ADDIS ABABA UNIVERSITY

SCHOOL OF DEVELOPMENT STUDIES

CENTRE FOR ENVIRONMENT AND DEVELOPMENT

RAILWAY DEVELOPMENT AND ITS IMPLICATIONS: DISPLACEMENT, RESETTLEMENT AND ITS EFFECTS ON LIVELIHOODS AND THE ENVIRONMENT IN SOUTH WELLO ZONE OF AMHARA REGION, ETHIOPIA

BY

ADANE EGZE FITRE

JUNE 2025

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DECLARATION

I, the undersigned, declare that this is my original work, has never been presented at this or any other university, and that all the resources and materials used for the dissertation have been duly acknowledged.

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DISSERTATION APPROVAL

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This is to certify that the dissertation prepared by Adane Egze Fitre, entitled "**Railway development and its implications: displacement, resettlement and its effects on livelihoods and the environment in south Wello zone of Amhara region, Ethiopia,**" is presented in fulfilment of the requirements for the Degree of Doctor of Philosophy in Development Studies (Environment and Development) and meets the accepted standards concerning originality and quality.

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LIST OF ABBREVIATIONS AND ACRONYMS

AALRT	Addis Ababa Light Rail Transit
ADB	Africa Development Bank
ATE	Average Treatment Effect
CSA	Central Statistics Agency
CVM	Contingent Valuation Method
EEP	Ethiopia Electric Power
ERC	Ethiopia Railway Corporation
ETB	Ethiopian Birr
SEIA	Socio-Environmental Impact Assessment
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
GDP	Gross Domestic Production
KII	Key Informant Interview
LSID	Large-Scale Infrastructure Development
MWTA	Marginal Willingness To Accept
Ologit	Ordered Logistic Regression Model
PSM	Propensity Score Matching
RAP	Resettlement Action Plan
SDG	Sustainable Development Goal
SIA	Social Impact Assessment
SLA	Sustainable Livelihoods Approach
SL	Sustainable Livelihoods
TEV	Total Economic Value
VND	Vietnamese Dong
WB	World Bank
WTA	Willingness To Accept

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ABSTRACT

The dissertation examines the impacts of railway development-induced displacement on household livelihoods in the South Wello Zone Amhara Region, the northern part of Ethiopia. The region works on multiple development projects, including railway expansion for economic growth, and leads to disruptions of livelihoods and creates social challenges due to displacement. The dissertation utilized a mixed-methods approach, collecting data from 304 households, including both displaced and non-displaced participants, through surveys, interviews, and focus group discussions. To analyze the primary and secondary data, the study employed quasi-experimental techniques such as propensity score matching, ordered logistic regression, and probit analysis. The research demonstrates that involuntary displacement causes major income reduction together with financial instability that erodes natural resources while breaking down social unity. Displacement of households leads to major income decreases as well as expense reductions which suggest that current resettlement plans and compensation schemes do not provide adequate support in rural areas - worsening socio-economic challenges. The research findings demonstrate how demographic characteristics including marital status together with religious background and age along with educational level that affect household satisfaction concerning paid compensation. Education functions as a vital factor that powerfully controls different aspects of livelihood elements. Research demonstrates that people who advance their education level gain much stronger human capital because those holding tertiary degrees experience 3.80 times better advantages in obtaining advanced skills and training compared to those with elementary education only. People who transition from elementary education to certificate-level training show nearly double the probability to advance their skills and build their social networks. Thus, education is a far way impactful on livelihood sustainability. Moreover, employment status strongly determines livelihood results. The stability and resilience benefits of obtaining employment on one's own farm surpass private business and organizational work. On the other hand, there was a pronounced disparity among households compensated in their willingness to accept and the compensation they received. This was due to the fact that the compensation received was by far lower than the expected amount. Sustainable rehabilitation becomes difficult because training programs do not match the requirements and recovery plans that do not support long-term success. The dissertation proposes developing compensation programs that combine non-financial benefits with customized training and methods to earn additional income and community participation to minimize displacement's adverse impacts.

Keywords: *Livelihood Change, Displacement, Compensation, Resettlement, Railway*

CHAPTER ONE

1. GENERAL INTRODUCTION

Development projects started with just the good intentions of becoming step up for progress and for an improvement of the quality of life at national and local levels. While such initiatives - including infrastructure development - lead to great benefits, they also have negative effects. As an example, large scale transportation project such as railway development often results in involuntary displacement affecting lives of individuals and communities. On top of this, railways facilitate communication of distant areas as well as promote trade and economic development (Rodrigue. 2024; Ranjan 2020) but often impose significant cost on some households with whom they came along the project site (Chen 2021; Gnade et al. 2016).

According to Nyaoro (2018), resettlement tensions arise within communities when Ethiopia is planning to build a near 5,000 kilometre standard gauge railway system connecting 49 towns (Chen, 2021; ERC, 2016). Ethiopia is primarily focused on its projects such as Addis Ababa-Djibouti Railway which strive to improve connectivity and promote economic development by way of stable interactions (Chen, 2021; ERC, 2016). But these initiatives displace rural communities causing socio economic and cultural destabilization (Cernea and Maldonado, 2018). A careful balance is needed to guarantee that development-induced displacement does not deadlock Ethiopia's progress both in economic prosperity and in protecting its citizens.

Land acquisition is what is needed for the infrastructure projects that require significant acquisition of land, threatening severely to rural communities dependent on land for subsistence (De, 2020). Land is essential part of livelihood to these communities: the aspect of land is not just an economic asset, but the very basis of its culture, the integral ingredient of its survival, and its identity (Sapkota, 2021; Shrestha et al., 2022). Farming is indelibly tied to social and cultural traditions in many places, like in South Wello Zone of Amhara, where the main role of land is in staying adhesive - otherwise fractured community as represented by the heritage passed down through the generations. In regard to this, displacement not only undermines these foundations but also poses a threat to food security, household incomes, and social cohesion (Kapur, 2019).

These challenges are aggravated by the process of resettlement owing to facing land requirement for development (Nyaoro, 2018). Even many of the displaced households have been struggling to secure job opportunities and access to alternative livelihoods. Ethiopia's constitutional provision to provide compensation and resettlement to those touched by hard development, however, has not reduced the widespread dissatisfaction. Nonetheless, compensation made in the lieu of landholdings often missed the mark in fulfilling community expectations. This is due to valuation methods fail to value with accuracy and these methods are inconsistently applied with a recognized shortcomings and constraints faced by cash for displaced households. In addition, Ethiopia's land tenure regime not fully owning the land but only providing usufruct rights further restricts remade households' ability to get adequate compensation or reconstruct their lives (Nisa & Khalid, 2024; Adamie, 2021).

In the last decade, about 20 million people were reported to be displaced annually for purposes such as relocation within cities, provision of infrastructure, industrial projects, and transportation networks (Hagen & Minter, 2020; Cernea & Maldonado, 2018). Such development projects have a great impact in rural communities through Ethiopia's reliance on land (Harrison, 2011). Displacement of households from their land holdings disrupts their livelihoods and social dynamics that lead to opposition and tension among affected areas (Dires et al., 2021; De, 2020; Hagen & Minter, 2020). Economic inequalities and lack of access to natural resources make many families vulnerable to poverty and exclusion after their land is being taken for development (Makacha et al., 2022; Gnade et al., 2016), these tensions are further exacerbated.

The evaluation of both compensation acceptance and household displacement outcomes requires a thorough analysis of related variables according to Oppio et al. (2015). Development projects require careful evaluation of compensation adequacy through economic, social and cultural measures since such benefits must consider the assets which build sustainable livelihoods. Strategies must promote inclusivity and equity in order to prevent negative effects of displacement when land forms the main basis of household livelihoods (Nisa & Khalid, 2024; De, 2020; Vanclay, 2017).

The railway development projects across the South Wello Zone require intentional strategic development practices that include all affected stakeholders. The development projects have brought beneficial economic growth to their region but simultaneously destroyed farming operations and decreased job availability while enlarging social gaps between people. The

serious problems require a manoeuvre at local priorities and affected community needs together with sustainable development planning approaches (Zoomers & Otsuki, 2017; Vanclay, 2017).

Thus, development-induced displacement and resettlement present significant challenges in Ethiopia's infrastructure development landscape. Every successful policy, specifically the infrastructure development, requires a deep consultation about the elements that influence compensation acceptance and livelihood restoration. To have a pronounced outcomes of development intervention, Ethiopia should implement inclusive planning practices with fair compensation policy. This policy needs to use sustainable livelihood approaches so as to manage the challenges of infrastructure development and create an equitably sustainable outcomes for the whole communities.

1.1. Literature Review

1.1.1. Railway Development and Land Expropriation in Ethiopia

Despite infrastructure advancement necessary and meant to serves as a vital foundation for social and economic advancement (McDermot et al., 2022; Coccia, 2019), it routinely inflicts critical harm on communities by triggering population relocation (Bouraima et al., 2023; Randell, 2016). Development projects displace millions of people worldwide during each year (Bouraima et al., 2023) and Ethiopia adopts infrastructure initiatives like railway construction to pursue economic gains though complete displacement statistics are inadequate in the country. Although Ethiopia is protected by compensation laws and its constitution, the government continues facing obstacles when it comes to delivering equal treatment, restoring livelihoods and ensuring satisfied communities (Siltan, 2019; Gebre, 2008). Countries including China, Vietnam and Ethiopia show that resettlement experiences lead to repeated social problems because inadequate policies neglect community needs (Ty et al., 2023; Yadeta et al., 2022; Liu et al., 2020) which results in diminished livelihood strength, becoming impoverished and environmental destruction. Fair compensation as well as sustainable relocation programs must combine with participatory decision processes and balanced environmental and social and cultural impact evaluations for proper resolution of these problems (Rowan, 2017).

Urban development projects in Ethiopia achieve implementation through expropriation-based acquisition of land which the government commonly employs as a protocol. This method generates substantial socioeconomic problems for farmers because it interferes with their livelihoods that depend on agricultural production (De 2020, Nyaoro 2018, Tong et al. 2019). The Ethiopian constitution grants compensation rights and following that Proclamation 1161/2019 serves to protect landholders alongside basic protections for their rights according to Singto et al. (2022) and George and Adelaja (2021) and Mahmood et al. (2020) and Roth et al. (2017). This legislative framework has shown poor implementation and insufficient protection of rights for the landholders. The financial compensation and unclear valuation methods combined with funding limits, make it hard for displaced populations to sustain their livelihood levels, or improve them over pre-displacement situations according to Dires et al. (2021), Vanclay (2017) and Abdo (2016). Land scarcity together with non-market resources especially cultural sites and undervalued land assets create additional negative consequences according to Abdelrhman et al. (2022; Ginsburgh 2017; Hasan-Basri et al. 2015). Expropriation generates unequal losses which exceed the compensation amounts thus requiring more equitable approaches between development needs and protection of property rights and livelihoods (Abdo, 2016).

Agriculture acts as the economic foundation and main livelihood source for the majority of Ethiopians because land functions as an essential resource within the country (CSA, 2018). The national infrastructure development strategy of Ethiopia combines space-saving practices for promotion of transformation alongside minimal displacement effects (Mahmood et al., 2020; ADB, 2019; Sabir et al., 2017; Foster & Morella, 2011). Such development projects have the potential to create major environmental and livelihood disruptions according to Khanani et al. (2021) when governance systems are insufficient. Inadequate compensation amounts for displaced people jeopardize the sustainability of affected communities therefore requiring a combination of stakeholder participation and complete assessments together with mitigation plans for negative impacts (Kidido et al., 2015; Sifuna, 2006). The lack of comprehensive stakeholder representation in land management processes results in reduced effectiveness for inclusive growth according to Mahmood et al. (2020), Ronja (2021) and Mahmood et al. (2020).

According to World Bank (2020), social and economic balance depends on well-adjusted land policies and governance (World Bank 2020). The welfare of residents depends on

solving expropriation-related issues even though the legal framework provides compensation since the valuation methods and compensation payments need improvement along with protection of property rights. Cash payments fail to substitute the complete worth of land ownership for rural communities since portions of rural livelihoods cannot obtain market worth (Chowdhry, 2022; Ghimire, 2017). Project benefits should be distributed equitably through participatory methods which also help avoid social disruptions caused by displacement (Robinson et al., 2020). Development projects in Ethiopia fail to capitalize on their potential local benefits mainly because of weak community participation alongside profit-first priorities and scarce job opportunities (Chen, 2021; Thacker et al., 2019). The existing restrictions create additional tensions and livelihood disturbances mainly affecting rural subsistence networks that encounter substantial negative impacts (Mahmood et al., 2020; Oppio et al., 2015; Alemu, 2015; Oakland Institute, 2011).

To overcome these challenges, transparency in the community participations, strategic plan and accountability are essential (EEP, 2019; UNDP, 2017). The affected communities should be fairly compensated and culturally sensitive resettlement programs should be designed if development efforts are to be sustainable and communities trust building. Combining the comprehensive participatory assessments facilitates achieving competing needs and rights that will lead to equitable outcomes (Gugssa & Broegaard, 2018; UNDP, 2018).

1.1.2. Legal and Policy Issues of Development Induced Displacement and Compensation

Ethiopia shows both agreement and disagreement between international trade law and environmental law, as per Abebe (2022). Environmental paradox represents the core element of global sustainability challenges, as described by Saaida (2023). Ethiopia encounters problems fulfilling its international commitments while protecting its environment because both policy implementation gaps and inadequate institutional coordination and insufficient political commitment exist (Hadis et al., 2019). The post-2020 agenda requires scholars to base it on and integrate how economy, society, and environment work together (Banerjee et al., 2020).

Experts from various fields such as scientists and ecologists and economists together with environmentalists report that existence on Earth currently faces an unfamiliar direction for both humanity and the natural world (Akter, 2023). World governments disregard ecological

systemic effects from their pursuit of economic development and resource usage (Saaida, 2023). Civilization together with its industrial revolution saw land and resource extraction expand (Akter, 2023). Ecosystem services (ES) face negative performance due to natural capital reduction and biodiversity losses which diminish the well-being standards for the current and upcoming generations (IPBES 2019 cited by Banerjee et al., 2020).

The 1995 Constitution of Ethiopia creates a federal government structure together with parliamentary leadership which mandates all citizens to protect their environment (Constitution, 1995; Mekonnen, 2021). Natural resource conservation strategy receives support through proclamations and regulations where both entities must demonstrate their responsibility and compliance (Tekelemichael, 2008). Governments choose economic success along with immediate outcomes instead of lasting environmental stability in their pursuit of national objectives (Saaida, 2023). Economic growth has traditionally received more importance than ecological sustainability until recent changes demonstrated the need for sustainable development practices (Acheampong & Opoku, 2023; Mekonnin, 2019).

Nevertheless, the environmental paradox is not fully the responsibility of governments and policymakers (Saaida, 2023). Policy monitoring and evaluation are effective for assessing implementation as well as for making any necessary adjustments (Molla et al., 2019). However, the lack of public participation in Ethiopia's forest policy process has been observed to be top down and not allowing for a proper environmental policy making (Redie & Leta, 2014), which calls for inter sectoral coordination and establishment of independent regulatory bodies (Turkato et al., 2023).

1.1.3. Environmental and Social Impact Assessment (ESIA) and Development-Induced Displacement

Environmental Impact Assessment (EIA) is a key instrument for appraising the possible environmental impacts of a development, to enable the decision-making to be based on informed choices, and is a way to implement sustainable practice. According to Evis (2013, p. 4, cited in Ulibarri et al., 2019), EIA does not only inform the decision makers and the public about the possible reasonable alternatives, rather it strives to mitigate adverse impacts and improve the quality of human environment. EIA Proclamation No. 299/2002 of Ethiopia which gives rise to Environmental Assessment to be carried out on larger projects acts as a plan to predict and prevent environmental impacts (Gubena, 2016). In order to simplify the

process further, the Ethiopian Environmental Protection Authority (EPA) has outlined guidelines which divide the projects into those that require a complete, partial or no EIA assessment (ERC, 2012). While EIA was recognized globally, yet its performance in Ethiopia is limited by the defects of procedures and poor enforcement mechanisms (Glasson & Therivel, 2019; Xie et al., 2023).

