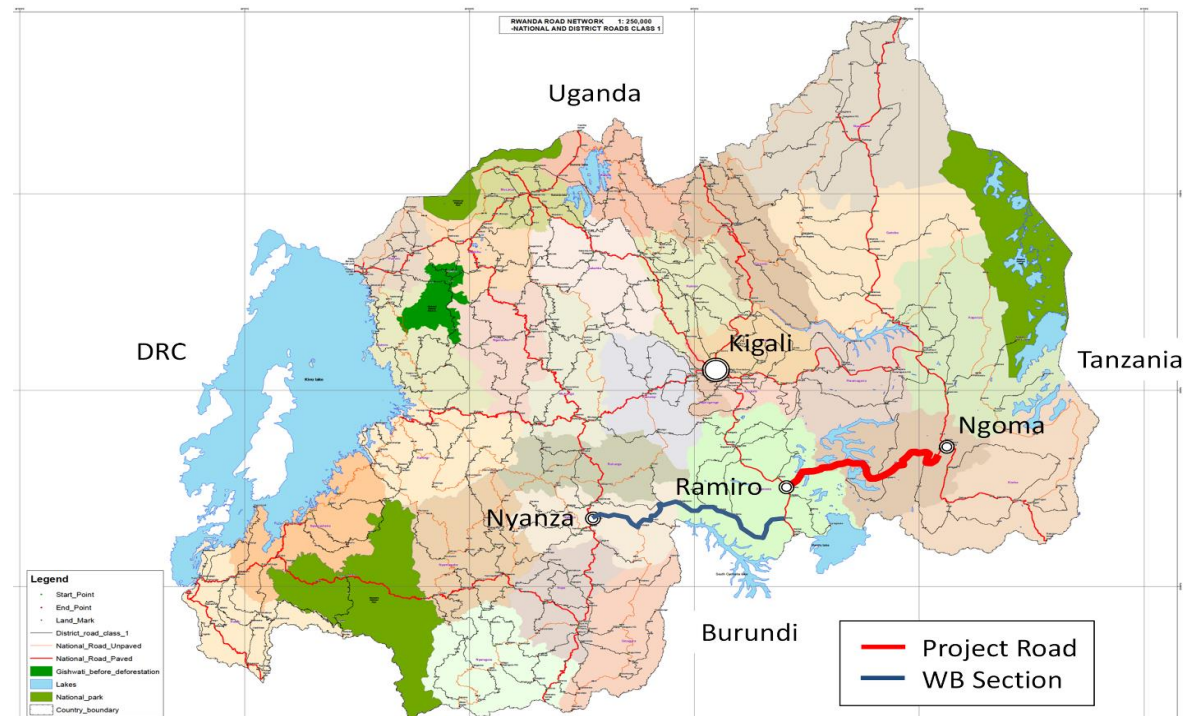


Figure 1: Project map showing its location

Source: Rwanda Transport Development Agency (RTDA). (2022). Environmental and Social Impact Assessment for the Ngoma-Ramiro Road Project.

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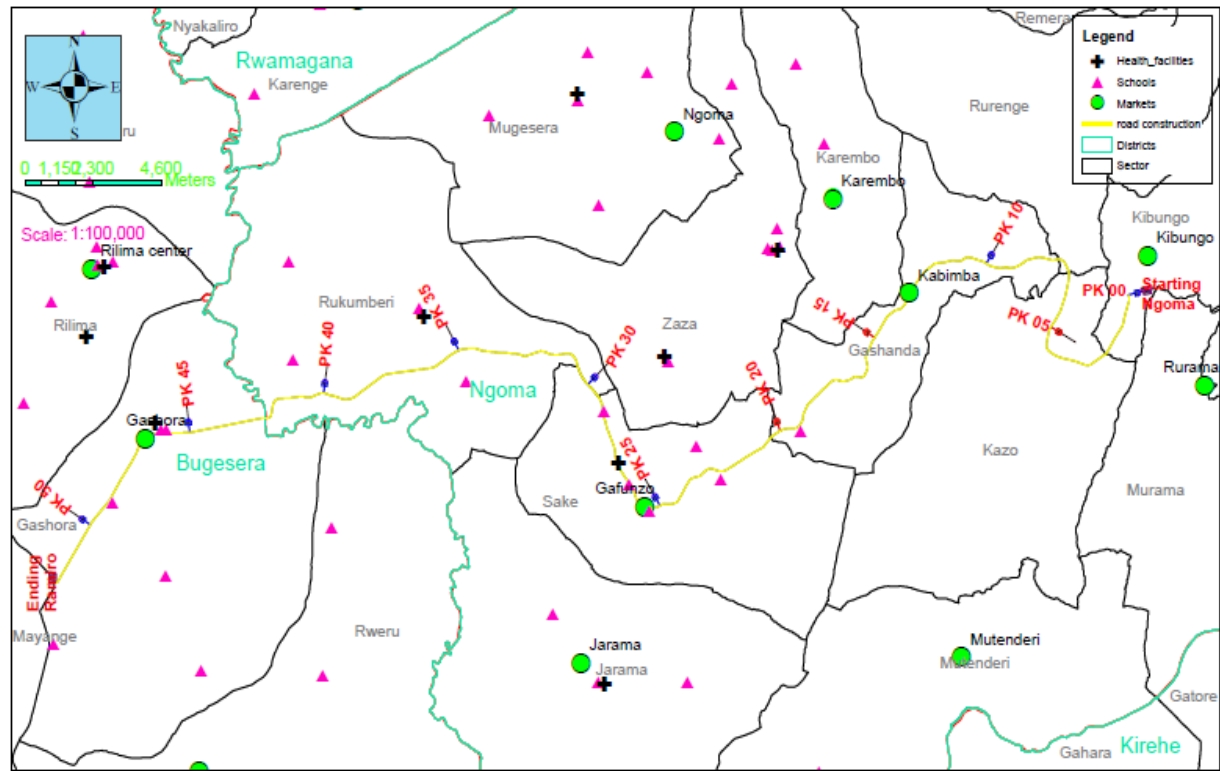


Figure 2: Project area with in different Sectors showing social infrastructures

Source: Rwanda Transport Development Agency (RTDA). (2022). Environmental and Social Impact Assessment for the Ngoma-Ramiro Road Project.

2.2. Research design and data collection methods

This study adopted a descriptive research design with a mixed-methods approach to assess the socio-economic and environmental impacts of the Ngoma–Ramiro Road resettlement program. Research design is a structured plan for collecting and analyzing data (Aggarwal & Ranganathan, 2019), and it guides the entire investigation process. The design combined quantitative and qualitative methods, where quantitative data measured income, employment, housing, and service access, while qualitative data explored perceptions and coping strategies (Creswell & Creswell, 2018). A cross-sectional descriptive approach was used to capture conditions at one point in time (Kothari, 2014).

The study targeted Bugesera (551,103 residents) and Ngoma District (404,048 residents), focusing on 227 affected households (4,371 PAPs overall) across six sectors: Gashora, Rukumberi, Sake, Gashanda, Kazo, and Kibungo (RTDA, 2025; NISR, 2022). A census sampling technique was applied to all 227 households, ensuring full coverage of affected persons. Additionally, purposive sampling selected 21 key informants, including local leaders, RTDA representatives, project implementers, and district authorities, bringing the total respondents to 248 (Sekaran & Bougie, 2016; Babbie, 2013).

Primary data were collected using questionnaires, semi-structured interviews, focus group discussions, and observation checklists. Questionnaires gathered quantitative household data, while interviews explored implementation challenges and experiences. Focus groups captured shared perceptions on compensation fairness, and observations assessed housing, infrastructure, and environmental conditions. Secondary data were obtained from

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government reports, RTDA documents, policy papers, and academic literature (Smith & Johnson, 2020). Data collection tools included structured questionnaires with open and closed questions, translated into Kinyarwanda to ensure clarity. Interviews continued until data saturation was reached. Documentary review and observation, supported by photographs, provided additional contextual evidence on socio-economic and environmental conditions in resettlement sites.

2.3 Data analysis and processing

This Data analysis involved examining, cleaning, transforming, and interpreting data to identify patterns and trends. The study used SPSS for quantitative analysis, while Excel was used for tables and figures to enhance visualization. Descriptive statistics such as frequencies and percentages summarized survey findings on community perceptions of the socio-economic and environmental impacts of resettlement. Data processing included editing, coding, and tabulation to ensure accuracy and clarity in line with study variables.

Editing involved checking questionnaires and interview responses for completeness, consistency, and elimination of errors or duplication, ensuring data quality. Coding assigned numerical or symbolic values to responses, enabling classification of data into categories for statistical analysis and trend identification. Tabulation organized data into tables showing frequencies, percentages, means, and standard deviations, where the mean measured average responses and the standard deviation measured response variability. Reliability interpretation followed Cronbach's Alpha guidelines, where ≥ 0.7 indicated high reliability and ≥ 0.9 excellent reliability (Hamed, 2016).

Validity was ensured through a pilot study involving 5 households excluded from the final sample, expert review by the supervisor, and use of the Content Validity Index (CVI), where a value ≥ 0.60 confirmed instrument validity (Chiang et al., 2015). Reliability was assessed using Cronbach's Alpha in SPSS, measuring internal consistency of instruments (Bryman, 2015; Gravesande et al., 2019).

Ethical considerations emphasized informed consent, confidentiality, anonymity, and voluntary participation (Mugenda, 2008). Authorization was obtained from the University of Lay Adventist of Kigali and local authorities. Participants were informed of their rights, including withdrawal at any stage, and data were used strictly for academic purposes.