Environmental considerations play an essential ground for sustainable growth by linking environmental concerns to national development policies. While Ethiopian policies mainly aim to promote economic development, to the disadvantage of environmental impacts, Dejenie and Kakiso (2023) assert that the Ethiopian policies do not explicitly address environmental concerns. Despite a UN accredited initiative like Sustainable Development and Poverty Reduction Program (SDPRP) and Growth and Transformation Plans (GTP I & II) efforts to achieve economic growth and environmental sustainability is still far behind. For example, critical stages in the EIA of Ethiopia's South Wello Zone railway project include screening, scoping and evaluation of an Environmental Impact Statement (EIS) (ERC, 2016). Environmental resource exploitation and crises pose various challenges to which different area stakeholders, e.g. scientists, technicians, politicians, economists and citizens (Akter, 2023) are involved. There is still place for effective public consultations and stakeholder engagement to determine important environmental matters (Njenga & Phiri, 2021; ERC, 2016). Moreover, being an integral part of the EIA process, baseline data collection (air quality, biodiversity, soil conditions, and socio-economic factors) is also done (Komínková, 2016). However, compliance monitoring is still an issue in developing nations, therefore the integration of Strategic Environmental Assessment (SEA) for long term sustainability (Shah, 2010).

The Environmental Policy of Ethiopia (1997) and Proclamation no. 299/2002 that requires Environmental and Social Impact Assessment (ESIA) for all major project frameworks, which is then underpinned by the law of Ethiopia's Environmental Conservation Agency (EPA, 2002). However, being a crucial part, the implementation of public participation is not efficient due to weak enforcement and limited technical capacity (Delmas & Toffel, 2004; Gebrehiwot, 2018). Large projects such as the Addis Ababa-djibouti Railway have been questioned on occasions of displacement, inadequate compensation and environmental degradation (Tadesse & Alemu, 2020). Resource exploitation is caused by economic growth,

business competition and consumerism leading to environmental and social challenges such as deforestation and social injustice (Akter, 2023).

Such development induced displacement continues to be a major challenge governed by international legal frameworks like the World Bank's Environmental and Social Framework (2018), International Finance Corporation (IFC) Performance Standard 5 and the African Union Kampala Convention, (AU, 2012). Compensation for affected populations is defined in Ethiopia's domestic legal framework, including Proclamation No. 1161/2019 and Regulation 472/2020. This paper argues that these legal provisions have not led to the expected outcomes such as delayed payments and inadequate property valuation as there are other challenges at play (Gebrehiwot, 2018; Tadesse & Alemu, 2020). It needs to have stronger enforcement mechanisms and some embedded capacity in institutions, while developing the economy in a balanced way with respect to environmental sustainability.

1.2. Theoretical Framework of the Dissertation

Sustainable Livelihood Approach (SLA) showed a detailed analysis of rural development by analyzing the interaction between assets, capabilities, opportunities, through institutional contexts (Natarajan et. al., 2022; Turner 2017). This approach therefore highlights the fact that natural, social, financial and human capitals are the most underpinning determinants to sustain livelihoods and support the building of community resilience (Ben & Agnes, 2023; Makacha et al., 2022; Turner, 2017). Through embarking upon the interconnections of such dimensions, SLA shows useful insights regards to the challenges and opportunities of rural populations (Natarajan et al., 2022; Kapur, 2019). Social network strengthen, resources provision and natural capital mitigation are the basic means of sustainable development (Ben & Agnes, 2023; Kapur, 2019). An effective recovery and growth for displaced communities is an important principle of traditional practices that integrates and adapt to the local contexts (Ben & Agnes, 2023; Sabir et al., 2017).

The dissertation seeks to apply the SLA framework to better understand the impact of displacement resulting from railway development in relation to the idiosyncratic process of land acquisition, livelihoods and broader developmental outcomes in Amhara region in Ethiopia. The dissertation adopt a holistic approach to developing the information gap and provide practical insights into how infrastructure projects can integrate development objectives with the needs of affected communities. SLA is finally a foundation on which to

advance an equitable and sustainable livelihood strategy in the face of large programmes of development (Makacha et al., 2022).

Displacement and Resettlement (D and R) related to development induced displacement and resettlement (DIDR) which necessitates communities' resettlement as a result of large scale development activities such as; infrastructure creation, urbanization and natural resource exploitation (Negi and Azeez, 2022, Aboda and Gupta, 2019). Based on a Michael Cernea's Impoverishment Risks and Reconstruction (IRR) model, key risks of population displacement, such as landlessness, joblessness, homelessness, marginalisation, food insufficiency, rise in morbidity, loss of access to common property resources, and community disarticulation (Koch-Weser & Guggenheim, 2021; Cernea & Maldonado, 2018). To minimize these risks and enhance the reconstruction of livelihoods of displaced populations, resettlement approaches should emphasize the adoption of broad approaches based on which resettlement is viewed as a comprehensive approach to the economic as well as social aspects of displacement (Cernea, 2021).

1.3. Conceptual Framework of the Dissertation

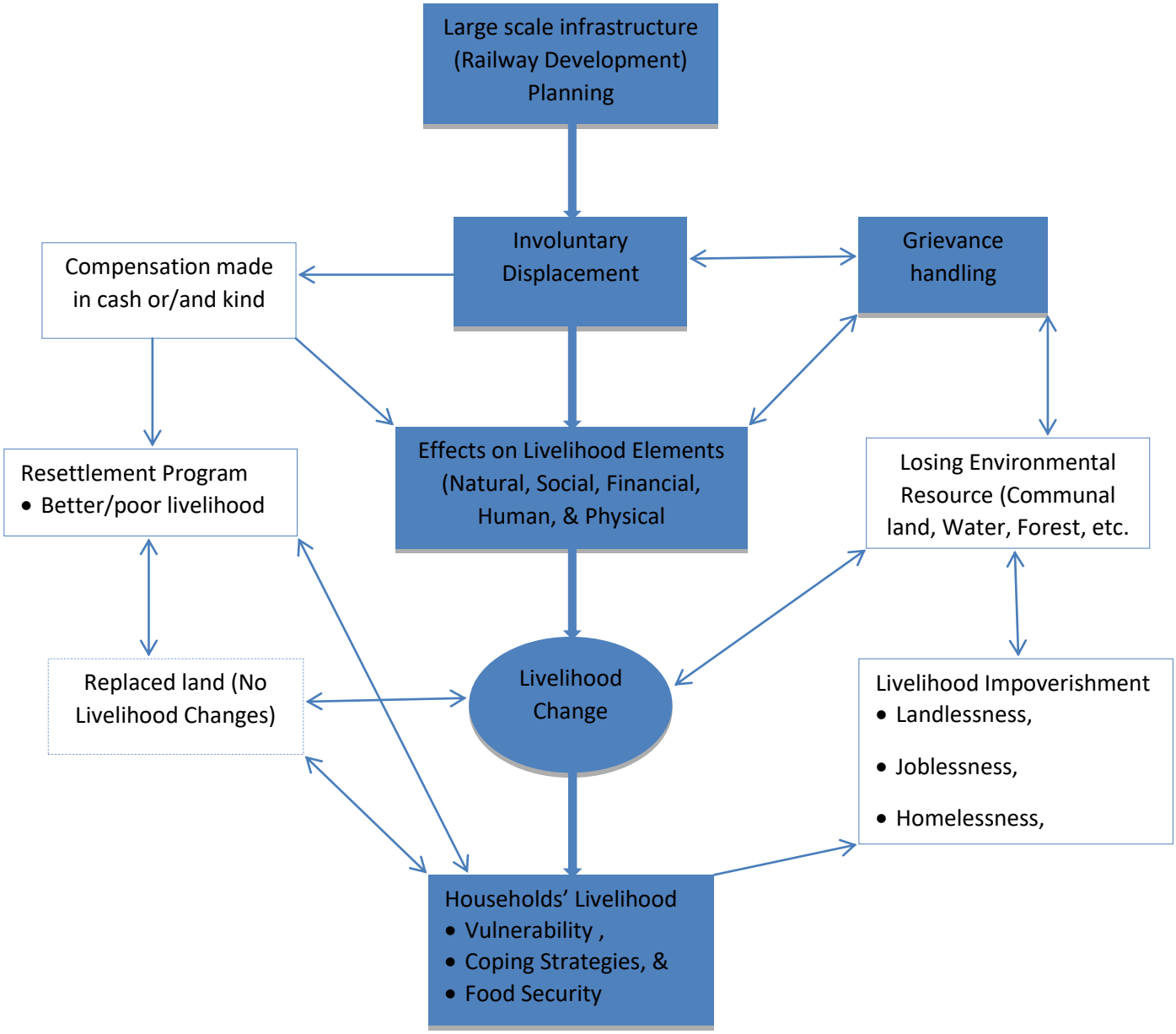
Infrastructure development might be aligned with researcher's view that some take a wide-angle while others zoom in on specific areas like transportation or energy systems. This dissertation delves into how different factors interconnect, especially looking at their influence on people's lives, focusing particularly on railway projects. Understanding how development affects people is necessary and looked at important factors like resettlement and changes in livelihoods is crucial. Often, infrastructure projects without the right support end up causing a lot of problems for families displaced by development (Cernea, 2000; Terminski, 2015). This framework offers a visual depiction of how land acquisition interacts with changes in livelihoods, laying the groundwork for further exploration in this area.

Others research work shows that development initiatives, conflicts, and natural disasters can impact households in various ways, and even when compensation is offered, displacement often results in lasting instability (ADB, 2018; Mathur, 2013). Disruptions like these take a toll on various forms of capital - natural (like land and water), social (community ties), financial (income aspects), human (skills), and physical (infrastructure like road) - which can seriously undermine sustainable ways of living (DFID, 1999; Scoones, 2009). When people are forced to move, it often changes their access to essential ecological resources, which can

lead to the degradation of critical elements like land, water, and forests resources - displaced communities rely on (Oliver-Smith, 2009). The results of resettlement can differ greatly - some families may find their living situations improved, while others struggle with poverty because of inadequate compensation and loss of their assets (Wilmsen & Wang, 2015).

Changes in livelihoods aren't uniform; while some people find better job opportunities, others end up losing their community ties and struggle with access to food (Scudder, 2012). When families find themselves more vulnerable, they frequently turn to either migrating or seeking help from outside sources (Hutton & Haque, 2004), and the loss of agricultural land only adds to the food security crisis (De Wet, 2006). When people have secure land rights, stable jobs, good housing, and robust social connections, they usually see an improvement in their quality of life (Cernea, 2008). However, without these elements, the cycle of poverty stemming from resettlement continues (Downing, 2002). Consequently, addressing these inequalities through effective policy steps is vital if we want to reduce the negative impacts of displacement from infrastructure.

Figure 1: Conceptual Framework of Involuntary Displacement and Its Impact



Source: Adopted Through an Extensive Literature Review, 2024

1.4. Statement of the Problem

The construction of transportation infrastructure through railways advances both local interconnection and strengthens trading activities while boosting economic development (Rodrigue, 2020, Ranjan, 2020). The country recognizes the importance of such innovation so as to begin its aggressive pursuit to construct an extensive national railway system (Chen 2021; ERC 2016). Projects crucial for economic development and unfortunately generate major social and environmental issues that chiefly involve forced displacement (Cernea & Maldonado, 2018). The challenges in Ethiopia run deep because land serves as the main

resource for maintaining food security and life-sustaining activities (Yigezu, 2021). Rural communities sustain their basic needs through farming the lands despite get expropriated during large scale project development (De, 2020; FAO, 2009).

Public infrastructure projects trigger tensions between communities and government authorities through such processes that expropriation fails to provide sufficient compensation and such compensation procedures create extensive social disruptions (Sabir et al., 2017; Nyaoro, 2018; Oppio et al., 2015). Physical displacement results in multiple serious negative outcomes such as destroyed livelihoods and limited employment chances and social fragmentation (Nyaoro, 2018, Oppio et al., 2015, Sabir et al., 2017, Natarajan et al., 2022). The on-going disruptions affect rural Ethiopia, specifically subsistence agriculture remains the main economic activity based on the concept of land identity and survival (Vanclay, 2017; De, 2020).

Ethiopia's legal systems through the Constitution (1995) offer payment alongside fresh employment opportunities to displaced individuals yet in practice these measures often remain incomplete (Dires et al., 2021; Tong et al., 2019). Compensation structures have limited comprehension capacities of multidimensional livelihoods which leaves affected households in a state of perpetual dissatisfaction with increased risk of impoverishment (De, 2020; Nyaoro 2018; Roth et al. 2017). The negative effects on displaced populations worsen that high conflict and violence rates alongside. It challenges the related valuation approaches and budget constraints, which restricted access to new land and cultural and social non-market assets (Dires 2021; Kapur 2019). Three fundamental problems emerge from non-participatory decision-making processes and insufficient resettlement programs because they produce sustained social and economic risks (Sabir et al., 2017; Roth et al., 2017).

The consequences of displacement extend past monetary losses since Natarajan et al. (2022) and Karki (2021) present their findings. Human capital suffers the most from displacement because the incident cuts off students from their educational paths and training facilities (Natarajan et al., 2022). The breakdown of trust together with community networks leads to individual displacement through interpersonal relationships strain because people lose necessary supportive networks (Makacha et al., 2022; Kapur, 2019). The essential reconstruction requirements of physical and financial resources including infrastructure and savings are hard to reach for resettlement areas (Habib et al., 2023; Ben and Agnes, 2023;

Nyaoro, 2018). Rural homes cannot adapt or improve their household economy because natural resources become scarce and ecosystem services remain unavailable.

The Sustainable Livelihoods Approach (SLA) creates an effective framework to analyze how development-induced relocation affects different groups of people (Natarajan et al., 2022; Karki, 2021). SLA shows that sustainability requirements for economic, social and environmental aspects plus to natural and human and physical and financial and social capital to maintain livelihood systems (Natarajan et al., 2022; Turner, 2017). Acquitted strategies which handle the complex ramifications of displacement need to be moral and sustainable and generate positive societal impacts (Makacha et al. 2022).

The Ethiopian displacement management system lacks holistic approaches and community participation. Thus, it creates households both socially marginalized and economically strained with insufficient income opportunities (Robinson et al., 2020). Resettlement programs establish sustainability when implementing fair compensation structures and transparent choice-making systems and delivering strategies based on cultural awareness (Habib et al., 2022). The three fundamental elements that drive displacement reduction come from Natarajan et al. (2022), Dehghani Pour et al. (2018), Roth et al. (2017) and Gebre (2008) simultaneously. Compensation methods for property and land fall short of market rates - creates economic hardship for relocated people (Agegnehu & Mansberger, 2020; World Bank, 2018; Daniel, 2015). This problem is also confirmed by Agegnehu & Mansberger (2020), World Bank (2018) and Daniel (2015). The environmental impact assessment and resettlement action planning process of the railway project faces obstacles due to inadequate resettlement policy implementation and weak coordination between different agencies. So, it has produced delays in compensation distributions and worsened household financial situations (Dires et al., 2021; Gomersall, 2021; Gebrehiwot, 2018). Assessment inconsistencies with resettlement planning exist in the project area because it affects household numbers to change between the pre-project and post-project times. The lack of community involvement in decision-making weakens resettlement program that results together with physical relocation initiatives that reduce household welfare (Gomersall, 2021; Assefa, 2021; Tadesse & Alemu, 2020; Ajulor, 2018). The required solution demands one integrated plan for immediate and prolonged requirements that should actively involve the community for optimum results.

It becomes paramount to create broad substantial policies that development-induced displacement and resettlements continue in their current state across Ethiopia. The proper management of displaced persons during railway development projects results in economic growth by means of socio-economic and cultural and environmental sustainability.

Research Questions

1. What barriers to land accessibility hinder infrastructure development in Ethiopia, particularly in the context of railways?
2. What are the socioeconomic impacts of railway infrastructure development and the resulting land displacement on the livelihoods of households in the South Wello Zone of the Amhara Region, Ethiopia?
3. What factors influence household satisfaction with compensation following railway-induced displacement?