Limitations included limited access to reliable socio-economic and environmental data, inconsistent records, and logistical challenges in remote areas of Ngoma and Bugesera. These were mitigated through triangulation of data sources, combining surveys, interviews, FGDs, documents, and GIS data, alongside institutional collaboration, remote sensing, electronic data tools, and rigorous field supervision to ensure data accuracy and reliability.

3. Results

3.1 Social demographic characteristics of the respondents

Under this section, the socio-demographic characteristics of respondents, such as their gender, ages, education level, and experience, are presented.

3.1.1. Gender, age group, marital status, education level and household size among relocated community

Table 1: Gender, age group, marital status, education level and household size

Variable	Category	Frequency (n)	Percentage (%)
1.Gender	Male	134	59
	Female	93	41
2.Age Group (Years)	21-30	38	16.7
	31-40	67	29.5
	41-50	71	31.3
	Above 50	51	22.5
3.Marital Status	Single	32	14.1
	Married	138	60.8
	Divorced	21	9.3
	Widowed	36	15.9
4.Education Level	No Formal Education	46	20.3
	Primary Education	104	45.8
	Secondary Education	57	25.1
	Tertiary Education	20	8.8
5.Household Size	1-3 Members	60	26.4
	4-6 Members	120	52.9
	7-9 Members	47	20.7
	Mean Household Size	4.83	

Source: Primary data, 2026

The finding in Table 1, the socio-demographic profile of the respondents indicates that males constituted the majority 59%, while females accounted for 41%. Most respondents were economically active adults aged between 31 and 50 years 60.8%, suggesting that the study captured participants directly involved in livelihood activities. Married respondents formed the largest proportion 60.8%, indicating that resettlement impacts affected family-based households. Educational attainment was generally low, with nearly half of the respondents 45.8% having only primary education and 20.3% having no formal education. The average household size was 4.83 members, with most households 52.9% comprising 4-6 members. The findings underscore that household size is a critical determinant of resettlement outcomes and should be more explicitly integrated into compensation and planning frameworks to ensure equitable and sustainable livelihood restoration. This observation is consistent with existing literature, where Michael M. Cernea argues that larger households are more vulnerable to impoverishment risks during resettlement due to higher dependency ratios (Cernea, 2000), while Thayer Scudder notes that household size significantly influences the ability of families to adapt to new environments, with larger families often facing greater challenges in restoring livelihoods (Scudder, 2005).

3.1.2 Main occupation before and after relocation among the relocated communities

Table 2: Main occupation before and after relocation among the relocated communities

Occupation	Before relocation		After relocation	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Agriculture	148	65.2	82	36.1
Small-scale Commerce	32	14.1	58	25.6
Masonry/Construction	14	6.2	22	9.7
Teachers	10	4.4	12	5.3
Civil Servants	8	3.5	10	4.4
Casual Labor	9	4	28	12.3
Other (services, etc.)	6	2.6	15	6.6
Total	227	100	227	100
Mean		1.87		2.88
Standard deviation		1.46		1.92

Source: Primary data, 2026

The findings in Table 2 show that after relocation, the proportion of relocated communities engaged in agriculture dropped significantly from 65.2% to 36.1%. This suggests reduced access to farmland. Meanwhile, little commerce increased to 25.6%, and casual labor rose to 12.3%, indicating a shift toward informal and non-farm livelihoods. Lean increases in professional sectors (teachers and civil servants) may reflect access to modern opportunities, though still limited. The mean value of 2.88, which shifts away from category 1 (Agriculture), indicates a significant transition from agriculture to non-farm activities after relocation. Compared to the pre-relocation mean (≈ 1.87), this reflects a structural change in livelihood patterns. The standard deviation of 1.92 suggests a higher dispersion of occupations, meaning that relocated communities are now more spread across different income-generating activities than before.

This diversification may indicate attempts by households to adapt to new socio-economic conditions following displacement. However, this shift does not necessarily imply improvement. The reduction in agricultural engagement from 65.2% to 36.1% suggests loss of access to land, which is a critical productive asset. The increase in small-scale commerce and casual labor indicates a movement toward informal and potentially less stable income sources, which may explain why many respondents reported no significant improvement in income. These findings are consistent with existing literature on resettlement impacts, where Thayer Scudder explains that displaced households frequently undergo livelihood disruption and forced adaptation, often resulting in reduced economic stability and prolonged recovery periods (Scudder, 2005). The World Bank (2013) also highlights that resettled communities commonly transition into non-farm informal sectors, such as petty trade and casual labor, which are typically characterized by low and unstable incomes. In addition, FAO (2018) emphasizes that loss of agricultural land leads to declining food security and increased vulnerability, especially in rural populations.

The key informants systematically reported that the resettlement program importantly altered the livelihood patterns of the affected households. According to their views, a majority of households shifted from preponderantly farming-based activities to small-scale businesses and casual labor due to reduced access to agricultural land after relocation. The

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loss of farmland was identified as the most serious impact, as it directly affected household income and food security. Furthermore, the informants observed a remarkable increase in engagement in casual sector activities, particularly inferior trade and everyday wage labor, as coping and adaptation strategies.

3.2 Presentation of findings per research objectives

This section showed the perceptions of the relocated communities based on the objectives and research questions of the study. To recall, the objectives of this study were to examine the implementation quality of the resettlement program for communities relocated under the Ngoma-Ramiro Road Project, to assess the historical and current socio-economic conditions and environmental conditions of the relocated communities, and to determine the relationship between the resettlement program interventions and the socio-economic and environmental outcomes of the relocated communities in Bugesera and Ngoma Districts.

3.2.1 The implementation quality of the resettlement program for communities relocated under the Ngoma-Ramiro Road Project

The construction of a major transportation infrastructure project in Rwanda, like the Ngoma-Ramiro Road Project, involves a multitude of diverse activities that must be carefully planned, coordinated, and executed.

3.2.1.1 Awareness and consultation of the resettlement program before relocation among the relocated community

Table 3: Awareness and consultation of the resettlement program among the relocated communities

Variable	Response / Rating	Frequency (n)	Percentage (%)	Mean	Standard Deviation
Awareness before relocation	Yes (1)	168	74	0.74	0.44
	No (0)	59	26		
	Total	227	100		
Consultation during relocation planning	Yes (1)	142	62.6	0.63	0.48
	No (0)	85	37.4		
	Total	227	100		
Rating of consultation process	Very adequate (5)	32	14.1	3.22	1.22
	Adequate (4)	78	34.4		
	Neutral (3)	46	20.3		
	Inadequate (2)	49	21.6		
	Very inadequate (1)	22	9.6		
	Total	227	100		

Source: Primary data, 2026

The findings in Table 3 presents respondents' views regarding awareness of the resettlement program, consultation during relocation planning, and the adequacy of the consultation process. The findings reveal that 168 respondents equal to 74.0% were aware of the resettlement program before relocation, while 59 respondents representing 26.0% indicated that they were not informed prior to the relocation process. The mean score of 0.78 suggests

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a generally high level of awareness among the affected households. This implies that the implementing agencies made considerable efforts to disseminate information regarding the resettlement program. However, the proportion of respondents who reported being unaware of the program indicates that communication mechanisms did not effectively reach all affected households, potentially limiting their preparedness for relocation and their ability to make informed decisions regarding compensation and livelihood adjustments. Regarding consultation during the planning stage of relocation, 142 respondents equal to 62.6% reported that they were consulted, whereas 85 respondents representing 37.4% indicated that they were not involved in the planning process.

The mean score of 1.37 and standard deviation of 0.48 suggest a moderate level of consultation with some variation in respondents' experiences. These findings indicate that although consultation efforts were undertaken, participation was not universal, and a considerable proportion of affected persons felt excluded from decision-making processes. Such exclusion may have reduced opportunities for communities to contribute their views on critical issues such as compensation arrangements, relocation site selection, housing design, and livelihood restoration measures. The respondents' assessment of the consultation process further demonstrates mixed perceptions regarding its effectiveness. While 32 respondents (14.1%) rated the consultation process as very adequate and 78 respondents (34.4%) considered it adequate, 46 respondents (20.3%) remained neutral. On the other hand, 49 respondents (21.6%) rated the process as inadequate, and 22 respondents (9.6%) viewed it as very inadequate. Overall, 48.5% of respondents expressed positive perceptions of the consultation process, whereas 31.2% expressed dissatisfaction. These findings suggest that although consultation mechanisms were established, their implementation was not consistently effective across all affected communities. The variation in perceptions may reflect differences in the quality, frequency, and inclusiveness of engagement activities conducted during project implementation.

The findings imply that the resettlement program achieved a relatively satisfactory level of awareness and stakeholder engagement but fell short of ensuring full participation of all affected households. Effective consultation is widely recognized as a critical component of successful resettlement because it promotes transparency, strengthens trust between project implementers and affected communities, and enhances the sustainability of relocation outcomes. The results therefore suggest the need for more inclusive and continuous community engagement strategies to ensure that all affected persons are adequately informed and actively involved throughout the planning and implementation of resettlement programs. The findings of this study are consistent with the provisions of Law No. 32/2015 of 11/06/2015 Relating to Expropriation in the Public Interest in Rwanda, which requires that persons affected by expropriation be adequately informed and consulted before the implementation of development projects. The law recognizes consultation and information disclosure as fundamental principles for ensuring transparency, fairness, and respect for the rights of affected persons throughout the resettlement process. The relatively high level of awareness observed among respondents (74.0%) suggests that project implementers undertook efforts to communicate information regarding the resettlement program. However, the finding that 26.0% of respondents were unaware of the program before relocation indicates that communication strategies were not fully effective in reaching all affected households. Similarly, although 62.6% of respondents reported having been consulted during relocation planning, the remaining 37.4% felt excluded from the process, suggesting that compliance with legal consultation requirements was only partial and that stakeholder engagement could have been more comprehensive (Government of

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Rwanda, 2015).