1.5. Objectives of the Dissertation

1.5.1. General Objective

The general objective of this dissertation was to assess the socioeconomic implications of railway infrastructure development-induced displacement and resettlement on households' livelihoods, environment, compensation satisfaction, and land accessibility in the South Wello Zone of the Amhara Region, Ethiopia.

1.5.2. Specific Objectives

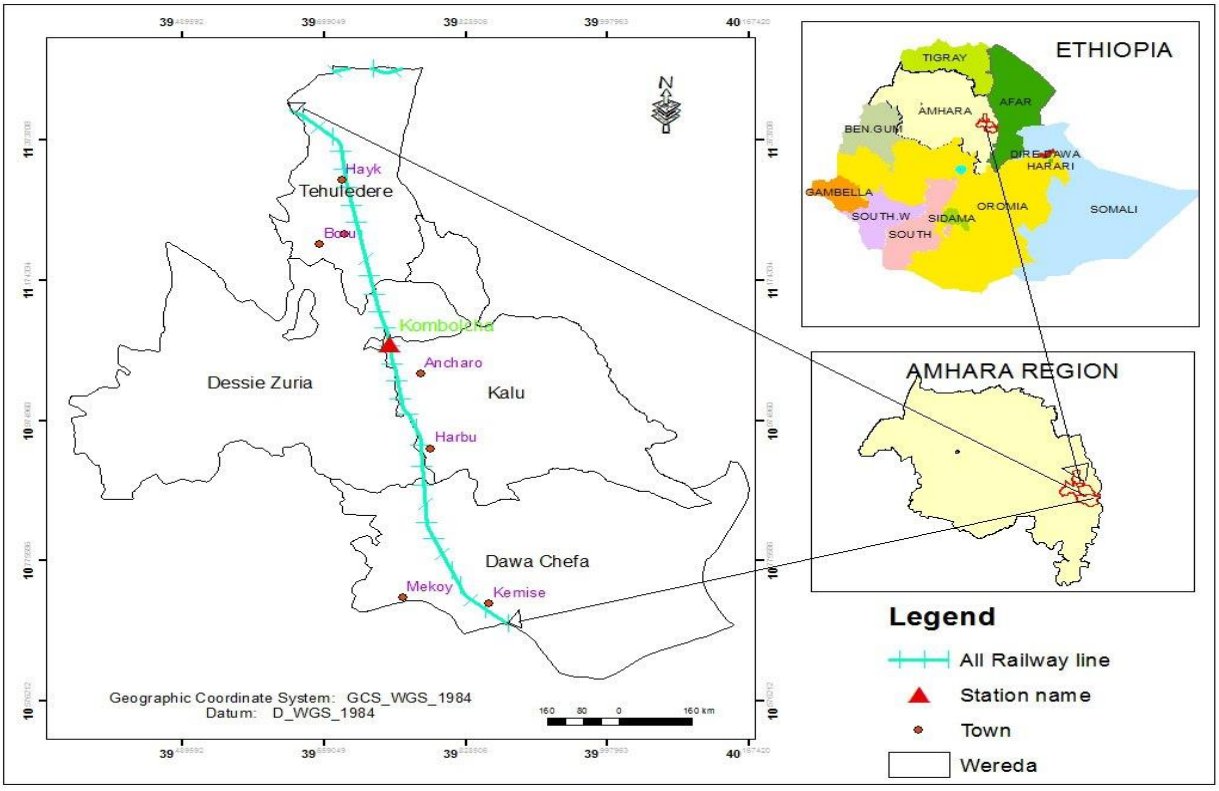
1. To investigate environmental impact of railway development in south Wello zone, Amhara region, Ethiopia
2. To identify the major barriers to land accessibility for infrastructure development with a focus on Ethiopia
3. To assess the determinants of railway-induced land displacement and their impact on household livelihoods in South Wello, Amhara Region
4. To analyse the impact of involuntary railway-induced resettlement on livelihoods of households in South Wello, Amhara Region
5. To assess the level of household satisfaction with compensation response to railway-induced displacement in South Wello, Amhara Region.

1.6. Research Methodology

1.6.1. Study Area

The Amhara region of Ethiopia shares its boundary with Oromia and Afar along with Tigray and Benishangul Gumuz regional states besides to the neighbouring Sudan country. As the second most populous region in Ethiopia it has the highest rural population (CSA, 2016). Research covers the railway line that spans through Kombolcha section between Kemissie and Hayk. The research area maintains heights from 1,500 to 1,840 meters above sea level (Addis et al., 2019) beneath climate factors that generate 725.1 mm to 1,612.6 mm average annual rainfall and 14.8°C to 20.9°C mean annual temperatures (Abegaz, 2020). Three different elevation areas are present in this study region where Dega high-altitude regions comprise 14% of the land mass and Weina Dega mid-altitude zones occupy 34% and Kola low-altitude zones take up 52%. The landscape of this region consists of mountainous areas and hilly terrains as well as sloping plateaus flowing into river systems (Addis et al., 2019). Physical variations of the region produce ecological patterns and primary economic functions as well as shape the infrastructure network.

Figure 2: Map of the Study Area



Source: Author

1.6.2. Methods

The dissertation conducted through both quantitative and qualitative methods for obtaining detailed and precise findings. This study combined quantitative methodology with statistical tools to view patterns and distributions to evaluate meanings and contexts through non-numerical data items - including interviews, observational studies and documentation. The research examined involuntary displacement impact on groups alongside their similarities and differences through ordered logistic regression (Ologit) coupled with propensity score matching (PSM) analysis and the use of both Probit and Likert scales. The findings received backing from the combination of descriptive statistics and counts and measures of frequency. A mix of research methods used to explore data extensively. On top of this, the study participants could better comprehend how land displacement affects household livelihood affairs.

Multiple sources of primary and secondary data provided a complete analysis of the livelihood changes due to displaced households. The data collection process consisted of home-based surveys and directed discussions between participants and expert interviews with important figures. Operationally designed questionnaires and semi-structured questionnaires in household surveys recorded residential population opinions about livelihood changes resulting from displacement. FGDs delivered detailed understanding about the lives and struggles of displaced people and key informant interviews (KIIs) supplied expert advice with specialized skills which together produced an extensive understanding of socio-economic consequences.

The study incorporated secondary sources with the inclusion of documentation from both Ethiopian Railway Corporation household records and regional administrative offices. The sources offered wide context which supported the validation of first-hand data findings to create a complete understanding of how displacement affects people.

The research checked the direct impact between displacements on livelihoods by using a quasi-experimental method. The research project analyzed households situated nearby the railway line as part of the project scope under this method. It included displaced families alongside non-displaced individuals who were identified through official records. The study used proportional sampling to obtain participants from three resettlement sites which

strengthened both the data applicability and participant representative sample. The sample size was determined using Yamane's formula:

$n = N / (1 + Ne^2)$

Where n represents the desired sample size, N is the population size (1261), e is the level of precision (set at 5%), and 1 represents the probability of occurrence. Applying this formula, the sample size was calculated as:

$n = 1261 / (1 + 1261*0.05^2) = 304$

Project-affected household are 304 who participated in the study both as displaced households and those who remained in their homes. Key informant reports from the municipal, Woreda and zonal, regional and federal administrative levels helped to obtain institutional and policy insights and project implementation information. FGDs with six separate sessions were conducted at different levels ranging from federal to Woreda to gather multiple types of insights. The research was able to analyze displacement effects by connecting different data types while integrating multiple perspectives into a comprehensive multidimensional study that examined both person-level and structural elements.

Through a quasi-experimental approach researcher aimed to validate displacement as the cause that influences livelihood changes. The selection of naturally occurring groups that differ according to displacement, explanatory variables forms the basis of the research design although true experimental assignment was not implemented. Through this methodology the study achieved systematized flexibility in their evaluation of economic effects stemming from displacement.

1.7. Significance of the Dissertation

This dissertation produces key findings about displacement and resettlement consequences on household economics and environmental effects of such development projects. The study examines inadequate compensation and asset loss and social network breakdown to uncover their impacts on household incomes as well as expenditures and compensation satisfaction and livelihoods during rail development.

The study demonstrates why policymakers together with practitioners must include these findings when designing future development plans which focus on land acquisition and

compensation practices. The study uses advanced statistical frameworks for both measuring outcomes and analyzing causal effects of different variables which create a strong research methodology foundation. The combination of different research methodologies strengthens both the accuracy and thoroughness of generated results which leads to improved solutions for displacement challenges.

This dissertation constitutes fundamental insights for assisting development professionals in creating responsible sustainable projects.

1.8. Scope of the Dissertation

The development of improved infrastructure networks demands substantial land acquisitions which forces people and businesses to leave their places through land expropriation frameworks. The construction of railways generates advantages as well as drawbacks regarding local community integration while land acquisition procedures often violate property entitlements and cause problems with resettlement plans and affect income sources and worsen environmental damage. The research investigates expropriation projects happening inside the railway construction areas throughout the Amhara regional state. The research sought to investigate the effects of properties acquired forcibly as well as altered lifestyles due to unbalanced compensation schemes.

The dissertation examines expropriation activities in the Kemissie-Hayk railway line of South Wello zone in Amhara region - starting from 2012 by using historical data records. This research aims to analyze the land expropriation connection to displaced livelihoods from railway project development. The research concentrates on the Kemissie to Hayk railway line through the Kombolcha section covering Tehuledere, Dessie Zuria, Kalu and Dawa Chefa Woredas. This investigation focuses on infrastructure-related displacement since it lacks adequate study and strives to create an evidence-based understanding of this subject. The study uses its research outcomes to support sustainable construction practices and enhance the welfare status of displaced populations.

1.9. Limitation of the Dissertation

The main restriction of this dissertation stems from using both selected household cross-sectional data combined with document reviews since they prevent the analysis from tracing changing patterns and temporal connections throughout time. Longitudinal data absence

restricts the research analysis because it eliminates investigators' ability to evaluate household livelihood variations and displacement effects under a time horizon. The researcher attempted to draw insights for long-term patterns despite the data amount to estimated rather than observed evidence. The investigation neglects external socio-economic and policy transformations while conducting research which could limit its ability to apply results across various settings.

1.10. Structure of the Dissertation

The study comprises seven chapters which present different sections of research analysis from introduction to conclusion. The first chapter establishes the main components of the research by presenting an overview of background information and problem statement together with objectives as well as research questions while defining the study scope. It has also a brief investigation of the relevant literature.

The study in Chapter Two evaluates environmental effects from railway construction processes throughout South Wello Zone within Amhara Region in Ethiopia. The evaluation examines numerous social and environmental elements to estimate ramifications. The paper uses Socio-Environmental Impact Assessment (SEIA) together with Likert scale analysis to examine gathered data. The chapter delivers a full view of rail development environmental consequences in the region through organized impact evaluation.

Chapter three explores the various obstacles that prevent infrastructure development through accessing land in Ethiopia. The importance of a participatory approach for fairness and sustainability alongside securing land for relocation and providing alternative compensation methods and jobs opportunities are assessed along with the associated issues concerning displacement and access to education.

Chapter four investigates the determinants of Railway-Induced Land Displacement and Its Impact on Household Livelihoods in the study area. The research utilizes ordered Logit along with propensity score matching model to examine the components that Railway-Induced Land Displacement affects for household capital assets.

Chapter five attributes to the impact of involuntary resettlement on households' livelihoods, with a specific case study of railway infrastructure-induced resettlement in the South Wello Zone of the Amhara Region, Ethiopia. This chapter employed a propensity score matching

model to measure involuntary displacement effects while presenting the selected data sources.

The chapter six analyses household satisfaction levels regarding compensations resulting from railway displacement in the study area. The results and discussions section presents a descriptive analysis of willingness to accept compensation, demographic information, compensation measures, inferential analysis of willingness to accept, and minimum acceptable compensation.

Finally, chapter seven serves as the general discussion and conclusion of the study and addresses the concluding remarks based on the research findings and the discussion session along with its contributions.

CHAPTER TWO

2. Effectiveness of implementing Socio-Environmental Impact Assessment (SEIA) in Ethiopian Railway Projects: A Case Study of the South Wello Zone, Amhara Region

Abstract

Railway development plays crucial roles for socio-economic growth, despite posing substantial environmental challenges that necessitate comprehensive assessment throughout project lifecycle stages. Related to railway infrastructure in Ethiopia, it is in low level of practicing socio-environmental impact assessment (SEIA) that affects sustainable development efforts. This study evaluates the SEIA implementation of a railway project located in the South Wello Zone of the Amhara Region. The research identifies key strengths, deficiencies, and measures required for successful implementation of SEIA aimed to improve environmental management practices aligned with sustainable development goals. A mixed-methods approach were used to integrates quantitative analyses through Likert scale surveys, qualitative data from questionnaires, focus group discussions, site observations, and interviews. Findings reveal widespread misunderstandings among stakeholders, impairing effective decision-making that accounts for environmental considerations. Most SEIA officials rated the process performance as "sub-standard" due to inadequate oversight, regulatory violations, and stakeholder coordination issues. Current rehabilitation and livelihood restoration strategies were largely ineffective, underscoring the need for more robust environmental restoration programs and stakeholder collaboration. The study recommends enhancing the SEIA process via increased environmental awareness among stakeholders, framework optimization, improved coordination, and strengthened data collection and monitoring systems. Incorporating cumulative impact assessments, post-project evaluations, and capacity-building initiatives is essential for creating a more resilient and informed decision-making environment. An improved SEIA framework facilitates sustainable railway development by aligning ecological sensitivities with long-term sustainability objectives, ultimately contributing to the sustainable advancement of railway projects within the study area.

Keywords: *Railway Development, Socio-Environmental Impact Assessment, Sustainable Development, Stakeholder Comprehension, Ecological consciousness*

2.1. Introduction

The movement of goods and services along with people depends on transportation to achieve socio-economic development (Damián & Zamorano, 2022; Rodrigue, 2020). The transportation industry underwent a transformative change because railways deliver efficient energy use and environmentally friendly operations (Milewicz et al., 2023). Railways have re-established operations under the African Union's Agenda 2063 to create connectivity as well as economic advantages and environmental improvements (Mouhamed et al., 2020).

Since its foundation in 1980, as the International Association for Impact Assessment (IAIA), the organization promotes SEIA practices (Vanclay, 2017). IAIA supports worldwide advancement in impact assessment of social, health and environmental sectors through its activities in knowledge sharing and guideline development and research publication and strategic partnerships (Morrison-Saunders et al., 2020). SEIA needs to be integrated with decision-making based on recommendations from three United Nations sustainability

frameworks including the Rio Declaration Agenda 21 and the 1992 Earth Summit sustainable development guidelines (Abdo, 2016; Abdo, 2016; Sánchez & Croal, 2012). The SEIA practices received comprehensive guidelines from the United Nations Environment Programme (UNEP) in 1999 which included specifications for project scoping and baseline establishment as well as predictions of impacts and protective measures and monitoring (Snell & Cowell, 2006; Desai, 2023).

The sustainability of railway projects heavily depends on comprehensive SEIA procedures. Strong institutions and lower levels of poverty together with civil conflict tend to generate low scores on the SEIA Quality Index (EQI) among affected nations. Economic strength together with sound policies and competent governance allows countries to create effective environmental regulations that preserve both development and nature conservation (Aung & Fischer, 2020). Sustainable economic development necessitates biodiversity protection through rigorous assessments and conservation strategies (Yigzaw, 2020). Researching non-economic values attributed to endangered species stands as a vital practice for railway development projects to protect these species (Amuakwa-Mensah et al., 2018). The identification of cultural ecosystem services leads to sustainable societal well-being according to Arnaiz-Schmitz et al. (2021). The evaluation of railway environmental impacts policy regulations supports long-term sustainability in accordance with Swangjang (2022) and Tsai et al. (2019).

Public decision-making receives guidance from SEIA while its procedure operates through screening and scoping and impact studies and alternatives analysis and management plans for complete impact analysis and resolution (Gubena, 2016). Developing nations rarely execute SEIA practices with complete impact assessment and alternative evaluations coupled with insufficient public participation (Li et al., 2019). The successful implementation of SEIA represents an essential requirement both for enduring train transportation development and balanced transportation strategies (Mouhamed et al., 2020). The government of Ethiopia has prioritized SEIA because it supports sustainable development efforts toward becoming a middle income country (Yigzaw, 2020).

Ethiopia's SEIA framework continues to meet obstacles through its execution of Proclamation No. 299/2002 from 2002, despite existing legal formation (Gubena 2016). Sustainable railway development requires substantial improvement of SEIA procedures and strengthened reporting quality combined with better enforcement practices (Yigzaw, 2020).

The effectiveness of SEIA suffers from three primary issues which include operational gaps between different stakeholders as well as shortages in qualified professionals and a lack of adequate public engagement (Mekonnin, 2019). The Ethiopian national environment suffers from unsustainable activities together with quick population expansion (Tekelemichael, 2008). Railways maintain environmental benefits but the process of construction creates ecological damages that threaten the industry by reducing its access to building resources (Damián & Zamorano, 2022). The SEIA requirements face implementation hurdles which diminish their capability to deliver sustainable development (Yigzaw, 2020).

The current Constitution of Ethiopia emphasizes environmental protection which functions as the basis for sustainable development operations (Zewde, 2019). The Environment Policy from 1997 requires decision-making processes to incorporate SEIA (Hadis et al., 2019; Zewde, 2019) and resulting in the SEIA Proclamation from 2002 which provided regulatory structures for SEIA (Yigzaw, 2020; Zewde, 2019). The Environmental Protection Authority (EPA) performs oversight of SEIA procedures while enforcing environmental regulations according to the direction of Zewde (2019).

Ethiopia established its railway history with the Franco-Ethiopian Railway that connected Addis Ababa to Djibouti during the late 1800s according to Rode et al. (2020). The country's economic growth accelerated through the establishment of the modern Addis Ababa-Djibouti Railway in 2016 (Mohapatra 2016). The Awash-Weldiya railway represents a transportation link that belongs to the Awash-Weldiya-Mekele corridor (Abdulaziz, 2020). The railway development program of Ethiopia battles with changing project requirements as well as management weaknesses and disagreement among financial backers according to Mouhamed et al. (2020) and Rode et al. (2020).

The railway infrastructure within the Amhara Region works to establish enhanced regional connections and foster economic development and improve livelihoods for local communities according to Rode et al. (2020) and Feyissa (2019). The development initiatives create new opportunities to reach markets more easily along with improved tourism and regional economic connections and improved regional economic cooperation according to Feyissa (2019). The integration of strict SEIA systems alongside joint stakeholder cooperation results in railway developments which achieve sustainable development targets by decreasing environmental harm and creating optimal socio-economic advantage (Ulibarri et al., 2019; ERC, 2012).

This research aimed to examine SEIA application for Ethiopian railway project development within Amhara Region's South Wello Zone. It focused on analysing both the strong and inadequate parts of SEIA procedures because it aimed to strengthen environmental management together with sustainable development practices. The analysis of SEIA effectiveness and project resulted in an improved railway projects in Ethiopia to support environmentally sustainable development strategies.

2.2. A Review of Environmental Policy and Legal Framework in Ethiopia

2.2.1. Legal aspects of Ethiopia's Environmental Policy

The relationship between international trade law and environmental law in Ethiopia reflects both collaboration and conflict, highlighting discrepancies between the country's international commitments and its actual environmental performance (Abebe, 2022). In most case, disparities happening from policy gaps, institutional fragmentation, and a lack of political will (Hadis et al., 2019).

Assessing implementation and facilitating the adjustments are practiced through an effective policy monitoring and evaluation within the policy cycle (Molla et al., 2019). The importance of inclusive environmental policy-making is emphasized, underscoring the need for collaboration among various stakeholders (Redie & Leta, 2014). However, Ethiopia's environmental policy process has predominantly followed a top-down approach, limiting public participation and yielding sub-optimal results. Addressing this issue requires inter-sectoral coordination and the establishment of independent forest regulatory bodies (Turkato et al., 2023).

Constitution of Ethiopia guarantees environmental protection and the right to a clean environment (Mekonnen, 2021; Constitution, 1995). Supporting proclamations and regulations reinforce these principles by holding both the government and individuals accountable for conserving natural resources (Tekelemichael, 2008). Historically, economic growth has been prioritized over ecological sustainability, leading to environmental degradation and public health concerns (Acheampong & Opoku, 2023). However, a paradigm shift has emerged, recognizing the limitations of unchecked growth (Mekonnin, 2019).

The SEIA Proclamation No. 299/2002 mandates SEIA implementation for major development projects in Ethiopia (Gubena, 2016). Serving as a critical planning and decision-making tool, SEIA identifies and mitigates potential environmental risks while maximizing

socio-economic benefits (Tekelemichael, 2008). Projects requiring SEIA cannot proceed without undergoing the process and obtaining authorization (Gubena, 2016).

Globally, SEIA systems have been widely adopted, with developing nations integrating them under the influence of international organizations (Aung & Fischer, 2020; Gubena, 2016). In Ethiopia, SEIA initially applied to donor-driven projects before becoming a mandatory requirement for specified public and private sector activities. The Socio-Environmental Impact Assessment Proclamation No. 299/2002 classifies projects based on their required level of assessment - full, partial, or exempt; in the meantime, the Ethiopian Environmental Protection Authority (EPA) has issued guidelines to support the process (Gubena, 2016; ERC, 2012).

Under the Socio-Environmental Impact Assessment Proclamation No. 299/2002, Ethiopia's regional states must establish their own environmental agencies responsible for formulating conservation strategies, conducting environmental monitoring, and evaluating SEIA study reports. The environmental agencies are in charge of auditing and regulating projects which has been licensed within their jurisdictions (Yigzaw, 2020).

2.2.2. SEIA Process and Compliance

The SEIA evaluates the potential environmental effects of development projects as a critical process of development interventions (Joseph et al., 2019) and, over time it has been practicing as an essential tool to promote sustainable development in order not to harm the environment (Aryal et al., 2020). SEIA looks into positive and negative aspects of the project from the view sides of the environment, having a due attention to socio-economic and cultural implications. However, there are gaps in the SEIA process which includes procedural flaws and inadequacies in generated reports, hinder its effectiveness (Glasson & Therivel, 2019).

Corporate productivity is enhanced by strengthening SEIA implementation and ensured by compliance with environmental regulations (Xie et al., 2023). The role of SEIA is highlighted in the environmental legislation by integrating environmental principles into decision-making processes, supporting sustainable development, and safeguarding the right to a clean and healthy environment (Yigzaw, 2020; Joseph et al., 2019).

When it comes to the railway project in South Wello Zone in Ethiopia, the SEIA process encompasses several key stages, including screening, scoping, and evaluating the Environmental Impact Statement (EIS) for approval (Komínková, 2016; ERC, 2012). Among

the pivotal roles in identifying major environmental concerns and defining the study's scope is stakeholder consultations (Hirpe & Seo, 2021); in the meantime, the baseline data collection covers various environmental parameters such as air quality, water resources, biodiversity, soil quality, cultural heritage, and socio-economic factors (Komínková, 2016).

During the impact assessment phase, it is very essential for a thoroughly analysis of potential effects on air quality, water resources, ecosystems, noise levels, and socio-economic aspects (Njenga & Phiri, 2021). On top of that, a mitigation measures are placed to address identified impacts and to ensure environmental protection and sustainable development (Komínková, 2016). To have a community input, active stakeholder engagement and public consultation are an integral part of the process (Njenga & Phiri, 2021). Finally, the SEIA report that holds findings, conclusions, and recommendations, undergoes regulatory review and approval (ERC, 2012). To ensure adherence to mitigation measures and environmental regulations during the construction phase, it is essential for compliance monitoring. To do sustainable development and advantages of integrated resource management in developing countries, the implementation of Strategic Environmental Assessment (SEA) becomes an increasingly important element of development project (Shah, 2010).

SEIA's key strength lies in its adaptability and process-oriented nature aimed to facilitate the effective integration with engineering studies (Zhao et al., 2023). By prioritizing coordination with relevant authorities and stakeholders ensures alignment with Ethiopian legislation regarding process scope, impact identification, and appropriate management strategies (Njenga & Phiri, 2021).

2.2.3. SEIA and the Railway Project

The Socio-Environmental Impact Assessment system is necessary aspect in railway projects through environmental impact evaluation and sustainable development promotion. Due to Ethiopia encompasses various agro ecological zones, national development policies needs to balance environmental stewardship with resource sustainability (Dejenie & Kakiso, 2023). The Ethiopia's SEIA legislation has two assessment approaches to examine environmental effects from individual projects and government-developed programs, as well as strategic plans and enactments (Yigzaw, 2020).

Towards measuring the effectiveness for sustainable development, the Socio-Environmental Impact Assessment Proclamation of Ethiopia has multiple restrictions that reduce its achievement (Feyissa, 2019). Therefore, it requires an improvement for SEIA

implementation with a detailed procedure that combined with specialized technical guidelines for each sector (Tekelemichael, 2008). As an established procedure, SEIA functions use scientific tools to forecast negative effects and develop strategies to counter them and present decision-makers with multiple choices. The evaluation criteria are essential parts of the effective SEIA that mainly affects the developing nations due to poor quality (Dejenie & Kakiso, 2023; Ebissa et al., 2022).

2.3. Research Methodology

2.3.1. Study Area

The Awash-Weldiya Railway corridor is a route connection within Ethiopian National Railway Network passing through Amhara Region. The railway corridor crosses two types of land-scape starting from high elevation areas to the low elevation plains - exhibit multiple ecological characteristics along with abundant natural resources. The Mille and Borkena rivers function as primary riverbanks in the study area. The soil attributes for the foundation of different farming practices that has a supportive means for more biodiversity within its flora and fauna. The study area recognized for strong agricultural capacity yet experiences on-going environmental issues that leads to forest clearance and soil damage together with land quality deterioration (Mekonnen et al., 2016; Taye, 2021). Having such environmental disturbance, it has power to destroy both economic and natural ecosystem stability of the area. The intervention is necessary and its effectiveness depends on including environmental protection within broader development plans and executing it from national to local context.

2.3.2. Photographs Captured during On-site Observations

Railway construction directly damages agricultural fields thereby affecting the communities located in the area. Agricultural land is the main input for sustaining livelihoods all along the households their lives based on. The local population faces both financial losses for farmers and weakened food security because land degradation combined with soil contamination and changes in water availability decreases crop yields (Taye, 2021).

The impact on the region extends beyond construction since those environmental disturbances create enduring harm to biodiversity while diminishing soil fertility and altering water availability (Mekonnen et al., 2016).

The sustainability of rural development depends on maintaining agricultural resources because these regions depend primarily on farming systems. Railway construction projects can reduce environmental damage by integrating both land restoration procedures and

sustainable water management systems according to Tareke (2020). Ethiopia can protect both environmental resources and economic stability of vulnerable populations by focusing on environmentally sustainable infrastructure projects.

Figure 3: Sample Picture of the Railway Section

Source: Author

Figure 4: Sample Picture of the Railway Section

Source: Author

The above figure shows a specific point in the study area, a particular section of the railway project illustrated as it demonstrates a significant impact on the environment and agricultural land.

2.3.3. Methods

To evaluate the SEIA effectiveness, it is essenntial to integrate with participant perception using mixed methods methodology. The research targeted officials includes local project administration representatives to federal staff members of ERC. It helps to get complete stakeholder evaluation of SEIA implementation (Ahmed et al., 2023; Taye, 2021).

This research employed purposive sampling and distributed 34 questionnaires across officials working at all levels. On top of this, the research used Likert-style scales in questionnaires - allowed participants to rate SEIA effectiveness throughout the project execution period (Xie et al., 2023; Mekonnen et al., 2016). Three Focus Group Discussions (FGDs) held and it included participants from different stakeholder groups agregated 27 members. National officials leading SEIA operations on a national scale attended one FGD. Besides, two discussions occurred at both project area and regional levels. Appropriate officials from the SEIA process joined the discussions together with relevant stakeholders according to Dejenie & Kakiso (2023) and Ahmed et al. (2023) and Tareke (2020).

Participants obtained space to disclose their SEIA process encounters and respective concerns and proposed recommendations all along such discussions, FGDs. This study utilized structured interviews, 28 informants who belong to specialties and various administrative positions – selected based on purposive sampling approach (Xie et al., 2023; Yigzaw, 2020; Botchway, 2021).

Both quantitative and qualitative methods were used to create an extensive understanding of SEIA implementation results. Such research design supportes to merge questionnaires with FGDs and KIIs - produced detailed results that could support enhanced policy making and planning for future adjustments (Dejenie & Kakiso, 2023; Ahmed et al., 2023).

Table 1: Key Informant Positions and Numbers at Different Levels

S/N	Offices	Position of Informants	Code	Key informant Number
01	At Federal Level	Environmentalist, and Head of Environmental Section	KII1	3
		Compensation Expert, Head of Compensation Section	KII2	2
		SEIA follow up Experts	KII3	3
02	At Regional Level	Environmentalist, and Head of Environmental Section	KII4	2
		Livelihood Restoration and Capital Planning Experts	KII5	2
		SEIA follow up Experts	KII6	3
03	At Woreda and City Level	Livelihood Restoration Specialist	KII7	3
		Environmentalists and head of Environmental Section	KII8	3
		Urban Land Marketing Experts	KII9	1
		Community leaders	KII10	6

Source: Author

The data analysis relied on quantitative and qualitative techniques - inquiring detailed results from the SEIA process. Questionnaire responses received statistical frequency, percentage, mean and standard deviation computation - part of the quantitative assessment that helps to discuss more. The employment of statistical procedures gave a numerical insight into official opinions that helps assessing trends and variations (Swangjang, 2022; Yigzaw, 2020; Mekonnen et al., 2016).

The qualitative data analysis method followed transcription of FGDs, KIIs and site observation - received thematic interpretation. The method focused on recognizing regular patterns and core ideas and essential information about stakeholders' viewpoints and worries and suggestions for SEIA all along its implementation starting from the legal basis (Ahmed et al., 2023; Tareke, 2020). The researcher allowed investigating both personal experiences and environmental circumstances from the thematic analysis (Botchway, 2021; Joseph et al., 2019; Komínková, 2016).

Both quantitative and qualitative results were used to deliver a comprehensive evaluation of stakeholder responses from different levels of awareness level. Questionnaire numerical data served to measure officials' views in a structured way; whereas, the qualitative information created a complete understanding of SEIA implementation hurdles and possibilities. Such research design enabled comprehensive assessment that supports to gain multiple viewpoints and deep analytic insight to come out the best decision (Dejenie & Kakiso, 2023).

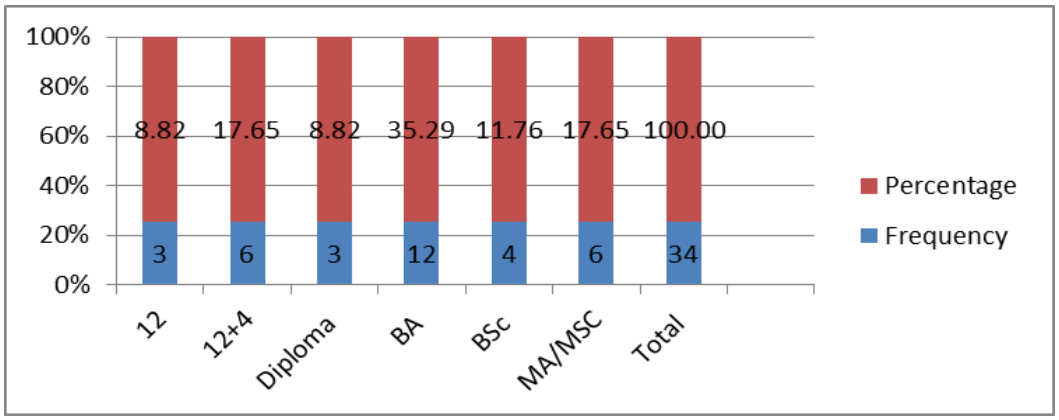
2.4. Data Analyze and Discussion

The evaluation section focused on the SEIA effectiveness through official and stakeholder perspective analysis. From the perspective of societal well-being, those factors have been described from the environmental sustainability assessments. In this regard, sustainable development requires an understanding of how stakeholders perceive these aspects (Swangjang 2022; Armaiz-Schmitz et al., 2021; Yigzaw 2020; Joseph et al., 2019). This assessment provided an essential knowledge in contextual way that considers South Wello Zone environmental circumstances in the Amhara Region of Ethiopia – helps to guide better environmental management and policy execution.