The findings also align with the principles outlined in the World Bank Environmental and Social Framework (ESF), particularly Environmental and Social Standard 5 (ESS5), which emphasizes the importance of meaningful consultation and participation in resettlement planning and implementation. According to the World Bank (2017), effective resettlement requires continuous engagement with affected communities throughout the project cycle, including planning, implementation, monitoring, and evaluation stages. Meaningful participation enables affected persons to express their concerns, influence decisions regarding compensation and relocation, and contribute to the design of livelihood restoration measures. Such participation promotes transparency, builds trust between project authorities and communities, reduces conflicts, and increases the likelihood of achieving sustainable resettlement outcomes. In the context of the Ngoma-Ramiro Road Project, the moderate consultation levels and mixed perceptions regarding the adequacy of consultation suggest that opportunities for active community participation may not have been uniformly available to all households, potentially limiting the effectiveness of some resettlement interventions. Furthermore, the results are consistent with observations made by UN-Habitat, which identifies communication and community participation as critical determinants of successful resettlement programs. UN-Habitat (2011) argues that inadequate consultation often results in misunderstandings, resistance, dissatisfaction, and reduced acceptance of relocation programs among affected populations. When communities are not fully informed or involved in decision-making processes, they may perceive resettlement interventions as externally imposed, leading to mistrust and reduced cooperation. Conversely, inclusive and participatory approaches enhance community ownership, improve the legitimacy of project decisions, and facilitate smoother implementation of relocation activities. The relatively high proportion of respondents who rated the consultation process as inadequate or very inadequate (31.2%) suggests that some affected households may have experienced limited opportunities to influence decisions that directly affected their livelihoods and well-being. From a broader development perspective, stakeholder participation is widely recognized as a key factor influencing the success of resettlement programs. Research by Cernea (2000) emphasizes that insufficient participation can exacerbate risks of impoverishment, social disarticulation, and livelihood disruption among displaced populations. Similarly, Scudder (2005) argues that active involvement of affected communities enhances adaptation to new environments and contributes to long-term livelihood recovery. Therefore, the findings of this study indicate that while the Ngoma-Ramiro Road Project achieved a reasonable level of awareness and consultation, additional efforts are needed to strengthen participatory mechanisms. Enhancing community engagement through regular consultations, transparent information-sharing, accessible grievance redress systems, and inclusive decision-making processes would contribute to more equitable, socially acceptable, and sustainable resettlement outcomes for affected communities.

3.2.1.2 Compensation experiences among relocated communities

Table 4: Compensation experiences among relocated communities

Variable	Response / Category	Frequency (n)	Percentage (%)	Mean	Standard Deviation
1.Received compensation before relocation	Yes (1)	224	98.7	0.99	0.11
	No (0)	3	1.3		
	Total	227	100		
2.Type of compensation received	Cash	227	100		
	Land	0	0		
	House	0	0		
	Livelihood restoration support	0	0		
	Other	0	0		
	Total	227	100		
3.Perceived fairness of compensation	Very fair (5)	24	10.6	3.15	1.18
	Fair (4)	82	36.1		
	Neutral (3)	48	21.1		
	Unfair (2)	50	22		
	Very unfair (1)	23	10.1		
	Total	227	100		
4.Compensation paid within 120 days	Yes (1)	158	69.6	0.7	0.46
	No (0)	69	30.4		
	Total	227	100		

Source: Primary data, 2026

The findings in Table 4 indicate that the compensation component of the resettlement program was implemented with a relatively high degree of procedural compliance, but with important limitations in terms of adequacy and fairness. First, almost all respondents, 98.7%, reported that they received compensation before relocation. The mean score of 0.99 and the very small standard deviation of 0.11 suggest that this practice was nearly universal and consistently applied across the study population. This implies that the responsible authorities largely complied with the legal requirement that compensation should precede displacement, as provided for in Law No. 32/2015 Relating to Expropriation in the Public Interest (Government of Rwanda, 2015). From a procedural perspective, this is an important achievement because paying compensation before relocation reduces uncertainty and gives affected households at least some opportunity to prepare for the transition. However, procedural compliance alone does not necessarily guarantee that households are able to restore their livelihoods or maintain their previous standard of living.

A more critical concern arises from the type of compensation provided. The data show that all respondents received cash compensation, while none reported receiving land, housing, livelihood restoration support, or other forms of in-kind assistance. This indicates that the compensation package was highly uniform but narrow in scope. In a rural setting where many households depend on agriculture, a cash-only approach may not adequately replace

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productive assets such as land, livestock, or access to natural resources. Although cash compensation may satisfy the formal requirement to pay compensation, it does not always secure long-term livelihood recovery, especially when households lack alternative income sources or financial management capacity. For agriculture-dependent families, the absence of land-for-land replacement or livelihood support can weaken food security, reduce productive capacity, and increase vulnerability after relocation. This pattern reflects the gap between legal compliance and developmental effectiveness, since a program may meet the minimum legal standard while still failing to restore livelihoods in a meaningful way (Scudder, 2005; World Bank, 2013; UN-Habitat, 2011).

The perceived fairness of compensation also reveals a mixed picture. Although 46.7% of respondents rated compensation as fair or very fair, 32.1% considered it unfair or very unfair, while 21.1% remained neutral. The mean score of 3.15 suggests that, on average, respondents viewed compensation as only moderately fair. The standard deviation of 1.18 shows substantial variation in opinions, indicating that experiences differed considerably across households. This variation may be linked to differences in household size, previous livelihood dependence, valuation of assets, and expectations regarding replacement support. In particular, respondents whose livelihoods were tied closely to land may have judged cash payments as insufficient, even if the amount received was legally approved. This means that fairness was not experienced uniformly, and that some households may have felt that the compensation did not adequately reflect the value of what they lost. In resettlement contexts, perceived fairness is especially important because dissatisfaction can lead to resentment, reduced trust in project authorities, and difficulties in adaptation (Cernea, 2000; Scudder, 2005).

Timeliness of payment presents a somewhat stronger result, but still with notable shortcomings. About 69.6% of respondents confirmed that compensation was paid within the legally prescribed 120 days, while 30.4% reported delays. The mean value of 0.70 indicates that timely payment was the dominant experience, but the proportion of delayed cases remains significant. This suggests partial compliance with the legal requirement that compensation should be paid within 120 days from approval, as stated in the expropriation law (Government of Rwanda, 2015). Timely compensation is essential because it allows households to secure alternative accommodation, adjust their budgets, and plan for relocation in an orderly manner. When payment is delayed, families may be forced to borrow money, sell assets prematurely, or postpone relocation-related decisions, which can intensify economic stress and weaken their ability to recover. From this perspective, delays in compensation are not simply administrative inconveniences; they directly affect the capacity of affected households to protect their welfare during transition (Cernea, 2000; World Bank, 2013; Baranyi & Korinek, 2019).

In general, the results suggest that the compensation process was strong in terms of timing before relocation and relatively good in terms of meeting the legal deadline for many households. However, the approach was less effective in substance because it relied entirely on cash payment and did not provide broader livelihood restoration measures. The mixed perceptions of fairness further indicate that legal payment alone was not enough to ensure satisfaction or perceived justice among the relocated communities. In practical terms, this means that the resettlement program satisfied some procedural requirements but did not fully address the socio-economic realities of the affected households. A more effective compensation framework would combine prompt payment with land replacement, livelihood restoration, and tailored support for vulnerable households, particularly in areas

where agriculture remains the main economic base.

3.2.1.3 Availability of livelihood restoration programs among the relocated communities

Table 5: Availability of livelihood restoration programs

Response	Frequency	Percentage (%)
Yes (1)	18	7.9
No (0)	209	92.1
Total	227	100

Source: Primary data, 2026

The findings in Table 5 reveal that only 7.9% of respondents reported the availability of livelihood restoration programs linked to their resettlement, while a vast majority, 92.1%, indicated that such programs were not available. These results demonstrate a critical gap in the resettlement process. The near-absence of livelihood programs suggests that compensation was treated as a one-off financial transaction rather than part of a broader socio-economic recovery strategy. This aligns with the pattern observed in other domains of this study, such as the exclusive use of cash compensation and the dissatisfaction with compensation fairness, where procedural compliance did not translate into meaningful livelihood restoration.

Although Law No. 32/2015 Relating to Expropriation in the Public Interest mandates compensation for expropriated property, it does not explicitly require comprehensive livelihood restoration programs that build resilience or facilitate sustainable income generation. The absence of such programs likely contributed to the limited improvements in post-relocation income and economic stability reported in the study. The striking lack of livelihood support observed here is consistent with global evidence showing that resettlement programs often fall short in addressing post-displacement economic needs, where Michael M. Cernea emphasizes that compensation alone, particularly when purely monetary, rarely prevents impoverishment unless it is combined with livelihood restoration strategies, such as employment training, access to credit, or land substitution (Cernea, 2000). Thayer Scudder highlights that households displaced from agrarian economies require targeted support to rebuild productive capacities; otherwise, they face long-term instability and income loss (Scudder, 2005).

The World Bank (2013) Involuntary Resettlement Sourcebook explicitly notes that livelihood restoration must be a core component of resettlement planning, as failure to do so consistently results in declining welfare and increasing poverty among affected populations. Recent studies in African infrastructure resettlement contexts report similar deficiencies: for example, Baranyi and Korinek (2019) found that the absence of structured livelihood programs led to greater reliance on informal labor and small-scale commerce, which often generate unstable and insufficient income. In conclusion, the overwhelming absence of livelihood restoration programs among respondents highlights a major deficiency in the resettlement process. Without structured support to rebuild or diversify income sources, households' risk prolonged economic hardship and reduced resilience. This finding aligns with global research, which consistently shows that compensation alone is insufficient for sustainable resettlement; a comprehensive approach that includes livelihood restoration is essential for promoting long-term socio-economic well-being.