2.5. Education Level of Official Respondents

Respondents' educational background during the SEIA evaluation is very indispensible element.

Figure 5: Respondents' Education Level



Source: Author, 2023

The graphical presentation of Figure 5 showed the educational backgrounds of respondents - reveal the professional qualifications. The above educational data revealed participants from every educational ground have been involved that includes high school graduates and individuals who obtained master's degrees. The SEIA evaluation reached great depth due to the fact that most participants have earned bachelor's degrees.

Results showed Bachelor of Arts stands as the most frequently held educational qualification by 35.29% of survey participants. The educational makeup of the respondents included people who finished high school equivalent to 17.65% of the total. 10.34% of the respondents have completed a Bachelors of Science program and diploma holders make up 8.82% of the total participants. The data based on 34 respondents demonstrated expertise variation in SEIA field.

Knowledge analysis of respondent backgrounds provided important understanding regarding their educational credentials and their social-environmental assessment viewpoints. Educational diversity ensured comprehensive assessments through the combination of opinions gained from qualified experts with different academic and specific professional qualifications.

2.5.1. Efficacy of SEIA in Railway Development: Stakeholder Awareness and Engagement

Table 2: Officials' response on the SEIA effectiveness of Railway project

	Very poor		Poor		Fair		Good		Very good			
Officials' response to the Statement	F	%	F	%	F	%	F	%	F	%	Mean	Std. Deviation
There is an awareness level of SEIA by all stakeholders.	14	41.18	16	47.06	2	5.88	0	0	0	0	1.53	0.12

SEIA plan fulfilled the standards under the preparation stage.	8	23.53	24	70.59	2	5.88	0	0	0	0	1.82	0.09
In contents wise, SEIA plan holds the necessary elements.	0	0	15	44.12	7	20.59	12	35.29	0	0	2.91	0.15
SEIA is being implemented according to the plan.	10	29.41	22	64.71	0	0	2	5.88	0	0	1.82	0.12
There are environmental rehabilitation activities like a refill the quarry site.	8	23.53	22	64.71	4	11.76	0	0	0	0	1.88	0.1
The resettlement programs are effective.	10	29.41	20	58.82	4	11.76	0	0	0	0	1.82	0.1
There is an effective management to minimize the effects of livelihood change on the environment.	0	0	30	88.24	4	11.76	0	0	0	0	2.11	0.06
Monitoring activities is being done according to SEIA plan	10	29.41	22	64.71	2	5.88	0	0	0	0	1.76	0.1
The evaluation of SEIA implementations is done on a timely base.	12	35.29	18	52.94	4	11.76	0	0	0	0	1.76	0.11
Effective measures have been taken after evaluating SEIA implementations.	12	35.29	18	52.94	4	11.76	0	0	0	0	1.76	0.11
There is a possible way out to revision the SEIA plan.	2	5.88	28	82.35	2	5.88	2	5.88	0	0	2.11	0.10

Source: Author, 2023

A railway project SEIA assessment process received official evaluations through Table 2. Officials graded the SEIA process for railway projects using a 5-point scale from Very Poor to Very Good with frequency and percentage and mean and standard deviation data shown in the table. The mean and standard deviation scores helped to create understanding about how officials view the SEIA process evaluation.

The ratings for the SEIA process evaluation spanned from Very Poor to Fair/Good and the evaluated mean scores fell between 1.53 and 2.91. The officials revealed their most favourable view regarding the SEIA plan's content when they rated the statement 'In terms of content, the SEIA plan holds the necessary elements' with an average score of 2.91. The SEIA document fulfilled its purpose by examining railway project socio-environmental impacts that run along the corridors (SEIA, 2011).

Stakeholder awareness of SEIA remained weak according to officials who rated this statement with 1.53 points out of 5. This supports the conclusion that SEIA faces limited stakeholder understanding and a lack of engagement. The SEIA document included public consultation as a fundamental requirement, according to its 2011 guidelines (SEIA, 2011).

The officials demonstrated consistent evaluation of the SEIA process through their low standard deviations between 0.06 and 0.15 for all evaluated components. The gathered data revealed a widespread agreement about SEIA implementation excellence and weaknesses in the railway project.

The data in Table 2 helped to understand official perceptions through frequency counts as well as percentage distributions and mean values and standard deviation values. The obtained understanding leads to enhanced future improvements and decision-making processes that enhance both stakeholder engagement methods and overall SEIA operation in railway projects.

A. Awareness and Understanding of the SEIA Process

To tackle the environmental issues in Ethiopia, it's crucial to strengthen the implementation of SEIA, especially by raising awareness among stakeholders (Njenga & Phiri, 2021; SEIA, 2011). Considering the SEIA process how it works helps to conceptualize its effectiveness. More importantly, when it comes to the understanding of how stakeholders were engaged and how much the public was involved has great implications, since both of these aspects are keys to making informed decisions. Therefore, it is certain to check if the views and worries of local communities, NGOs, and other involved parties have been properly taken into account and woven into the planning and execution phases of railway projects.

International environmental regulations are intended to tackle climate change and protect biodiversity, despite their success is often hampered by a lack of commitment - making ecosystems more susceptible to harm (Hadis et al., 2019). On the other hand, Ethiopia's Proclamation 299/2002 requires environmental authorities to gather input from the public. In this regards, due consideration is given to those communities that are directly impacted, when preparing the SEIA study report and its review. It highlighted how important this was to be ensured that SEIA reports are easy for the public to access and get feedback from stakeholders.

Yet, when it has been given close attention to stakeholders how they were grasp the SEIA process, there were some major gaps. With a rough estimation, 47.06% of the officials surveyed categorized stakeholder awareness as Poor or inadequate. This shows there's a significant misunderstanding regards to the SEIA procedures. Additionally, about 41.18%, indicated that they felt the awareness level was Extremely Poor - pointing out there is an understanding gap. The overall unawareness was a major stumbling block, as it prevented

people from taking part meaningfully and making informed choices all along such railway developments.

Without stakeholders solid grasp of SEIA, they overlook how projects could harm the environment. This gap in understanding results in poor informed decisions, insufficient attention to environmental issues, and a lack of public involvement. Therefore, the focus should be on stakeholders' awareness creation to tackle these challenges effectively. Better understanding needs a roll out efforts like sharing information, customized training sessions, and stepping up engagement activities. Increasing awareness among stakeholders help them to contribute more in environmental decision-making - helps to ensure sustainability as part of railway projects and overall development plans.

B. SEIA Challenges and Imperative for Enhancement

Incorporating environmental factors into the development plans hits sustainability targets, and considers the lasting effects infrastructure project that is on the environment and people's living conditions (Mwanga, 2022). Throughout the years, various legal frameworks, starting from the Rio '92 Summit, have effectively connected development with the protection of the environment, highlighting the importance of sustainability for future generations.

Ethiopia has put in place a strong set of laws and institutions aimed at tackling environmental issues, which includes the Constitution from 1995, the Environmental Policy adopted in 1997, and SEIA Proclamation No. 299/2002. Moreover, the Federal and Regional Environment Offices are crucial in helping to engage stakeholders in both environmental protection and the implementation of policies (Ebissa et al., 2022).

Even with all these efforts, putting SEIA into practice in developing nations comes with notable hurdles (Shah, 2010). In a recent study, officials' viewed on SEIA compliance during the early stages of a railway project revealed that a significant 70.59% considered the SEIA plan to be Poor, which showed that it didn't meet the necessary standards. Additionally, 23.53% of respondents found it to be Very Poor, which raises worries about how well the plan covers and tackles essential environmental issues that seemed overlooked during some stages of its implementation.

When looking at the content of the SEIA plan, it turned out that 44.12% of the officials considered it to be Poor or Substandard, which suggested that there were some missing elements or environmental factors that weren't taken into account adequately. On the flip

side, a noteworthy 35.29% of respondents felt that the plan had all the key elements for assessing environmental impact. When it comes to how well it was put into action, a whopping 64.71% of officials scored the SEIA execution as Poor, and an extra 29.41% went even further, labelling it as Very Poor. These ratings point out some serious issues like not enough oversight, falling short on following the protocols, and poor coordination among the different stakeholders who should be managing and monitoring things.

Even though both global and local development goals strive to combat poverty through better infrastructure and economic chances (Mwanga, 2022), there are still notable discrepancies in environmental recovery and resettlement efforts that pose challenges. These gaps really throw a wrench in the works when it comes to helping communities that are affected, lessening environmental harm, and keeping railway projects viable in the long run. In addition, the development of infrastructure brings along various environmental hazards, such as changes to the landscape, pollution, degradation of soil, threats to biodiversity, and endangerment of species (Njenga & Phiri, 2021). This highlights the shortcomings in rehabilitation and resettlement programs.

The expansion of railways in Ethiopia, largely fuelled by economic growth and a surge in urbanization, has led to significant land degradation and a loss of habitats due to poor environmental planning, as noted by Tadesse and Bekele in 2022. So, it's really important to stick to strict SEIA guidelines and keep an eye on the environment constantly. This is a key to lessen negative effects and making sure that infrastructure development is sustainable. The aim was to carry out railway projects in a responsible manner, while also pinpointing and tackling any negative effects on the environment. Interestingly, the study showed that a striking 64.71% of officials rated the monitoring activities related to SEIA as Poor, and 52.94% shared similar concerns regarding the evaluation process itself. Additionally, a staggering 88.24% of officials voiced their disappointment regarding how livelihood restoration and environmental impact reduction were managed, pointing to major flaws in handling socio-environmental risks both during and after the project's launch.

Even with all these hurdles, Zhao and colleagues (2023) highlight some notable advantages of the SEIA process, pointing out its flexibility, dynamic character, and integrative approach. It's really important to revisit and update the SEIA plan. This tackles all the environmental impacts tied to railway projects comprehensively. Updating the plan means taking into account the feedback from stakeholders and adding new environmental data into the mix. In

Ethiopia, the focus of SEIA assessments is on evaluating impacts, planning for mitigation, and developing management strategies (Njenga & Phiri, 2021). The on-going issues with SEIA reports are the basic considerate regards to environmental management strategies, mitigation tactics, and how costs are allocated (Ebissa et al., 2022). It calls to adapt the SEIA framework to better suit current circumstances (Zhao et al., 2023).

A notable 82.35% of officials deemed the SEIA plan as Poor - clearly indicated a strong need for updates and enhancements. It drives for fresh environmental insights, and impacts that were not accounted for before or changing circumstances regarding the project. To tackle these changing factors, a thorough overhaul of the SEIA plan is absolutely necessary, making sure it stays applicable, adaptable, and truly effective in dealing with the environmental and social hurdles posed by railway development.

2.5.2. Efficacy of SEIA in Railway Projects: Various Stakeholder's Perspectives

This research looked at different perspectives of the stakeholders and how well the SEIA process works for railway projects in the study area. Thus, three focus group discussions were held that allowed diving deep into the strengths, weaknesses, and areas for improvement in the SEIA process. This focused on how well the project engaged with stakeholders and how effective the measures to mitigate the impediments. Different participants were engaged in the discussion including local residents, government representatives, and developers shared their varied insights, and brought to light both the hurdles and the possibilities for improving SEIA's application.

Community members were not clear how well the environmental rehabilitation efforts can be successful and effective managing the environmental impacts. KII_{10} raised several pressing concerns like the disruption of habitats, the loss of agricultural land, and the neglect of water pollution issues. Officials recognized the SEIA framework is important, but they indicated there needs a better coordination and stronger enforcement mechanisms throughout the project phases. On top of that, developers involved in the project were aware of the shortcomings of the SEIA and accepted to work together, incorporate new technologies, and carry out more thorough impact evaluations.

Participants indicated different flaws in the SEIA process. Members of the community raised inaccuracies in baseline data, poor monitoring practices, and the oversight of cumulative impacts from various projects. Officials from various government levels recognized to place a SEIA before approving projects. However, they outlined the social impact assessments

often fall short and lack proper guidelines for monitoring and enforcement. To tackle these issues, project developers suggested a solid data gathering, sophisticated modelling methods, and teams up different fields that would be beneficial.

Even though there are notable weaknesses, participants still saw some beneficial mitigation strategies in the railway projects, like efforts in restoring ecosystems and enhancing social infrastructure. Still, they pointed out that there were some gaps in how these measures were put into practice and monitored, highlighting the importance of regular assessments and follow-ups.

The SEIA documents are designed to set baseline conditions for various environments - physical, biological, social, and economic - while also looking at any negative impacts they might have on vegetation, wildlife, landslide areas, soil erosion, water resources, farmland, grazing regions, and places where people might need to move (SEIA, 2011). Even with all the efforts put in, there were still worries about how well the mitigation measures were working and whether the impact assessments were thorough enough.

The discussions made in the focus groups highlighted how crucial it is to have better coordination, transparency, and to get the community involved from the start in the SEIA process. Stakeholders made it clear that comprehensive cumulative impact assessments and impartial third-party evaluations are needed to really enhance the reliability and effectiveness of the SEIA process.

Various key informants, like environmentalists, compensation pros, specialists on SEIA follow-up, experts in restoring livelihoods, urban planning professionals, and leaders from the community, shared additional insights into the strengths and challenges of the SEIA process. As noted by the key informant (KII1), SEIA plays a crucial role in pinpointing environmental impacts and suggesting ways to mitigate them, yet they recognized that on-going improvements are essential because of unexpected challenges that arise when a project is underway. KII5 pointed out that there were discrepancies in how many households and how much land was affected, compounded by limited resources from nearby areas like quarry sites, which muddled the understanding of the project's impacts.

KII7 pointed out that SEIA plays a crucial role in assessing how projects affect local-communities and figuring out how to compensate them appropriately. They recognized that when things were done poorly, it often resulted in mistakes and failed to properly address the rights and welfare of those affected. There were also worries about how well SEIA follow-

ups were working, especially when it came to keeping track of mitigation efforts and making sure environmental rules were being followed. Flood in the resettlement areas and the lack of alternative land have been mentioned as major hurdles to overcome.

On a regional scale, KII6 shared their overall approval of the SEIA process, recognizing its contribution to both environmental safeguarding and sustainable growth. Still, they emphasized that essential elements for managing disposal sites and planning for resettlement have not been adequately covered in the SEIA for this specific railway project.

Despite KII2 indicated how SEIA effectively identifies impacts on local livelihoods and works on developing suitable compensation measures, there are challenges like flooding and poor dumpsite management. In a similar way, an expert on SEIA follow-ups, KII6 highlighted how important it is to monitor after assessments to spot gaps and improve mitigation strategies. However, all agree that there are on-going hurdles with resettlement and restoring the environment.

There were challenges to identify the SEIA helps communities after the projects. KII7 pointed out that, despite of the SEIA process is intended to safeguarding livelihoods it misses the mark to foster long-term recovery and prosperity for the affected communities. Problems related to waste management and the decline of the environment that hurt alternative ways for locals to make a living.

2.6. Discussions

The findings showed how the SEIA process operates in railway projects in the study area. The major problem was the stakeholders were not really grasp how the SEIA process works that makes it tough for them to be fully involved in the related decision. It needs launching a focus on awareness campaigns and educational programs - highlighting both the environmental impacts of railway projects and the crucial role of engaging stakeholders actively.

The community challenged to know how it can be spotted and dealt with environmental issues, disrupted habitats and polluted water sources. Officials recognized the need for better coordination and enforcement; in the meantime, developers accepting to work together and carry out thorough impact assessments. All stakeholders unaware of the limited public engagement in the SEIA process, it doesn’t really promote inclusivity and results in decisions that overlook the perspectives of the community.

The SEIA process has a flaw aspect including use of faulty baseline data, poorly aligned monitoring systems, and a lack of thorough evaluation of social impacts. The shortcoming leads to misguided choices and a lack of thorough consideration for important environmental elements. Throughout the early stages of railway projects, it’s unclear how the SEIA plan met the necessary standards. Most officials found the content of the SEIA plans missed key elements and the environmental risks weren't evaluated properly. Additionally, a number of officials rated the implementation of SEIA poor by pointing out issues like lack of proper oversight, failure to follow protocols, and poor coordination among key stakeholders.

Many officials felt the way livelihood restoration and environmental impact reduction management wasn't working that leads to widespread dissatisfaction. This points out what lessen to be learnt from the projects' impact on local livelihoods and enhance environmental restoration by providing better support for the communities being affected. Even though the SEIA process is acknowledged for being adaptable, the capability to incorporate fresh insights and responding to new environmental issues is a challenge. Therefore, it enquires urgent updates to guarantee more thorough evaluations, smarter decision-making and improved strategies for mitigating issues.

Even with these flaws, those involved recognize that there are some benefits that have come from the mitigation strategies, thanks to the presence of SEIA documents. Still, there are on-going worries about how well these plans are being put into action. These findings highlighted how crucial it is to keep improving the SEIA process so that we can better support sustainable development in the area.

As a result, this study underscored the considerable obstacles and shortcomings in how SEIA is executed for railway projects in the study area. The SEIA process plays a vital role in thorough assessments, early issue identification, stakeholder engagement, compliance assurance, and adaptive management; however, it's clear that there are several weaknesses that need fixing. There are several issues to be solved like the lack of stakeholder involvement, gaps in baseline data, ineffective monitoring and enforcement, poor consideration of cumulative environmental effects, and a lack of thorough post-project evaluations. Making SEIA more effective and foster sustainable railway development calls for bolstering stakeholder engagement, refining data gathering and monitoring systems, incorporating cumulative impact evaluations, and setting up solid follow-up and review processes.

2.7. Conclusion

The railway line serves as a crucial transport route, linked region to region. The study area is grappling with serious environmental issues, like deforestation and land degradation, which underscore the critical need for a comprehensive SEIA that is vital for sustainable development - let alone the railway environmental impacts. According to the findings of this research, there are major flaws in the SEIA process for railway projects in terms of stakeholder engagement, which is a serious aspect of the project when it comes to SEIA. So, important environmental issues were ignored often, leading to poorly informed choices that overlook both ecological and social impacts. Officials deemed the SEIA plan inadequate pointing out crucial element that does not sufficiently assess environmental impacts. On top of that, the SEIA execution had a low score, facing problems like poor oversight, not following protocols that lack an effective teamwork among all involved parties.

The ecological damages were not taken as a lesson to help the communities being affected. This really showed that it needs the environment rehabilitation and better help for the communities affected. To really boost SEIA outcomes, it's essential to raise stakeholder awareness through focused education and information campaigns. In addition, it’s essential to update the SEIA plan to achieve a thorough assessment using an informed choices, and effective mitigation strategies.

Community members raised flags about whether the SEIA is properly recognizing and handling environmental concerns. Officials from the government recognized that there's a pressing need for improved coordination and stricter enforcement, while developers of the project promised to foster better collaboration and conduct thorough impact assessments. A frequent problem is the lack of public involvement, which really emphasizes how crucial it is to have platforms that engage everyone.

CHAPTER THREE

3. Unraveling Barriers of access to Land for Infrastructure Development in South Wello Zone, Amhara Region, Ethiopia: Experiences from Hayik-kemissie Railway Development in South Wello Zone of Amhara Region.

Abstract

Large-scale infrastructure development, particularly the railway infrastructure has significant socio-economic and cultural consequences for local communities. These include involuntary displacement, land expropriation, and disrupted livelihoods. This study examined the key barriers to land access for railway development that's related to its impacts on the affected household. Using a qualitative research approach, the study analysed data obtained from interviews, focus group discussions, and policy document reviews. Findings' of the research revealed an in-sufficient community consultation, lack of transparency in compensation processes, and gender disparities - exacerbated displacement effects. More importantly, gender, marital status, and employment status influence vulnerability, with women including those unmarried or economically dependent by facing heightened risks due to limited land rights. To mitigate the adverse effects, the study underscoring the need for inclusive community participation, fair compensation mechanisms, and independent land valuation - further highlighted the importance of restoring women's access to resources to ensure equitable recovery. Policy recommendations focused to aligning railway development with Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 5 (Gender Equality), to promote inclusive growth. By integrating gender-sensitive approaches and strengthening accountability in land acquisition processes, Ethiopia can advance sustainable infrastructure development while safeguarding the rights and livelihoods of displaced communities.

Keywords: *Land management, Displacement and Compensation*

3.1.Introduction

Land acquisition management issues along with their social ramifications hinder the achievement of successful development projects throughout Ethiopia. Agriculture stands as the dominant economic sector in the country thus access to farmland is critical for survival. Land policies allow house owners to use land without providing them legal property rights (Leta, Berlie, and Ferede, 2021). Yigezu (2021) points out that achieving food security proves to be a complex endeavor but poor land ownership creates major disadvantages that harm household welfare as Harrison (2011) demonstrates.

An ambitious plan to increase the country's railway network from 902 km to 4,199 km is laid out by the Ethiopian Planning and Development Commission (PDC, 2021). Acquiring land for this development, particularly for railway infrastructure, form a big challenge even in cases of consultations through the constitutionally established frameworks. Thorough land reforms are urgent because of the challenges, governance, fairness, and sustainability issues, among others. Reforms such as these should increase the government's administrative

efficiency and address the needs of rural communities (Azadi et al., 2016; Chitonge, 2021). Nevertheless, there are conflicts over land that lead to evictions and fair compensation (Gebresenbet, 2016). In other words, Ethiopia is faced with distributive issues related to fair distribution of resources, and conflict resolution as well as addressing diverse needs, all disproportionately impacting marginalized groups (Azadi et al., 2016). The expansion of railway system can then be seen as tackling land acquisition, governance and reform issues for the purpose of making the development process more inclusive.

Ethiopia's land management is a composite between the historical, social, political, and cultural factors (Fraol, Dagnachew, and Liku, 2021). With the country seeking to expand infrastructure through forced acquisitions of land, the aim is to spur economic advancement by increasing employment and decreasing reliance on aid (Unruh et al., 2019; Calderon, Cantu, & Chuhan-Pole, 2018). However, to facilitate sustainable progress, infrastructure planning should be addressing social issues for creating local jobs, and driving inclusive economic development (UNDP, 2018).

This development however can cause displacement, alter livelihoods and entail environmental uncertainties (Aboda et al., 2019) that usually lead to objective resettlement and reduced livelihoods (Sabir et al., 2017). The overarching aim of economic growth is aspired, but infrastructure projects may not only throw up challenges to the well-being of households that are affected by them although ultimately this is good for them, in the process.

Keeping the balance between the pros and cons of the investments in infrastructure is essential (Sabir et al., 2017). Although such land acquisition has contributed to overall economic advancement, it can contribute to stress, insecurity, marginalization of specific groups that are at risk of losing their land rights (Sun et al., 2019). Additionally, the absolutely necessary connection between land acquisition and resettlement is most often overlooked, leading to insufficient responses to lifestyle and livelihood changes (Unruh et al., 2019). Hence, looking to achieve equilibrium in project impacts, it has also become important to acknowledge that compulsory land acquisition may also generate stress and marginalization.

From this point of vantage, there is gap in the research with respect to the intricacies involved in undertaking the task of land acquisition, which is central to the process of development of railway infrastructure. While the efforts to carry out reforms in administration and addressing rural concerns in the infrastructure project implementation is made, the problem of continued

lack of livelihood restoration of affected households and on-going land disputes remain factors barring the land accessibility essential to time sensitive development initiatives. These impediments disproportionately impact this group is marginalized or communities impacted by such projects.

This study was therefore motivated by the need to explore the factors limiting land access for railway infrastructure development in Ethiopia, given the country's porous land management system and its potential adverse effects. The study sought to offer insights for the refinement of land policies, inclusive development and mitigation of the negative impacts on the local community that would otherwise be caused by these initiatives by exploring the synergies between land governance, equity, sustainability and infrastructure.

3.2. The Role of Land Accessibility in Sustainable Infrastructure Development and Community Engagement

Ethiopia’s GDP and employment are largely provided by land, which is a key means of production (Adamie, 2021). Even with all these challenges associated with infrastructure (Foster and Morella, 2024), the matter can demand land expropriation which means the displacement of people and fair remuneration. For example, the government recognizes infrastructure development as important for economic growth (ADB, 2019; PDC, 2021); hence it opens doors to exploit land in an effective way (Mahmood et al., 2020). Nevertheless, gender disparities in accessing natural resources (Ronja, 2021) exist, in areas such as land access (Harry, 2024; Abera et al., 2023) in particular in the developing countries like Ethiopia where women face barriers to accessing natural resources such as land in comparison to men.

In a development initiative, around 10 million people become displaced each year (Cernea 2004) which may impact communities and household security (Khanani et al., 2021; Sabir and Torre, 2020; Sapkota, 2017). For sustainable development to mitigate negative impacts, stakeholders, they must be involved in the planning for mitigation and implementation; there should be involvement of environmental assessments, and assistance to communities that will be affected (Egze et al., 2023; Kidido and Kuusaana, 2013). Adopting effective land policies and institutions has significant implication on addressing complex land issues and inclusive development, as resources management does not include pace reform in women representation (Ronja, 2021; Mahmood et al., 2020).

Valuation, compensation, and livelihood losses related to land expropriation in developing countries have been noted to pose issues concerning the amount of money to pay, methods of compensation, as well as livelihood losses and, interestingly, require participatory approaches to ensure fairness with respect to the amount of money paid (Chowdhry, 2022; Robinson et al., 2020; Deininger and Selod, 2019; Ghimire, 2017). Trade-offs can easily be evaluated; stakeholders can be involved, as well as the rights and livelihoods of the communities are respected, in just land governance (World Bank, 2020; Deininger and Selod, 2019). Successful infrastructure projects require fair compensation, livelihood restoration, and community involvement to mitigate adverse effects and achieve positive outcomes (Azadi et al., 2016; Robinson et al., 2020).

3.3. Challenges and Considerations for Infrastructure Development and Resettlement in Ethiopia

Economic growth depends on infrastructure development, but it makes things horrendous if it is not regulated by a responsible government. Land use is currently inefficient and practice is restricted to farmland and habitat fragmentation (Unruh et al., 2019). Infrastructure projects in Ethiopia have the tendency of not being well involved by communities and this makes it not at all easy to ensure that they benefit and sustain local populations (Chen, 2021; Thacker et al., 2019). Expropriation has a negative impact; displacement, disruption of livelihood and generation of social tensions (Mahmood et al., 2020). This particular problem is disastrous for areas with a large portion of land dependent for the subsistence of their inhabitants. Unfortunately, social consequences of such displacements have been neglected despite the fact that they significantly distort community dynamics (De, 2020; Oppio et al., 2015; Oakland Institute, 2011).

In Ethiopia, urban development strategies are based on the practice of compulsory land acquisition (Adam, 2015), which has proven quite dissatisfactory for displaced farmers. They compete and get into conflicts with other farmers, many struggles to procure new farmland. Land acquisition for public projects is necessary, but must offer solutions to challenges of the displaced communities (Yirsaw, 2013; Oakland Institute, 2011).

Rebuilding livelihoods of communities while involving them allows them to be empowered and their needs met specifically (Atnafu, 2017). It can conduct comprehensive assessments and consultations, which will show project challenges and priorities, thus improving project's

effectiveness. It is also important to address gender gaps in access to and decision making around resources (Harry, 2024; Sen, 2019). Women, children suffer from displacement, worsen economic and social vulnerability, disrupt education and employment, and require gender specific policy for integration (Talema and Nigusie, 2023; Lowe et al., 2022; Randell, 2016).

3.4.Balancing Sustainable Infrastructure Development and Land Rights in Ethiopia

For Ethiopia's long term economic growth and social well-being, as well as environmental sustainability (UNDP, 2018), sustainable development of infrastructure is vital. However, people resettled by large scale projects and resettlement projects have often incurred negative impacts in the form of reduction in agricultural productivity as well as displacement on large scales. To address these challenges, fair compensation should be given priority, forced evictions are minimized, communities affected are consulted and alternative land or allowances (Abera et al., 2023; Mahmood et al., 2020; Wilson et al., 2018) are provided.

In fact, stakeholder engagement and participatory planning help to reduce displacement impacts, but in kind and land replacement represent viable but challenging strategies (IFAD, 2021; Unruh et al., 2019). Despite equitable access to infrastructure, job creation and inclusive growth feature (UNDP, 2018), land policies should be clear and participatory that promotes community rights for building trust and sound outcomes (Hunduma & Mengistie, 2021; World Bank, 2021; USAID, 2019). Ethiopia's complex land rights system-considering its small plots, limited access, and displacement, inclusive and rights respecting planning is needed (Unruh et al., 2019; UNDP, 2018; Filippoo, 2012). Fair and less harmful deals with the allocation of land, resettlement, and expropriation are made (Eunce, 2018; Bell & Reed, 2021).

Displacement also affects women, children and female headed households and has aggravated their economic and social vulnerabilities (Lowe et al., 2022). Widows and single mothers experience more hardships because marital status worsens hardships, and limited employment leaves many with no option but to do informal work. However, targeted policies for integration are needed for education disruption, in particular for girls and age-related risks (e.g., child exploitation, elderly isolation) (Talema and Nigusie, 2023).

Despite these efforts, infrastructure projects in Ethiopia often result in inadequate compensation, displacement, and limited job opportunities, with women facing particular difficulties in accessing land (Ronja, 2021; World Bank, 2010; IIED, 2009). To ensure equitable and sustainable development, it is crucial to focus on fair compensation, gender-responsive policies (Talema and Nigusie, 2023), and robust community engagement. By addressing these issues, Ethiopia can achieve sustainable infrastructure development that maximizes positive impacts and minimizes harm to affected communities.

3.5.Methods

This study employed qualitative methods to explore and understand the hurdles related to land access for the Kemissie-Hayk Railway project in Ethiopia. The primary data were collected by interviewing 40 important figures involved in railway projects, including 12 women and 28 men. Informants selected based on their expertise in a purposive way. Data were collected from February 2023 and March 2023 - analysed using a content analysis.

Hsieh and Shannon (2005) highlight that the content analysis method used to interpreting textual information in a subjective manner, as noted by Parveen and Showkat (2017). The content analysis used to accumulate understandings regarding the significance, background, and personal experiences tied to the challenges of land accessibility for infrastructure projects in Ethiopia. Likewise, the research used secondary sources, like various project documents and reports, to enriching the context even further. After that, collected primary and secondary data and turned Amharic version into English and then carrying out the content analysis. This helps to grasp the nuances of social reality, amalgamate subjective insights with scientific analysis (Shava, 2021).

Using a narrative approach, the data were analysed and weaved together the key themes to uphold validity and reliability through triangulating the information collected. This process collected insights from interviews, focus group discussions, and reviews of documents. Six focus group discussions used to capture a wide range of viewpoints, with forty-five people taking part in total. The conversations included thirty men, aged from 23 to 68, and fifteen women aged 27 to 55. In Group 1, the officials were selected from the federal government - including some from the Ethiopian Railway Corporation. The second group included officials from local government pertinent to the railway project area. Community leaders and families impacted made up the third Group.

Each group was carefully composed to include voices from different stakeholder groups and departments engaged at various levels. Two sessions were organised for each group, leading to six engaging discussions in total. A semi-structured guide used during the sessions, which helped to foster active participation and deep conversations while keeping everyone's identity private.

Additionally, 34 questionnaires were distributed to officials to capture a broader spectrum of written opinions. Among the key informants, there were 12 women and a number of men, showcasing a broad spectrum of expertise and administrative roles.

Table 3: Key Informant Positions and Numbers at Different Levels

Offices	Position of Informants	Code	Key informants	
			Men	Women
At Federal Level (Ethiopian Railway Corporation)	Environmentalist, Head of Environmental Section	KI1	3	
	Compensation Expert, Head of Compensation Section	KI2	2	2
	Livelihood Restoration Follow Up Specialist	KI3	1	
At Regional Level	Compensation Experts	KI4	1	1
	Livelihood Restoration and Compensation Experts	KI5	2	
	Land Experts	KI6	2	1
At Woreda and City Level	Compensation Valuation Committee Members	KI7	8	2
	Livelihood Restoration Specialist	KI8	2	1
	Environmentalists	KI9	1	1
	Urban Land Marketing Experts	KI10	1	1
	Compensation Payment Grievance Experts	KI11	2	
	community leaders and projected affected household heads	KI12	3	3

Source: Author, 2023

Table 3 shows representation from federal to local levels in roles like determining compensation, environmental assessments, and addressing grievances.