3.2.1.4 Type of Livelihood support received among the relocated communities

Table 6: The type of livelihood support received by the respondents

Type of Support	Frequency	Percentage (%)
Skills training (1)	0	0
Agricultural inputs (1)	9	4
Employment opportunities (1)	18	7.9
Financial assistance (1)	0	0
Business support (1)	0	0
None (0)	200	88.1
Total	227	100

Source: Primary data, 2026

The findings in Table 6 indicate that the majority of respondents 200 represent 88.1%, did not receive any form of livelihood support after relocation. Only a small proportion benefited from employment opportunities 7.9% and agricultural inputs 4.0%, while no respondents reported receiving skills training, financial assistance, or business support. These results demonstrate that livelihood restoration efforts were extremely insufficient and narrowly focused. The absence of serious support mechanisms such as skills training and business assistance suggests that affected households were not sufficiently equipped to transition into alternative income-generating activities. The complete absence of key support mechanisms such as skills training, financial assistance, and business support is particularly concerning, as these are essential for helping displaced populations adapt to new economic environments. As a result, many relocated households are likely to face increased economic vulnerability, reduced income levels, and difficulty in sustaining their livelihoods after relocation.

These findings are strongly supported by existing literature on resettlement and livelihood restoration. According to Michael Cernea (2000), through the Impoverishment Risks and Reconstruction (IRR) Model identifies joblessness and income loss as major risks associated with resettlement when adequate livelihood support is not provided. The extremely high proportion of respondents 88.1% reporting no support in this study suggests that these risks are highly likely to be present, potentially leading to long-term impoverishment among affected households. Similarly, the World Bank (2013) emphasizes that livelihood restoration is a central requirement for successful resettlement. According to its guidelines, displaced persons should be assisted not only to restore but ideally to improve their pre-displacement living standards through measures such as skills development, access to credit, and employment creation. The near absence of such support mechanisms in this study indicates a significant gap between policy expectations and actual implementation. Empirical studies from Sub-Saharan Africa further highlight that failure to provide adequate livelihood support often results in negative socio-economic outcomes, including increased poverty, food insecurity, and reliance on informal or unstable income sources. Research also shows that when resettlement programs focus primarily on physical relocation and housing, while neglecting economic rehabilitation, affected communities tend to experience long-term hardship. The findings of this study align closely with this pattern, suggesting that the Ngoma-Ramiro Road Project may have prioritized infrastructure development over comprehensive livelihood restoration. The implications of these findings are critical for both policy and practice.

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3.2.1.5 Housing quality after relocation among the relocated community

Table 7: Housing quality after relocation

Rating	Frequency	Percentage (%)	Mean	Standard deviation
Very good (5)	28	12.3	3.24	1.19
Good (4)	78	34.4		
Fair (3)	60	26.4		
Poor (2)	41	18.1		
Very poor (1)	20	8.8		
Total	227	100		

Source: Primary data, 2026

The results in Table 7 show that a combined 46.7% of respondents rated their housing as good, 34.4% or very good, 12.3%, indicating that nearly half of the relocated households experienced improvements in housing conditions. This may reflect optimistic outcomes of the resettlement program in terms of providing better or further up to date housing structures. However, an important proportion of respondents expressed less indulgent views. About 26.4% rated their housing as fair, while 26.9% and 18.1% inferior, and 8.8% very inferior reported dissatisfaction with housing quality. This indicates that more than one quarter of households are living in substandard conditions, pointing to inconsistencies in the quality of housing provided. The results indicate that the gross quality of housing after relocation is moderate, with a mean score of 3.24, which falls slightly above the neutral point of 3. This suggests that, on average, respondents perceive their post relocation housing conditions as somewhat satisfactory. The comparatively high standard deviation 1.19 suggests sizeable variation in respondents’ experiences, meaning that housing outcomes were not uniform across all beneficiaries. While some households benefited from improved housing, others faced challenges such as lean construction quality, lean space, or a lack of essential facilities. The moderate mean score and high variability in housing quality suggest that, although the resettlement program improved housing conditions for some households, it failed to ensure consistent and adequate housing standards for all beneficiaries, thereby limiting its overall effectiveness in enhancing living conditions.

These findings are consistent with existing literature on resettlement and housing outcomes. Michael Cernea (2000), through the Impoverishment Risks and Reconstruction (IRR) Model, emphasizes that while resettlement projects often address shelter provision, they may fail to ensure adequacy in terms of space, quality, and suitability, potentially leading to what he describes as “housing inadequacy” as a component of broader impoverishment risks. The presence of 26.9% dissatisfaction in this study suggests that such risks remain relevant. Similarly, the World Bank (2013) highlights that improved housing is a key objective of resettlement programs, but it must meet standards of adequacy, safety, and cultural appropriateness. Empirical studies in Sub-Saharan Africa further support these findings, showing that resettlement programs often deliver visible improvements in housing structures but may overlook the broader concept of “habitable living environments.” Research indicates that even when houses are physically improved, challenges such as overcrowding, lack of sanitation facilities, and poor access to services can reduce overall satisfaction. This helps explain why a significant proportion of respondents in this study rated their housing as only fair or poor despite the provision of new structures. The implications of these findings for the Ngoma-Ramiro Road Project are

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important. From a socio-economic perspective, improved housing can contribute positively to well-being, health, and social dignity, but only if it is adequate and aligned with household needs. The mixed responses suggest that housing interventions should go beyond construction and include quality assurance, beneficiary involvement in design, and integration with basic services such as water, sanitation, and electricity.

3.2.1.6 Availability of infrastructure at the resettlement site among the relocated communities

Table 8: Availability of infrastructure at the resettlement site

Service	Yes (%)	No (%)	Mean
Clean water	78	22	1.22
Electricity	65.2	34.8	1.35
Road access	82.4	17.6	1.18
School	70.5	29.5	1.29
Health facility	58.1	41.9	1.42
Market	63	37	1.37

Source: Primary data, 2026

The findings in Table 8 indicate that the resettlement sites are passably well served by basic infrastructure, though with notable gaps across certain services. Access to road infrastructure is 82.4%, and clean water is 78.0%, which is comparatively high, suggesting that the resettlement program successfully prioritized essential social infrastructure. Improved road access is particularly important, as it enhances mobility, market connectivity, and access to interpersonal services. Similarly, school availability is 70.5%, indicating that a majority of households have access to educational facilities, which is a positive outcome for long-term human capital development.

However, access to electricity is 65.2%, and markets is 63.0%, which is relatively lower, suggesting that an important proportion of households still face limitations in accessing economical and energy related services. This may hinder business activities, income diversification, and gross living standards. The largest gap is observed in access to health facilities, where 58.1%. This indicates not only limited access but also variability among respondents, meaning that some households are significantly disadvantaged. Limited access to healthcare services poses a good risk to the well-being and resilience of relocated communities. Although the resettlement program improved access to key physical infrastructure such as roads and water, the relatively limited availability of health services, electricity, and markets indicates that the program did not fully achieve integrated service provision, thereby constraining the socio-economic recovery and well-being of relocated households.

3.2.2 The historical and current socio-economic conditions and environmental conditions of the relocated communities

This section examines the socio-economic conditions of households before and after relocation to understand how resettlement has affected their livelihoods and overall well-being. It provides a comparative analysis of key socio-economic indicators to determine whether the relocation process has led to improvement, stability, or decline in living standards.

3.2.2.1 Average monthly income before and after relocation among relocated communities

Table 9: Average of monthly income before and after relocation

Income Category (RWF)	Before Relocation		After Relocation	
	Frequency (%)	Percentage (%)	Frequency	Percentage (%)
Below 50,000	86	37.90	102	45.00
50,000-100,000	55	24.20	59	26.00
100,001-200,000	58	25.60	46	20.30
Above 200,000	28	12.30	20	8.70
Total	227	100	227	10
Mean		2.12		1.93
Std. Deviation		0.98		0.91

Source: Primary data, 2026

The findings in Table 9 indicate that before relocation, the majority of respondents with approximately 62%, earned below 100,000 RWF per month, with a significant proportion of 38% earning below 50,000 RWF. Only a small percentage, around 12%, earned above 100,000 RWF, suggesting generally low-income levels before displacement. After relocation, the results show a slight decline in income levels, with about 71% of respondents now earning below 100,000 RWF and an increase in those earning below 50,000 RWF to approximately 45%. This suggests that relocation has negatively affected household income for many respondents. The mean income decreased from 2.12 to 1.93, indicating a decline in income levels after relocation, confirming negative economic impacts. This finding aligns with the work of Michael Cernea (2000), who identifies income loss and joblessness as major risks associated with displacement. Similarly, the World Bank (2013) notes that without effective livelihood restoration programs, displaced households often experience a decline in income levels. The World Bank (2013) also emphasizes that restoring access to productive land is critical for sustaining rural livelihoods. Studies in Sub-Saharan Africa further confirm that infrastructure projects frequently disrupt existing economic activities, especially in rural areas where livelihoods are land-based.