Grasping the surrounding issues of land accessibility, the research employed thorough qualitative strategies - includes content analysis and verify information from interviews, surveys, and focus groups. Collecting insights from informants with a variety of expertise and responsibilities really boosted the trustworthiness of our findings regarding the effects of

infrastructure projects. The Ethiopia Railway Corporation, along with the local woreda administration, reported that 1261 households were impacted by the railway project in the study area, and notably, 408 of these were led by women. Several households led by women found that parts of their farmland, or sometimes even whole plots, were taken away without their consent for the railway construction project.

3.6.Data Analysis and Interpretation

This research delves into the intricate challenge of land accessibility for infrastructure development in Ethiopia, underscoring its profound impact on the livelihoods of local residents. Addressing these challenges in the railway infrastructure project is not an easy issue. So that a qualitative data were collected by using systematic methodological approaches focusing on content analysis. The findings were thematically organized and are presented in the following discussion.

3.6.1. Fair Compensation and Livelihood Sustainability in Ethiopian Land Acquisitions

In the case of Ethiopia, fair compensation for land acquisitions have been inadequate and unfair as the valuation methods don't take into consideration the actual value of property lost (Alemu, 2015; Alias & Nasir, 2006). Details on transparency, accountability and community engagement are stressed, with cash compensation ‘alone insufficient’ (Deininger & Selod, 2019). Atnafu (2017) stated that community involvement in rebuilding livelihoods of the displaced populations enables them to be empowered and their needs met. Through focus group discussions (FGD-3), displacement concerns are emphasized, especially for women and other at risk populations' issues with not having access to resources and opportunities (Ronja, 2021; Unruh et al., 2019). Socio-economic disparities need to be addressed in resettlement programs through tailored support such job training, income generating programs, and urban relocation among others (Reddy, 2018; Sapkota, 2017). Nevertheless, women, children and Female headed households bear a disproportionate amount of displacement which results in disproportionate economic and social vulnerabilities, and exclusion of women from gender parity and inclusion, therefore necessitate sex and gender sensitive policies for integration (Talema and Nigusie, 2023; Lowe et al., 2022; Randell, 2016).

When people are moved from their homes, they're often left without a place to live or land to call their own, much like what happened with the Rengali and Singrauli projects in India (Reddy, 1998). In Ethiopia, as the railway system expands, it's boosting the economy, yet many locals are being forced to move without proper compensation or new housing solutions (Ethiopian PDC, 2021; Alemu, 2015). To truly tackle land shortages and help people maintain their livelihoods, it needs a due consideration of different support options, like providing job training and financial help (Deininger & Selod, 2019). When communities bring into the decision-making fold, it builds trust and teamwork, which tends to result in fewer issues and more successful projects (Hunduma & Mengistie, 2021; Atnafu, 2017).

Training programs intended for displaced individuals often fall short, failing to truly align with what the participants need (KI12). To make retraining really work, it is necessary to create jobs that fit what the market is asking for. A good example of this is the Dudichua Coal Project in India, where farmers who lost their lands found themselves getting better-paying jobs instead (Cernea, 2004). Programs aimed at empowering women and marginalized communities - like those focused on job training and placements - have shown to be quite successful in building resilience and helping people blend into society (Sapkota, 2017). To ensure that fair and sustainable development serves everyone, it's essential to adopt approaches that actively engage all parties involved.

3.6.2. Land Displacement and Job Opportunity

In Ethiopia, many infrastructure efforts seem to focus more on generating income than on ensuring good governance or involving local communities, which ultimately limits access to benefits such as skilled jobs and reliable energy. When land is taken through forced expropriation, it makes acquiring property much more difficult, layering additional challenges onto these projects. Atnafu (2017) highlights how crucial it is to get communities involved, recognize their hardships, include them in decision-making, and provide sufficient support to truly help them get back on their feet.

At a Kombolcha meeting, displaced families voiced their hopes for employment linked to the on-going projects. Yet, interviews uncovered that such job openings weren't fitting for those affected, intensifying the rivalry for available positions. This short-term involvement doesn't really tackle the challenges faced by those who have been displaced.

When people lose their jobs due to long commutes or displacement the household economy suffers significant damage especially if the compensation from authorities does not replace

informal employment income. The problem primarily impacts rural residents who depend on their local market along with their social network and its affects female-headed households in a disproportionate manner (Abera et al., 2023). Female-headed families endure severe financial harm because formal job options are difficult to find which forces many women to accept dangerous informal work opportunities (Talema and Nigusie, 2023; Lowe et al., 2022)

In his 2017 work, Atnafu highlights how crucial it is to address what affected communities need, involve them in making decisions, and support them, all of which can really contribute to rebuilding their livelihoods. Effective governance and responsibility are keys to making sure that infrastructure projects truly help communities rather than hurt them. This highlights how vital it is to have focused efforts that foster social fairness and assist those who are often left behind. In spite of this, infrastructure projects in Ethiopia frequently bring about insufficient compensation, inadequate resettlement, limited job opportunities, and limited access to land by women (Ronja, 2021; World Bank, 2010; IIED, 2009).

3.6.3. Challenges of Displacement and Education Accessibility

Community members of displaced households in Kombolcha area expected employment either from the project directly or indirectly associated with it. Job opportunities available through displacement projects mainly benefited other candidates since displaced households needed to undertake the same competition as the regular population according to interview findings (KI4). The study indicates that females as well as senior citizens experience social isolation and education decline resulting from displacement (Talema and Nigusie, 2023; Lowe et al., 2022).

According to a study by Khanani and colleagues in 2021, losing a job due to displacement has a major impact on families' financial stability. That said, it's worth highlighting that many people suffer from economic setbacks, especially when it comes to the money they miss out on from informal jobs or businesses, and this often goes unaddressed. Consequently, people involved in this type of work often encounter considerable difficulties when it comes to infrastructure projects like building railways.

On top of that, households resides being affected their ability to oversee their children's education - often leads to live close to schools for better access. When people are displaced, it leads to rising education expenses, putting extra pressure on families with kids in school. Therefore, it’s important to take into account the outside factors like education access and associated costs in order not to interrupt the children’s learning. Addressing the needs of

projected affected households, by providing necessary support such as education, is the success aspect of projects for lasting sustainability of the households' livelihoods.

Take the Bujagali Hydropower and Chad-Cameroon Pipeline initiatives, for instance. These projects led to the displacement of thousands, but many of these displaced individuals were left with barely any compensation or job prospects, as highlighted by reports from the World Bank (2010) and IIED (2009). Often, infrastructure projects seem to put profits first, which can really limit how much communities are involved in decisions about displacements. Forced relocations create serious difficulties, so it's essential to address lost chances and guarantee education access, both of which are keys for the well-being of the communities that are affected. Still, the existing compensation system, based on the market price of physical assets, probably doesn't fully meet these requirements. For Ethiopia to achieve fair and sustainable development, it's essential to ensure that those affected are compensated fairly, that gender-sensitive policies are implemented (Talema and Nigusie, 2023), and that there is genuine engagement with the community. These elements are crucial for making sure that infrastructure projects bring about benefits while reducing any adverse effects on the communities involved.

3.7. Conclusion

To keep out of the way of the well-being of households affected by development projects like railway, especially in developing countries such as Ethiopia, the land access barriers related with displacement management. Livelihood losses are often resulted of lack of fair compensation from compulsory land acquisition, suitable practice is thereby crucial. Market-based compensation methods often missed to capture the fair value of property due to some property characteristics are unavailable in the market comparison - leaving to communities' unjustly treated and without sufficient resources to rebuild. Complementary initiatives such as replacement land and job training are essential, but getting replacement land is very hard and households frequently have to take lot less desirable plots. More is needed to invest on this for financial aid and specially designed trainings are essential for people to shift towards sustainable livelihoods.

Engaged community participation means the company is transparent, accountable and sustainable. In the decision-making process, affected households need to be engaged to achieve development objectives aligned with local needs. Resettlement is a particularly

problematic certainty; ability to restore practitioners decidedly for the change of living being since formerly is captured with basic.

Gender, marital status and employment greatly influence displacement effects. Married men are the majority on farms - the unmarried men are vastly more unemployed. Women's work differs; married women are business owners, girl's education were seen gendered. Investments in education and governance, which is related to SDG 5 and 9, support infrastructure projects with fair compensation, gender equality and grievance addressed. Sustainable equitable development creates equal opportunity spaces between women and displaced families by making community engagement prioritized along with fair payment structures while ensuring inclusivity.

CHAPTER FOUR

4. Determinants of Railway-Induced Land Displacement and Its Impact on Household Livelihoods in South Wello, Amhara Region

Abstract

The aim of this study is to analyse the impacts of land displacement due to railway development on livelihood assets of households in the study area. Using both primary and secondary data, the research relied on the responses of 213 randomly selected households. It utilized ordered logistic regression analysis and propensity score matching. The findings demonstrated that advancing from elementary to tertiary education increases the likelihood of developing human capital in terms of skills and education by 3.80 ($p < 0.001$). Similarly, progressing from elementary to certificate training raises this likelihood by 1.90 ($p < 0.001$). Employment status also plays a pivotal role, with Own-farm employment showing higher livelihood sustainability compared to other types of employment such as private business or organizational work. The findings emphasized the critical roles of education, employment opportunities, and resource accessibility in post-displacement livelihood recovery. Therefore, calling for strategic interventions is crucial to address the challenges of land displacement and promote sustainable livelihoods throughout development process.

Keywords: *Land displacement, Railway development, Sustainability, Human capital, Education*

4.1.Introduction

The development of transportation infrastructure, particularly railways, connects remote regions, stimulates trade, and fosters local economic development (Rodrigue, 2020) (Ranjan, 2020). Ethiopia, recognizing the importance of transportation, has embarked on an ambitious plan to construct almost 5,000-kilometer standard gauge railway network connecting 49 towns (Chen, 2021; ERC, 2016). However, these advancements often impose significant costs on communities residing along the project paths (Chen 2021; Gnade et al., 2016). One of the most pressing challenges is land displacement, which disrupts livelihoods and social cohesion, especially in developing regions where land-based activities are vital for subsistence and survival (Nisa & Khalid, 2024; Vanclay, 2017).

Ethiopia's dual challenge lies in balancing rapid infrastructure development with the well-being of its agrarian population. While railway projects like the Addis Ababa-Djibouti Railway represent national efforts to enhance connectivity and economic growth (Chen 2021; ERC 2016), they also displace communities, causing socio-economic and cultural disruptions (Egze et al., 2023).

In administrative zones of the study area, the challenges associated with land displacement underscore the profound significance of land resources. Land is an essential element for many households, and it is far more than an economic asset; it serves as a cornerstone of identity,

culture, and survival. Farming, the primary livelihood in these areas, is deeply intertwined with social and cultural traditions, reflecting the essential role of land in maintaining community cohesion and heritage (Shrestha et al., 2022; Sapkota, 2021). Displacement undermines these foundations, threatening household incomes, food security, and community cohesion (Egze, et al., 2023; Kapur, 2019).

The challenges extend beyond land loss. Displacement often forces families into precarious circumstances, leaving them vulnerable to poverty and social exclusion (Makacha et al., 2022; Gnade et al., 2016). Moreover, restricted access to natural resources and economic prospects exacerbates these hardships (Ben & Agnes, 2023; Kapur, 2019). Although compensation and resettlement programs aim to mitigate these impacts, inadequate implementation frequently leaves displaced households struggling to rebuild their livelihoods (Zoomers & Otsuki, 2017; Vanclay, 2017). Additionally, Ethiopia's complex land tenure system, which provides most rural households with usufruct rights rather than full ownership, restricts their ability to secure adequate compensation or alternative livelihoods (Nisa & Khalid, 2024; Adamie, 2021).

The South Wello Zone railway projects disrupted agricultural productions, thus limiting local employment opportunities, exacerbating economic inequality, and altering social dynamics. While promising regional economic growth, the displaced communities demand inclusive strategies and careful planning to ensure equitable and sustainable outcomes (Belda et al., 2024; Ben & Agnes, 2023).

Therefore, this study aimed at examining the socio-economic impacts of land displacement caused by railway development on households in the South Wello Zone, with a particular focus on its influence on capital assets. By analyzing the experiences of land displaced communities, this study intended to provide actionable insights for policymakers and planners to balance economic growth with social equity.

4.2.Sustainable Livelihoods Framework: A Comprehensive Perspective

The concept of Sustainable Livelihoods (SL) has emerged as a response to debates surrounding development theories, providing a more balanced and comprehensive view of livelihoods. It goes beyond mere income generation to encompass capabilities, assets, and viable opportunities, thus recognizing the diverse nature of livelihoods and emphasizing

human agency within the context of power dynamics and resource distribution (Natarajan et al., 2022; Turner, 2017).

At its core, the sustainable livelihood framework offers a holistic understanding of livelihoods by considering various dimensions, constraints, and opportunities (Makacha et al., 2022). By incorporating the experiences of individuals, households, networks, and communities, it presents an alternative perspective to traditional income-based approaches. This approach focuses on the interplay of different forms of capital-human, social, natural, physical, and financial-identifying key factors that impact rural survival (Turner, 2017; Makacha et al., 2022; Ben & Agnes, 2023). Central to this approach is the recognition of how capital assets and institutions interact to shape livelihood strategies, with institutions, policies, and governance structures playing a crucial role in determining outcomes for rural households (Robert & Gordon, 2014).

Emphasizing sustainability as a core principle, the Sustainable Livelihoods Approach (SLA) transforms it into a comprehensive framework that integrates economic, social, and environmental dimensions. The SLA aims at poverty reduction, opportunity creation, and sustainable practices to enhance rural livelihoods and build resilience emphasizing the significance of traditional practices in rural livelihoods and addressing the complex social, political, and economic relationships within communities (Natarajan et al., 2022; Kapur, 2019; Turner, 2017).

Capital assets, encompassing human, social, natural, physical, and financial capital, are fundamental to individual well-being and the sustainability of livelihoods. Effective distribution and management of these assets, considering structural and relational factors that influence access, are crucial. Social relations shape vulnerabilities and opportunities within communities, while policies and institutional frameworks determine resource availability (Natarajan et al. 2022; Makacha et al., 2022). Sustainable livelihoods strive to balance resource use and adaptation without depleting critical assets (Sapkota, 2021).

Infrastructure improvements are essential to support sustainable livelihood development (Kapur, 2019), as disruptions such as displacement can impact overall well-being by hindering access to assets (Egze et al., 2023). Beyond income generation, a comprehensive understanding of livelihoods involves education, community support, and environmental sustainability. Therefore, policies play a significant role in promoting economic well-being

and guiding interventions to enhance livelihood outcomes while mitigating vulnerabilities (Kapur, 2019; Turner, 2017).

Natural resources and ecosystem services are integral to rural livelihoods, yet their value is often underestimated, resulting in underinvestment and mismanagement (Ben & Agnes 2023; (Mutandwa et al., 2019; Turner, 2017). Land ownership influences diversification opportunities (Habib et al., 2023), while the depletion of natural capital poses risks to vulnerable populations (Ben & Agnes, 2023). Innovative approaches are required to regenerate and sustain ecosystem services, essential for livelihoods. Physical assets like infrastructure and equipment also contribute to sustainable development by facilitating market access and services (Ben & Agnes, 2023; Calow, 2017; Grebner et al., 2017).