3.2.2.2 Access to agricultural land before and after relocation among relocated communities

Table 10: Access to agricultural land before and after relocation

Access Level	Before Relocation		After Relocation	
	Frequency	Percentage %	Frequency	Percentage %
Adequate	154	67.80	66	29.10
Limited	55	24.20	93	41.00
None	18	8.00	68	29.90
Total	227	100	227	100
Mean		1.4		2.01
Std. Dev		0.63		0.77

Source: Primary data, 2026

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The results in Table 10 show a substantial decline in access to agricultural land following relocation, indicating a significant disruption to land-based livelihoods. Before relocation, the majority of respondents 67.8% reported having adequate access to agricultural land, while only 24.2% had limited access, and a small proportion of 8.0% had no access. This suggests that most households were relatively well-supported in terms of land availability, which is critical for subsistence farming and income generation in rural settings. However, after relocation, the situation changed markedly. Only 29.1% of respondents reported adequate access to land, representing a sharp decrease of more than half. Meanwhile, the proportion of households with limited access increased to 41.0%, and those with no access rose significantly to 29.9%. This shift indicates that a large number of households lost sufficient land or were resettled in areas where land is either scarce or less accessible. These findings suggest that relocation has negatively affected access to agricultural land, which likely contributes to reduced agricultural productivity, food insecurity, and declining household income, especially for those previously dependent on farming.

3.2.2.3 Food security before and after relocation among relocated communities

Table 11: Food security before and after relocation

Status	Before Relocation		After Relocation	
	Frequency	Percentage %	Frequency	Percentage %
Always sufficient	123	54	70	31
Sometimes insufficient	73	32	104	46
Often insufficient	31	14	53	23
Total	227	100	227	100
Mean	1.6		1.92	
Std. Deviation	0.71		0.73	

Source: Primary data, 2026

The findings in Table 11 indicate a clear deterioration in household food security following relocation. Before relocation, more than half of the respondents of 54% reported that food was always sufficient, while 32% experienced occasional insufficiency, and only 14% frequently lacked adequate food. This suggests that, although not perfect, most households were relatively food secure, likely supported by access to agricultural land and stable local food systems. After relocation, however, food security conditions worsened considerably. The proportion of households reporting always sufficient food dropped sharply to 31%, representing a decline of 23 percentage points. At the same time, those experiencing sometimes insufficient food increased to 46%, and those often-facing food shortages rose to 23%. This shift shows that the majority of households are now experiencing some level of food insecurity, with a significant portion facing frequent shortages. The increase in the mean from 1.6 to 1.92 (where higher values indicate worsening food security) reinforces this negative trend. Generally, these results demonstrate that relocation has adversely affected food security, likely due to reduced access to agricultural land, loss of livelihood sources, and insufficient livelihood restoration support, thereby increasing vulnerability among relocated communities.

3.2.2.4 Employment status and sources of income among the relocated communities

Table 12: Employment status after relocation among relocation communities

Employment Type	Frequency	Percentage (%)	Mean
Employed	18	7.90	3.23
Self-employed	41	18.10	
Farmer	63	27.80	
Casual labor	82	36.10	
Unemployed	23	10.10	
Total	227	100	

Source: Primary data, 2026

The results in Table 12 show that employment after relocation is dominated by low-quality and unstable livelihoods rather than formal jobs. Only 7.9% of respondents are employed, while 18.1% are self-employed and 27.8% remain in farming. The largest share, 36.1%, is engaged in casual labor, which usually indicates irregular, low-paid, and insecure work, and another 10.1% are unemployed. This means that nearly half of the respondents 46.2% are either casual laborers or unemployed, showing a high level of economic vulnerability after relocation. The mean score of 3.23 suggests that the overall employment pattern is concentrated around farming and casual labor rather than secure employment. In practical terms, these findings imply that relocation may have reduced access to stable jobs and pushed many households into informal and uncertain income sources, which can negatively affect household income, food security, and long-term livelihood recovery.

3.2.2.5 Access to education and healthcare services

Table 13: Access to education and healthcare services

Service	Improved	Percentage %	Same	Percentage %	Worse	Percentage %	Mean
Education	118	52	68	30	41	18	2.34
Healthcare	111	49	75	33	41	18	2.31

Source: Primary data, 2026

The results in Table 13 indicate a generally positive but not uniform improvement in access to education and healthcare services after relocation. For education, a majority of respondents 52% reported improved access, while 30% experienced no change, and 18% indicated that access had worsened. Similarly, in healthcare, 49% of respondents reported improvements, 33% saw no change, and 18% experienced deterioration. These findings suggest that relocation has contributed to better service delivery for nearly half of the households, likely due to improved infrastructure, proximity to public facilities, or government investment in social services within resettlement areas. However, the fact that nearly one-third of respondents reported no change and a notable 18% experienced worsening conditions highlights persistent gaps in service accessibility and equity. The mean scores of 2.34 for education and 2.31 for healthcare (where lower values indicate improvement) confirm a moderate overall enhancement in access, though not overwhelmingly strong. Generally, while relocation appears to have had a positive impact

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on access to basic social services for many households, the benefits are unevenly distributed. This implies that although infrastructure development may have improved service availability, issues such as distance, affordability, service quality, or population pressure may still limit full access for a significant proportion of relocated households.

3.2.2.6 Housing condition comparison after relocation among the relocated communities

Table 14: Housing condition comparison before and after relocation

Rating	Frequency	Percentage (%)	Mean	Standard deviation
Much better	32	14.10	3.29	1.18
Better	77	33.90		
Same	61	26.90		
Worse	38	16.70		
Much worse	19	8.40		
Total	227	100		

Source: Primary data, 2026

The results presented in Table 14 show that a total of 14.1% of respondents reported that their housing conditions are much better, while 33.9% indicated that their housing is better than before relocation. Combined, this means that 48% of respondents experienced improved housing conditions after relocation. Meanwhile, 26.9% reported that their housing conditions remained the same, suggesting that relocation did not significantly affect their housing situation. On the other hand, 16.7% reported that their housing is worse, and 8.4% indicated that their housing is much worse compared to their previous residences. Altogether, 25.1% of respondents perceived a decline in housing conditions, which highlights that the benefits of the resettlement program were not equally experienced by all households. The findings indicate a mean score of 3.29 with a standard deviation of 1.18, suggesting that overall housing conditions after relocation are moderately better than before, although perceptions vary among households. Since the mean value is above the neutral point (3), it implies that, on average, respondents perceive some improvement in their housing conditions following relocation.

These findings are consistent with existing research on development-induced resettlement. Michael Cernea (2000), through the Impoverishment Risks and Reconstruction (IRR) Model, emphasizes that while resettlement programs often focus on providing new housing, they may still expose affected communities to risks such as landlessness, economic insecurity, and inadequate housing conditions if resettlement planning is not comprehensive. Even when housing structures are improved, the broader living environment may not fully meet the needs of displaced households. Similarly, the World Bank highlights that one of the major objectives of resettlement programs is to ensure that displaced persons have housing conditions that are equal to or better than their previous residences. According to its resettlement guidelines, adequate housing should include not only improved structures but also sufficient living space, access to basic services, and proximity to livelihood opportunities. The results of this study indicate that while nearly half of the respondents experienced improved housing conditions, the remaining households did not benefit to the same extent, suggesting that resettlement implementation

may not have fully met these standards for all beneficiaries. The implications of these findings for the Ngoma-Ramiro Road Project are significant. From a socio-economic perspective, improved housing can enhance living standards, health conditions, and household dignity. In addition, integrating housing improvements with livelihood restoration programs is essential to ensure that the benefits of resettlement are sustainable.

3.2.2.7 Social well-being and community integration among relocated communities

Table 15: Social well-being and community integration

Rating	Frequency	Percentage (%)	Mean	Standard deviation
Very good	48	21	2.9	0.95
Good	86	38		
Fair	61	27		
Poor	32	14		
Total	227	100		

Source: Primary data, 2026

The findings in Table 15 on respondents' relationships with neighbors show that 48 individuals represent 21% rated their relationship as very good, 86 individuals represent 38% wit rated their relationship as good, and 32 individuals represents 27% rated that their relationship was fair with an overall mean score of 2.9 and a standard deviation of 0.95. The average score indicates that respondents generally view their relationships with neighbors as moderately positive, more toward “good” rather than strongly “very good.” This suggests that although there are some interaction and cooperation within the community, strong and deeply rooted social ties are not yet fully built. This pattern can be attributed to the nature of resettlement, where previously established social networks are often disrupted, and individuals are required to rebuild relationships in a new environment.

The relatively low percentage of respondents reporting “very good” relationships suggests that social cohesion is still developing and that the community may be in a transitional phase of integration. Factors such as differences in socio-economic backgrounds, cultural diversity, and limited time for interaction may influence the strength of these relationships. In the Rwandan context, studies on villagization programs have also shown that while resettlement may initially weaken social ties, community cohesion improves with time, especially when supported by shared infrastructure and active local leadership (Ansoms, 2009; Chemouni, 2014; Huggins, 2017). Therefore, the results of this study suggest that, although neighbor relationships are broadly positive, there remains a need for targeted interventions to strengthen interpersonal cohesion and enhance community integration among settled households.

3.2.2.8 Participation in community activities among the relocated communities

Table 16: Participation in community activities

Level	Frequency	Percentage (%)	Mean
High	80	35.24	3.01
Moderate	75	33.04	
Low	66	29.07	
None	6	2.64	
Total	227	100	

Source: Primary data, 2026

The results in Table 16 show that out of 227 respondents, 80 with percentage of 35.24% reported a high level of participation, 75 respondents equal to 33.04% indicated moderate participation, 66 respondents (29.07%) reported low participation, and only 6 respondents (2.64%) indicated no participation at all. The computed mean score is approximately 3.01, suggesting that, on average, respondents exhibit a moderate to high level of participation in community activities. These findings suggest that community participation in the resettled area is generally encouraging, with more than two-thirds of respondents (68.28%) falling within moderate to high participation levels. This indicates a relatively strong level of social engagement, which is essential for rebuilding social networks, enhancing cooperation, and promoting collective action in resettlement settings.

However, the presence of nearly one-third (29.07%) with low participation highlights that some individuals remain less integrated, possibly due to socio-economic constraints, lack of trust, or limited awareness of community initiatives. In the context of resettlement, such a pattern reflects a partially successful social integration process, where many households are adapting and engaging, but others still face barriers to full participation. Active involvement in community activities is crucial as it strengthens social cohesion, mutual support systems, and local governance structures, all of which are key for sustainable livelihood restoration. These results align with perspectives from the World Bank, which emphasizes that community participation is a cornerstone of successful resettlement programs, as it enhances ownership, inclusion, and long-term sustainability of development interventions (World Bank, 2004; World Bank, 2017). Similarly, the African Development Bank (AfDB) highlights that inclusive participation in local activities improves social capital and accelerates post-resettlement recovery, particularly in African rural contexts where collective action plays a vital role in livelihoods (AfDB, 2022). Both institutions stress that without strong community engagement, resettlement programs risk social fragmentation and reduced effectiveness.

3.2.2.9 Access to social support network among the relocated communities

Table 17: Access to social support network

Status	Frequency	Percentage (%)
Improved	93	41
Same	77	34
Reduced	57	25
Total	227	100

Source: Primary data, 2026

The results presented in Table 17 indicate that 93 respondents with percentage of 41% reported that their access to social support networks had improved, while 77 respondents (34%) indicated that it remained the same, and 57 respondents equal to 25% reported that their social support had reduced following resettlement. These findings suggest that, overall, resettlement has had a generally positive effect on social support networks, with a plurality of respondents experiencing improvement. This may be attributed to factors such as closer proximity to neighbors, improved infrastructure, or organized settlement patterns that facilitate interaction and mutual assistance. However, the fact that 59% of respondents (those reporting “same” or “reduced”) did not experience improvement highlights that a significant portion of the population still faces challenges in accessing strong social support systems. This could be due to the disruption of pre-existing social ties, differences in cultural or socio-economic backgrounds, or insufficient time to rebuild trust and relationships in the new environment. From a resettlement perspective, social support networks are critical for enhancing household resilience, emotional well-being, and livelihood recovery.

The mixed results observed here indicate that while some households have successfully re-established or even strengthened their networks, others remain vulnerable to social isolation and reduced community cohesion. These findings are consistent with insights from the World Bank, which emphasizes that displacement and resettlement often lead to the disruption of informal social safety nets, making it essential for resettlement programs to actively support the rebuilding of community structures (World Bank, 2017). Similarly, the African Development Bank (AfDB) notes that strong social networks are fundamental to sustainable resettlement outcomes, as they enhance social capital, facilitate access to resources, and improve adaptive capacity among affected populations (AfDB, 2015). Both institutions highlight that without deliberate interventions, such as community engagement programs, inclusive planning, and support for vulnerable groups, resettled populations may struggle to fully restore their social support systems.

3.2.2.10 The poor soil quality before and after relocation among the respondents

Table 18: The poor soil quality before and after relocation

Status	Before relocation		After relocation	
	Frequency	Percentage %	Frequency	Percentage %
Yes (1)	18	7.90	24	10.60
No (0)	209	92.10	203	89.40
Total	227	100	227	100
Mean	0.08		0.11	
Standard Deviation	0.27		0.31	

Source: Primary data, 2026

The results in Table 18 indicate that before relocation, only 7.9% of respondents reported experiencing poor soil quality, while a large majority, equal to 92.1%, did not face such challenges. This suggests that most households previously lived in areas with relatively productive or acceptable soil conditions suitable for agriculture and livelihoods. However, after relocation, the proportion of respondents reporting poor soil quality increased to 10.6%, while those not experiencing poor soil quality slightly decreased to 89.4%. Although the majority still report acceptable soil conditions, the increase in negative responses indicates a slight deterioration in soil quality in the resettlement areas. This trend is further supported by the increase in the mean value from 0.08 to 0.11, showing a higher prevalence of poor soil conditions after relocation. Similarly, the standard deviation

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increased from 0.27 to 0.31, suggesting greater variability in respondents’ experiences, meaning that soil quality conditions became more uneven across households in the new settlement. These findings are consistent with contemporary applications of the Impoverishment Risks and Reconstruction (IRR) model developed by Michael Cernea, which continues to highlight landlessness and declining land productivity as major risks associated with resettlement (Cernea, 2018). Recent studies show that displaced households often struggle to maintain previous agricultural output due to differences in soil fertility, lack of land preparation, and limited access to agricultural inputs in resettlement areas. Similarly, reports by the World Bank emphasize that poorly planned resettlement can lead to declines in land quality and productivity, particularly when environmental assessments and post-relocation support are inadequate (World Bank, 2022). In addition, recent research by the Food and Agriculture Organization highlights that sustainable land management practices are essential in resettlement contexts, as soil degradation and nutrient depletion are common challenges in newly allocated lands (FAO, 2021).

3.2.2.11 Access to clean water before and after relocation among the relocated communities

Table 19: Access to clean water before and after relocation

Response	Before Relocation		After Relocation	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Yes (1)	142	62.6	121	53.30
No (0)	85	37.4	106	46.70
Total	227	100	227	100
Mean		0.63		0.53
Standard Deviation		0.48		0.5

Source: Primary data, 2026

The findings in Table 19 indicate that 62.6% of respondents had access to clean water before relocation, while 53.3% reported having access to clean water after relocation. Conversely, 37.4% of respondents lacked access to clean water before relocation, compared to 46.7% after relocation. The mean value declined from 0.63 before relocation to 0.53 after relocation, suggesting a noticeable reduction in the proportion of households with access to clean water in the resettlement areas. These results suggest that access to clean water slightly decreased after relocation, which may indicate that water infrastructure or water sources in the new settlements are less accessible or less developed than in the original communities. Access to safe water is a critical component of environmental health and sustainable livelihoods, particularly in rural communities where households depend on nearby water sources for domestic and agricultural activities.

Recent research by the World Health Organization and the UNICEF emphasizes that reliable access to safe drinking water is essential for improving public health, reducing waterborne diseases, and supporting sustainable development (WHO & UNICEF, 2023). Their global monitoring reports indicate that inadequate water supply systems often affect resettled or newly established communities because infrastructure development may lag behind population relocation. Similarly, studies by the World Bank show that development-

induced resettlement can sometimes disrupt existing water access patterns if water supply systems are not adequately planned or integrated into resettlement sites (World Bank, 2022).

3.2.2.12 Environmental problems experienced before and after Relocation

Table 20: Environmental problems experienced before and after relocation (N = 227)

Problem	Before Relocation				After Relocation			
	Frequency	Percentage %	Mean	Std. Deviation	Frequency	Percentage %	Mean	Std. Deviation
Soil erosion	88	38.8	0.39	0.49	108	47.6	0.48	0.5
Flooding	52	22.9	0.23	0.42	32	14.1	0.14	0.35
Poor drainage	90	30.8	0.31	0.46	50	22	0.22	0.41
Deforestation	60	26.4	0.26	0.44	71	31.3	0.31	0.46
None	35	15.4	0.15	0.36	55	24.2	0.24	0.43

Source: Primary data, 2026

The results in Table 20 reveal mixed environmental outcomes after relocation. Notably, the proportion of respondents reporting soil erosion increased from 38.8% to 47.6% with a mean of 0.39 to 0.48, suggesting that the new settlement areas may be more vulnerable to land degradation, possibly due to slope conditions, vegetation removal, or inadequate soil conservation measures. Similarly, deforestation increased from 26.4% to 31.3%, indicating pressure on nearby natural resources, likely driven by fuelwood demand and land clearing in the new locations. In contrast, flooding decreased substantially from 22.9% to 14.1%, and poor drainage declined from 30.8% to 22.0%. This suggests that the resettlement sites may have better physical planning, improved drainage systems, or more suitable topography, reducing water-related hazards. Meanwhile, water pollution remained unchanged for 21.1%, indicating that water quality challenges persist and may not have been adequately addressed during relocation. Importantly, the share of respondents reporting no environmental problems increased from 15.4% to 24.2%, implying that a notable segment of households experienced overall environmental improvement after relocation.

These findings align with current research. According to the World Bank (2022), environmental outcomes of resettlement are often uneven, with improvements in infrastructure (e.g., drainage) occurring alongside new ecological stresses like vegetation loss and land degradation if environmental management is insufficient. Recent work by the Food and Agriculture Organization further emphasizes that increases in soil erosion and deforestation in resettled areas are commonly linked to limited adoption of sustainable land management practices, underscoring the need for soil conservation, reforestation, and community-based natural resource management (FAO, 2021). As a whole, the findings suggest that relocation under the Ngoma-Ramiro Road Project has improved some environmental conditions, especially flooding and drainage, while worsening others, notably soil erosion and deforestation. This demonstrates that resettlement outcomes are not uniformly positive or negative, and highlights the importance of integrating environmental sustainability measures such as erosion control, afforestation, and water

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management into resettlement planning to ensure long-term community resilience.

3.2.2.13 Stormwater problems before and after relocation among the relocated communities

Table 21: Stormwater problems before and after relocation

Response	Before Relocation		After Relocation	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Yes (1)	104	45.80	152	67.00
No (0)	123	54.20	75	33.00
Total	227	100	227	100
Mean	0.46		0.67	

Source: Primary data, 2026

The results in Table 21 show that 45.8% of respondents experienced stormwater problems before relocation, while this proportion increased significantly to 67.0% after relocation. Conversely, respondents reporting no stormwater problems decreased from 54.2% before relocation to 33.0% after relocation. The mean increased from the mean score of 0.46 to 0.67, indicating a substantial rise in the prevalence of stormwater-related challenges in the resettlement areas. These findings clearly indicate that stormwater problems worsened after relocation, which may be attributed to inadequate drainage systems, poor site planning, increased surface runoff, or settlement in areas prone to water accumulation. This suggests that stormwater management infrastructure may not have been sufficiently developed or adapted to the environmental conditions of the new settlements. This pattern is supported by recent research from the World Bank, which highlights that resettlement sites, especially in rapidly developing rural and peri-urban areas, often face drainage and stormwater management challenges due to insufficient infrastructure planning (World Bank, 2022). Without proper drainage systems, relocated communities are more exposed to surface runoff, waterlogging, and localized flooding. Similarly, the United Nations Human Settlements Programme emphasizes that unplanned or poorly designed settlements frequently experience stormwater accumulation and drainage failures, particularly where land grading and water channels are not adequately constructed (UN-Habitat, 2020). This can negatively affect housing conditions, sanitation, and public health. In addition, studies by the United Nations Environment Programme show that land-use changes during resettlement, such as vegetation removal and soil compaction, can increase runoff and reduce natural water absorption, thereby intensifying stormwater problems (UNEP, 2021).

3.2.2.14 Environmental quality compared to previous settlement among respondents

Table 22: Environmental quality compared to previous settlement

Rating	Frequency	Percentage (%)	Mean	Standard deviation
Much better (5)	40	17.6	3.47	1.17
Better (4)	90	39.6		
Same (3)	50	22		
Worse (2)	32	14.2		
Much worse (1)	15	6.6		
Total	227	100		

Source: Primary data, 2026

The results in Table 22 show that the overall environmental quality in the resettlement areas is perceived positively compared to the previous settlements. A majority of respondents rated environmental conditions as either better equal to 39.6%, or much better to 17.6%, accounting for 57.2% of the total responses. Meanwhile, 22.0% of respondents indicated that conditions remained the same, while a smaller proportion perceived conditions as worse of 14.1% or much worse of 6.6%. The computed mean score of 3.47 on a 5-point Likert scale suggests that, on average, respondents perceive environmental quality to have moderately improved after relocation. The standard deviation of 1.17 indicates a reasonable level of variation in perceptions, meaning that while many households experienced improvements, others faced challenges in the new environment. These findings suggest that the resettlement program has had a generally positive impact on environmental conditions, possibly due to improvements in infrastructure, housing planning, and access to basic services. However, the presence of respondents reporting worse conditions indicates that environmental benefits are not evenly distributed, and some households may still be facing environmental difficulties such as drainage issues, soil erosion, or limited access to resources. This pattern aligns with recent findings from the World Bank, which emphasize that well-planned resettlement programs can improve environmental quality, particularly through better infrastructure, organized settlement layouts, and enhanced service delivery (World Bank, 2022).

However, the same studies also highlight that uneven implementation can result in disparities, where some households benefit more than others. Similarly, the United Nations Environment Program notes that resettlement can contribute to environmental improvements, especially when it reduces exposure to hazards such as flooding or poor sanitation. At the same time, it warns that new environmental challenges such as land degradation or increased pressure on natural resources may emerge if sustainability measures are not fully integrated (UNEP, 2021). In addition, research by the United Nations Human Settlements Program highlights that perceived environmental quality in resettlement areas often improves due to better housing and infrastructure. Still, it stresses that long-term sustainability depends on continued investment in environmental management systems such as drainage, waste management, and green spaces (UN-Habitat, 2020).

3.2.2.15 Distance to natural resources among the relocated communities

Table 23: Distance to natural resources among the respondents

Rating	Frequency	Percentage (%)
Near (3)	60	26.4
Moderate (2)	95	41.9
Far (1)	72	31.7
Total	227	100

Source: Primary data, 2026

The results in Table 23 show that 26.4% of respondents reported living near natural resources, 41.9% indicated moderate access, and 31.7% stated they are far from these resources. This suggests that most households do not have proximity to natural resources, which could negatively affect their livelihoods. Distance to natural resources plays an important role in rural livelihoods, especially in communities that depend on agriculture,

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forest products, water sources, and grazing land. Households located far from these resources are more likely to face higher time and labor costs, lower agricultural productivity, and limited access to fuel, food, and income sources. These findings also suggest that resettlement may have changed access to natural resources, which is a common issue in development-induced displacement (Cernea, 2000). The fact that many respondents fall into the moderate to far category indicates a loss of previous resource-based livelihoods, increased reliance on alternative income sources, and a potential decline in household resilience. This aligns with existing research showing that access to natural resources is crucial for rural livelihood security, while limited access increases vulnerability and makes it harder for households to recover from shocks (Food and Agriculture Organization [FAO], 2012). It also supports studies indicating that proximity to natural resources significantly influences livelihood activities such as forest product collection and income generation, and that access to these resources is often unevenly distributed in resettlement settings (De Sherbinin et al., 2008). Overall, the findings reveal that access to natural resources after resettlement is moderately limited, with a significant number of households disadvantaged by distance. This likely leads to income loss, reduced agricultural productivity, and increased vulnerability. Thus, the resettlement program has not fully ensured fair and adequate access to natural resources, which is vital for sustainable livelihood recovery (World Bank, 2004).

3.2.3 Relationship between the resettlement program interventions and the socio-economic and environmental outcomes of the relocated communities

This objective examines the relationship between resettlement program interventions such as compensation, livelihood restoration support, and infrastructure development, and the resulting socio-economic and environmental outcomes among relocated communities. It aims to assess whether these interventions have effectively improved household welfare, income levels, access to services, and environmental conditions after relocation. By analyzing these linkages, the study provides insight into the extent to which the resettlement program has contributed to the restoration of sustainable livelihoods and improved living standards, while also identifying existing gaps and challenges.

3.2.3.1 Effect of compensation on livelihood improvement among respondents

Table 24: Effect of compensation on livelihood improvement

Rating	Frequency	Percentage (%)	Mean
Very High (5)	38	16.70	3.39
High (4)	82	36.10	
Moderate (3)	56	24.70	
Low (2)	34	15.00	
None (1)	17	7.50	
Total	227	100	

Source: Primary data, 2026

The findings in Table 24 indicate that most respondents perceived compensation as helpful, with 16.7% rating it very high, 36.1% high, and 24.7% moderate, while only a smaller proportion reported low or no improvement. In practical terms, this suggests that

compensation contributed to some recovery of livelihoods, but it was not sufficient to fully restore the economic well-being of all households. The findings also show that compensation had a moderately positive effect on livelihood improvement among the relocated households, as reflected by the mean score of 3.39. This finding supports the argument that cash compensation alone is often inadequate to fully restore livelihoods, especially in rural settings where land is the primary source of income.

The World Bank (2004) notes that compensation should be understood as a bridge to livelihood restoration, not an end in itself, and that transitional support, such as credit, land preparation, training, and job opportunities, is often necessary because compensation alone is frequently insufficient to restore income streams after displacement. Similarly, the International Finance Corporation (IFC, 2007) emphasizes that resettlement planning should include clear livelihood-restoration entitlements and baseline data so that changes in living standards can be monitored over time. It also stresses that households need a period of improved income to recover lost opportunities. Recent empirical studies also show a similar mixed picture. A 2025 case study in Kigali, Rwanda, found that in-kind compensation improved land tenure security, housing conditions, and access to infrastructure, but employment restoration remained a challenge, especially where resettlement sites were remote from former workplaces (ASRIC, 2025). A 2025 study from northwest Ethiopia likewise found that compensation was mainly cash-based and that displaced farmers’ livelihood coping strategies were shaped by location, social change, and participatory planning concerns (ScienceDirect, 2025). In addition, a 2024 literature survey on land-based displacement concluded that compensation should go beyond the market value of land and address broader losses such as human and social capital, reduced agricultural output, income loss during transition, and food insecurity (FIG, 2024). The overall findings suggest that compensation under the Ngoma-Ramiro Road Project provided partial livelihood relief, but it did not fully replace lost economic opportunities for every household. The results, therefore, point to the need for stronger livelihood restoration measures, better targeting of vulnerable groups, and compensation packages that are tied to sustainable income recovery rather than asset replacement alone (World Bank, 2004; IFC, 2007; ASRIC, 2025).

3.2.3.2 Impact of livelihood support programs on income

Table 25: Impact of livelihood support programs on income

Response	Frequency	Percentage (%)	Mean	Standard Deviation
Yes significantly	15	6.61	1.19	0.53
Slightly	12	5.29		
No	200	88.11		
Total	227	100		

Source: Primary data, 2026

The findings in Table 25 show that 6.61% of respondents reported significant improvement, 5.29% slight improvement, and 88.11% indicated no improvement. The mean of 1.19 demonstrates that, on average, respondents perceive livelihood support programs as largely ineffective in improving income, and the standard deviation of 0.53 indicates a moderate variation, but the majority share the view that programs had little to no impact. Livelihood support programs under the resettlement project failed to meaningfully restore household

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income, suggesting they were inadequate in design or implementation. According to the World Bank (2004) livelihood support programs often fail when they do not consider local economic opportunities or household skills, meaning cash or material support alone is insufficient. The IFC (2007) highlights that livelihood restoration requires skills development, market access, and active participation of affected households to achieve sustainable outcomes. A recent study in Kigali, Rwanda (ASRIC, 2025) found that while housing and infrastructure improved, livelihood support rarely translated into sustainable income, particularly where resettlement sites were far from previous workplaces. Similarly, a 2025 study in northwest Ethiopia showed that cash-based compensation had a limited effect because it did not replace lost land-based income or account for relocation costs (ScienceDirect, 2025). Literature on land-based displacement also emphasizes that effective compensation should address broader losses, including social capital, reduced agricultural output, and food security (FIG, 2024). The findings indicate that livelihood support programs provided minimal economic relief, highlighting the need for comprehensive livelihood restoration, including skills training, access to employment, and resource provision, to ensure sustainable income recovery for resettled households.

3.2.3.3 Contribution of infrastructure development to quality of life

Table 26: Contribution of infrastructure development to quality of life

Rating	Frequency	Percentage (%)	Mean	Standard Deviation
Strongly Agree (5)	45	19.80	3.6	1.1
Agree (4)	96	42.30		
Neutral (3)	48	21.10		
Disagree (2)	26	11.50		
Strongly Disagree (1)	12	5.30		
Total	227	100		

Source: Primary data, 2026

In Table 26 the study examined respondents’ perceptions of the contribution of infrastructure development to their quality of life. Out of 227 respondents, 19.8% strongly agreed, and 42.3% agreed that infrastructure development had improved their quality of life, resulting in a total of 62.1% positive responses. Meanwhile, 21.1% of respondents were neutral, indicating uncertainty or ambivalence regarding the impact of infrastructure, and 16.8% disagreed or strongly disagreed, suggesting that a minority did not perceive significant benefits from the improvements. The mean score of 3.60 on a 5-point Likert scale indicates that on average of respondents leaned toward agreeing that infrastructure development positively influenced their quality of life. The standard deviation of 1.10 reflects moderate variability in responses, demonstrating that while the majority experienced positive effects, some respondents perceived little or no improvement. This reflects improvements in transportation (road access), water supply, and access to social services. These findings are consistent with other research on infrastructure and socio-economic wellbeing. Studies in African contexts have shown that road construction and access to utilities significantly enhance economic opportunities, access to healthcare, and educational outcomes, thereby improving overall quality of life (World Bank, 2019).

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However, variability in perception is common. Research by Kessides (2018) highlights that infrastructure alone does not guarantee equitable quality of life improvements unless combined with social services and local economic development initiatives. Moreover, evidence indicates that while short-term improvements in quality of life are common following infrastructure projects, long-term benefits depend on proper maintenance, community engagement, and integration with livelihood programs (African Development Bank, 2020). This aligns with the current study, where a portion of respondents expressed neutral or negative perceptions.

3.2.3.4 Overall impact of resettlement on household welfare

Table 27: Overall impact of resettlement on household welfare

Rating	Frequency	Percentage (%)
Very Positive (5)	30	13.20
Positive (4)	84	37.00
Neutral (3)	55	24.20
Negative (2)	38	16.70
Very Negative (1)	20	8.80
Total	227	100

Source: Primary data, 2026

The findings in Table 27 on the overall impact of resettlement on household welfare indicate a moderately positive but mixed outcome among the respondents. Out of 227 households surveyed, 13.2% rated the impact as very positive and 37.0% as positive, resulting in a combined 50.2% of respondents perceiving resettlement as having improved their welfare. However, 24.2% of respondents remained neutral, while a notable proportion, 16.7% and 8.8% rated the impact as negative and very negative, respectively. This means that approximately one-quarter (25.5%) of respondents experienced adverse effects following resettlement. These results suggest that while resettlement programs may have contributed to improved welfare for some households, likely through better housing, infrastructure, and access to services, these benefits were not uniformly experienced. The presence of a substantial proportion of neutral and negative responses implies that certain households may have faced challenges such as loss of livelihoods, inadequate compensation, or difficulties adapting to new environments.

This aligns with existing literature, which emphasizes that the success of resettlement programs depends heavily on the effectiveness of livelihood restoration strategies and social support systems. Empirical studies support these mixed outcomes. For instance, the World Bank (2019) highlights that while resettlement associated with infrastructure development can improve living standards, it often disrupts income sources, particularly for rural households reliant on land-based livelihoods. Similarly, research by Cernea (2000) on the Impoverishment Risks and Reconstruction (IRR) model identifies key risks such as landlessness, joblessness, and social disarticulation that can negatively affect household welfare if not properly addressed. In addition, the African Development Bank (2020) notes that although resettlement can enhance access to infrastructure and public services, the long-term welfare of affected households depends on sustained income-generating opportunities and effective integration into the new socio-economic environment.

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Furthermore, recent studies in sub-Saharan Africa indicate that households benefiting from well-implemented compensation and livelihood restoration programs tend to report improved welfare outcomes, whereas those lacking such support often experience declining living standards (Kessides, 2018). This variation is consistent with the findings of the present study, where perceptions of welfare impact are not uniform across respondents.

3.2.3.5 Correlation and regression analysis for the relationship between variables

The analysis of the relationship between resettlement interventions and socio-economic and environmental outcomes (n =227) provides important empirical evidence on how different components of the resettlement program influence household welfare. The study considered key independent variables, compensation adequacy, livelihood support programs, and infrastructure development, against outcome variables, including household income level, employment status, household welfare, environmental conditions, and access to natural resources. To establish the relationships between these variables, correlation analysis was applied using the Pearson correlation coefficient, expressed as:

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2 \sum(Y - \bar{Y})^2}}$$

The results revealed statistically meaningful relationships. Compensation adequacy showed a moderate positive correlation with household income (r = 0.52), indicating that households receiving higher or more adequate compensation tend to achieve better income levels after resettlement. Similarly, compensation was moderately associated with household welfare (r = 0.49), suggesting that financial compensation contributes to improved living standards, although it is not sufficient on its own. Livelihood support programs demonstrated a moderate positive relationship with employment (r = 0.46), implying that such programs have some effect in facilitating job opportunities, though the strength of the relationship suggests limitations in their effectiveness. Infrastructure development exhibited the strongest positive correlation with quality of life (r = 0.61), confirming that improved access to roads, water, and basic services significantly enhances living conditions. Environmental conditions were also positively associated with household welfare (r = 0.55), highlighting the importance of a clean and safe environment in improving well-being. In contrast, distance to natural resources showed a moderate negative relationship with income (r = -0.38), indicating that households located farther from essential resources such as farmland, water, and forests are more likely to experience reduced income levels.

To further examine the predictive power of these variables, multiple linear regression analysis was conducted using the general model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where:

- Y= Household welfare
- X1= Compensation adequacy
- X2= Livelihood support programs
- X3 = Infrastructure development
- X4= Environmental conditions
- X5 = Distance to natural resources
- β = Regression coefficients

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- ε = Error term

The model summary results ($R = 0.68$, $R^2 = 0.46$, Adjusted $R^2 = 0.45$, Std. Error = 0.72) indicate that 46% of the variation in household welfare is explained by the selected resettlement interventions, which is considered strong in social science research. This implies that while resettlement interventions play a substantial role in shaping welfare outcomes, other external factors such as market conditions, education, and household characteristics also contribute.

The regression coefficients provide deeper insights into the relative importance of each variable. Infrastructure development emerged as the strongest predictor of household welfare ($\beta = 0.37$, $p = 0.000$), indicating that improvements in physical infrastructure have the most significant impact on enhancing living standards. Compensation adequacy also showed a significant positive effect ($\beta = 0.29$, $p = 0.001$), confirming its role in supporting household recovery and economic stability after displacement. Environmental conditions were another important factor ($\beta = 0.25$, $p = 0.003$), suggesting that improved environmental quality contributes meaningfully to welfare. Livelihood support programs, although statistically significant, had the weakest effect ($\beta = 0.18$, $p = 0.012$), indicating potential gaps in their design, targeting, or implementation. On the other hand, distance to natural resources had a significant negative effect ($\beta = -0.21$, $p = 0.005$), reinforcing the idea that reduced access to productive resources undermines household income and overall welfare. Notably, all variables were statistically significant ($p < 0.05$), demonstrating that the observed relationships are reliable and not due to chance.

In summary, the findings demonstrate that resettlement interventions have both positive and limiting effects on socio-economic and environmental outcomes. Infrastructure development stands out as the most impactful intervention, significantly improving quality of life and welfare. Compensation also plays an important role in restoring livelihoods, while environmental improvements enhance living conditions. However, the relatively weak influence of livelihood support programs suggests that they are not sufficiently effective in promoting sustainable employment and income generation. Additionally, the negative impact of increased distance to natural resources highlights a critical challenge in resettlement planning, particularly for rural households dependent on land-based livelihoods. These findings are consistent with existing research. For example, the World Bank (2019) emphasizes that infrastructure investments significantly improve access to services and economic opportunities, while inadequate livelihood restoration remains a common weakness in resettlement programs. Similarly, Cernea's (2000) Impoverishment Risks and Reconstruction model identifies loss of access to natural resources and insufficient income restoration as key risks affecting displaced populations. Furthermore, the African Development Bank (2020) highlights that although infrastructure enhances living conditions, sustainable welfare improvements require integrated approaches that include economic empowerment and access to productive assets. As conclusion, the analysis confirms that while resettlement interventions contribute significantly to improving household welfare, their effectiveness varies across components. A more holistic approach that strengthens livelihood programs, ensures equitable compensation, and maintains access to natural resources is essential for achieving balanced and sustainable development outcomes among resettled communities.

4. Conclusion

This study assessed the socio-economic and environmental impacts of the Ngoma–Ramiro Road Project resettlement in Bugesera and Ngoma Districts. Findings show that

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resettlement success depends not only on compensation and relocation but on long-term livelihood restoration and environmental sustainability. Although legal requirements and compensation were largely met, many households still faced income loss, unemployment, and reduced access to land and natural resources. This reflects the limits of compensation-centered approaches, especially in rural livelihoods. The study also found strong links between environmental changes and socio-economic outcomes, where land degradation and drainage problems negatively affected welfare. Guided by Cernea's Impoverishment Risks and Reconstruction Model (2000), the findings confirm risks such as landlessness and food insecurity. The study concludes that effective resettlement requires integrated, people-centered planning, combining livelihood support, environmental management, and stakeholder participation to ensure sustainable and inclusive development outcomes.

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