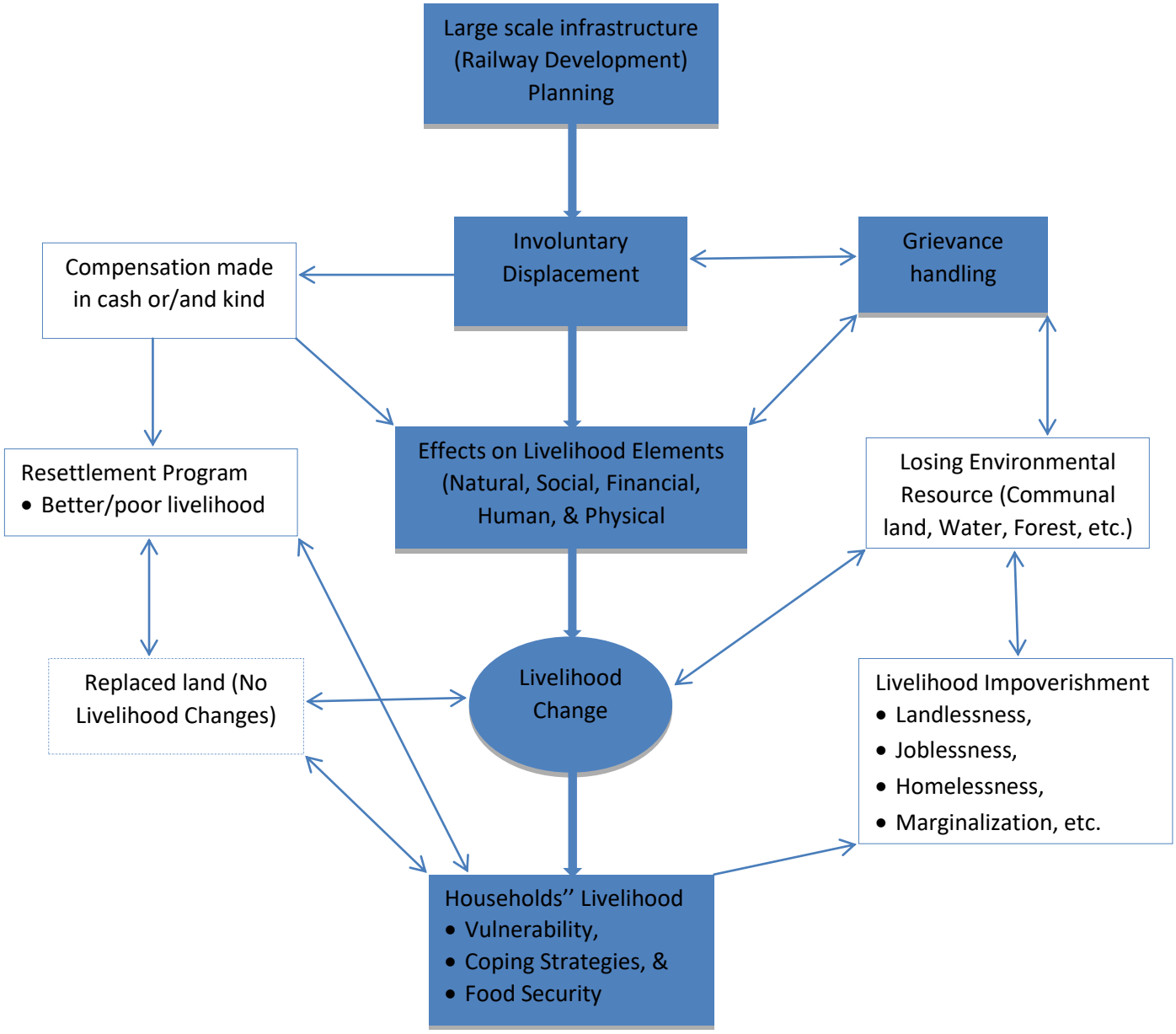
Financial assets are crucial for risk management and livelihood stabilization, but limited access to capital and economic opportunities restrict participation in rural economies. Strengthening social assets, including networks, community support, and local institutions, improves resilience, allowing communities to effectively respond to challenges and adapt to evolving circumstances (Ben & Agnes, 2023; Kapur, 2019).

The interaction among the five capital assets shapes livelihood strategies and determines the sustainability of rural communities. By addressing resource distribution, strengthening community networks, and promoting ecosystem conservation, the Sustainable Livelihoods Approach offers a holistic strategy to enhance livelihoods, reduce poverty, and foster long-term development in vulnerable regions (Ben & Agnes, 2023; Kapur, 2019; Turner, 2017).

4.3.Conceptual Framework of the Dissertation

The opinion that researchers have regarding infrastructure development is not uniform and some of them consider it in general, while others concentrate on certain types of infrastructure. The dissertation studies the relations between the diverse factors especially how they affect livelihood and the railway projects, but primarily the railway development. Impact of this should have been assessed based on variables such as resettlement and livelihood changes. So, infrastructure projects without proper interventions become a challenge for multifaceted adversities for the development induced displaced households. The conceptual framework presented here represented the relationship between the land acquisition and change in livelihood in a visual form and serves as a support for future research on the field.

Figure 6: Conceptual Framework of Involuntary Displacement and Its Impact



Source: Adopted Through an Extensive Literature Review, 2024

4.4. Methods

This study employed a quantitative research approach to analyze the impact of railway development-induced land displacement on livelihoods of households. A cross-sectional research design was adopted where data were collected concurrently, and analyzed through ordered logistic regression (Barros & Hirakata, 2003) and propensity score matching. These enabled a rigorous and objective examination of the relationship between railway development and livelihood outcomes, and offering comprehensive insights into the

multifaceted impacts of development induced displacement (Islam & Filho, 2023; Siltan, 2019).

Participants in household survey were selected using stratified random sampling techniques. This approach ensured that the sample was representative of the diverse characteristics of affected households along the Kemissie to Hayk railway section.

4.4.1. Research Variables

Table 4: Description of the Variable

Types of Variables	Variable	Description
Dependent Variables	human	Members of the household have an advantage in education and skill trainings after the resettlement (1=strongly disagree, 2=disagree, 4=agree, 5=strongly agree)
	physical	The current resettlement area is not different from the previous one in terms of access to basic services (1=strongly disagree, 2= disagree, 4 =agree,5=strongly agree)
	fiancial	Household income has substantially increased after displacement (1=strongly disagree, 2= disagree, 4 =agree,5=strongly agree)
	natural	The current resettlement area is not different from the previous one in terms of natural resource access (land, water, forest and natural amenities) (1=strongly disagree, 2= disagree, 4 =agree,5=strongly agree)
	social	Given resettlement due to the railway project, the social networks among the community are not disintegrated (1=strongly disagree, 2= disagree, 4 =agree,5=strongly agree)
	overall_sust	Overall sustainability of household livelihoods in the railway project-affected area
Independent Variables	sex	Sex of the household head/ respondent (1 = male or 0 = female)
	age	Age of the household head/respondent (categorized into 6 groups)
	edu	Schooling status of the household head education (categorized as 1=Elementary School; 2=Secondary School; 3=Certificate;

	4=Tertiary Education)
empt	After eviction the households employment status (categorized as 1=Own-farm; 2= Own Business; 3=Private Organization; 4=Government; 5= No Job)
gotrepl	Household land displaced and got replaced land (categorized as 1 = Yes and 0 =No)
sati2com	Household satisfied with the given amount of compensation (categorized as 1 =Yes and 0 =No)
miswater	Due to displacement, the household lacked access to water resources (categorized as 1 =Yes and 0 =No)
misforest	Due to displacement the household missed forest resource (categorized as 1 =Yes and 0 =No)

Source: Author, 2023

4.4.2. Model Specification

4.4.2.1. Ordered Logit Model

The study utilized ordered logistic regression as the analytical method to explore the effects of different factors on capital assets. This method demonstrates the ordered nature of the categories among dependent variables. The formulation of the ordered logit model for analyzing relationships between a set of independent variables and an ordinal dependent variables-natural, financial, physical, social, and human capital-were derived from the survey responses of the participants. These outcome variables are ordered from 'strongly disagree' to 'strongly agree' with assigned values from 1 to 5.

For each dependent variable Y, representing levels of agreement from 'strongly disagree' to 'strongly agree' (denoted as y = 1, 2, 3, 4, 5, respectively), the study collected cross-sectional data at a specific time to measure how household livelihoods across the five capital assets fell into the specified categories. This analysis aimed to analyse the impacts of railway development on the livelihoods of households in the study area.

The model is formulated as follows:

For a single latent variable Y*,

$$Y_i^* = X'_i \beta + \varepsilon_i \quad \text{..... (1)}$$

$$Y_i = j \ \ if \ a_{j-1} < Y_i^* < a_j \quad \text{..... (2)}$$

Where Y_i* represents unobservable variable for the households' livelihoods captured under the five capital assets, and X'_i represents the vectors of independent variables. β denotes the vectors of coefficients for each respective independent variable, α_j represents the cut of four points (intercepts) between the two thresholds among the five categories (if α_1 is set to zero, and the remaining thresholds (α_2, α_3, α_4, α_5) are estimated), and ε_i represents the error terms of the unexplained part of the dependent variable.

The probability that observation i is selected alternative j, P_{ij} is:

$$p_{ij} = p(Y_i = j) = p(a_{j-1} < Y_i^* < a_j) = F(a_j - X'_i\beta) - F(a_{j-1} - X'_i\beta) \quad \text{..... (3)}$$

For ordered logit, F is the logistic CDF could be explained as:

$$F(z) = e^z / (1 + e^z) \quad \text{..... (4)}$$

The ordered logit model with j alternatives has one less set of coefficients with (j-1) intercepts. In this case, there are four intercepts, which demonstrates an ordered logit model. This model, therefore, has five alternatives with four sets of influence for each respective independent variable.

Thus, the influence of each variable on the various alternatives sums up to zero, where a one-unit increase in an independent variable either raises or lowers the log of odds of being in a higher or lower category level compared to a reference group. This approach facilitates the analysis of potential relationships between household livelihood capital assets and various independent variables, explaining how land displacement is influenced in the context of railway development initiatives.

4.4.2.2. Propensity Score Matching (PSM)

The railway project intervention requires assessments to determine whether it has had a positive or negative impact on households' livelihoods. Similarly, human capital was chosen to affirm the findings of the Ologit model and enhance the understanding of its interconnectedness with the benefits for households in education and skill training following successful resettlement with land displacement, particularly in contrast to those of who are not

displaced.

To measure such an intervention, the following equation can be developed:

$P(x) = P(D=1|x) = E(D|x)$

D is a binary variable indicating whether an observation has experienced land displacement as the treatment group (D=1 for households with displaced land) or without displacement as the control group (D=0 for households not displaced), with human capital being considered as an outcome variable directly linked to education and skill training. The variable x represents the independent variables that influence the probability of being assigned to the railway project-affected groups. By applying a kernel matching method, we can match observations between households with land displacement and households without displacement based on their propensity scores (Kane et al., 2020).

This comparison can be expressed as: $y=\begin{cases} y1 \text{ if } D = 1 \\ y2 \text{ if } D = 0 \end{cases}$

The kernel matching method is distinguished by its flexibility, balance, efficiency, robustness, local adaptation, and ability to provide valid inference, making it a valuable tool for matching observational data in various research contexts (Miao et al., 2015). Thus, kernel matching involves matching each affected observation (i) with multiple control observations (j). The weights used in this matching process are inversely proportional to the distance between the propensity scores of households with land displacement (Pi) and households without displacement (Pj). The matching is based on the propensity scores, and the weight applied to each control observation j is determined as:

$$w(i,j) = \frac{K\left(\frac{Pj-Pi}{h}\right)}{\sum_{j=1}^{n} K\left(\frac{Pj-Pi}{h}\right)}$$

In the propensity score weighting method, K denotes the kernel matching function used to assign weights to the control group (households without land displacement). The propensity score Pj reflects the probability of a household being in the control group, while Pi represents the propensity score for each affected household with displaced land in the project area. The bandwidth parameter h determines the extent of weighting between the affected observations (i) and the control observations (j).

The Treatment-Effects estimation involves weighting the households with land displacement and those without displacement before calculating the average treatment effect (ATE). The ATE measures the difference in outcomes between these two groups, offering insights into the impact of land displacement on the human capital of the affected households. $\Delta = y_1 - y_0$

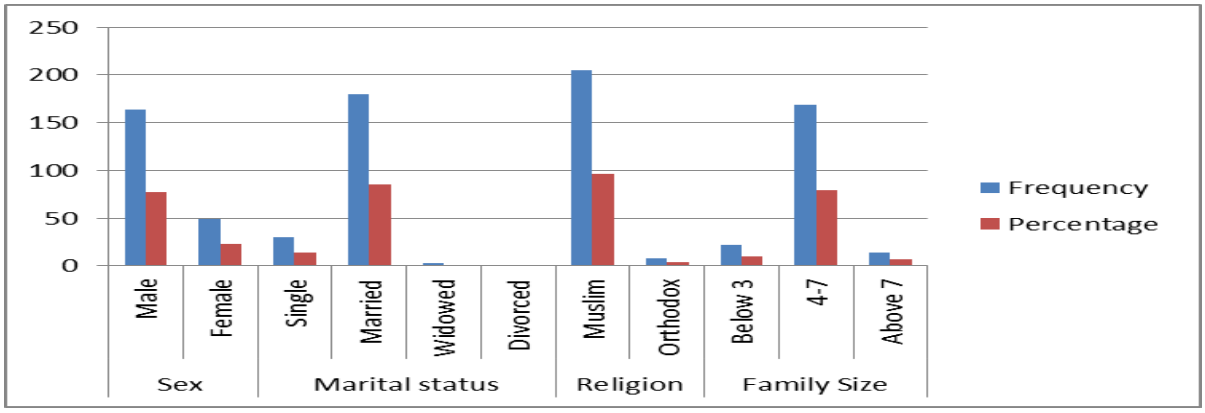
$$ATE = E(\Delta) = E(y_1|x, D=1) - E(y_0|x, D = o)$$

4.5. Findings and Discussions

4.5.1. Demographic Characteristics of Respondent

In the study, a total of 213 questionnaires were successfully collected from those distributed, and the presentation of the collected data is as follows.

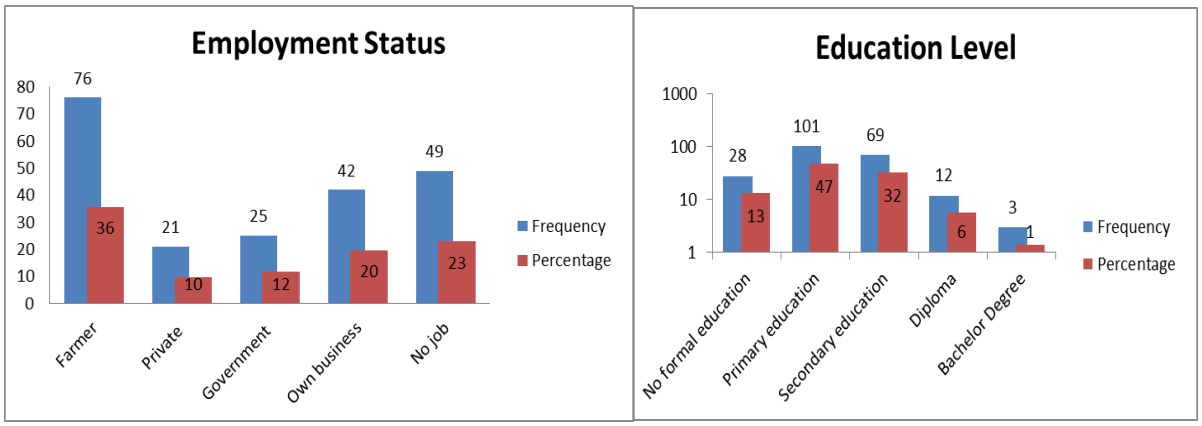
Figure 7: Demographic Information (Head of the Household)



Source: Sample Survey, 2023

Figure 7 presents the demographic characteristics that the male respondents accounted for 77%, while the remaining 23% were female. Those married, single or divorced were 84.5%, 14% and 1.4%, respectively. The analysis of family size that reveals 79.4% having a family size ranging from 4 to 7 members, 10% having family members with less than 3, and the remaining 6.5% having more than 7 family members.

Figure 8: Head of the households' Employment and Education



Source: Sample Survey, 2023

The survey provided insights into the respondents' employment status and education. While the railway line crosses rural Woredas and Kebeles, the study area of the railway is in close proximity to towns and cities such as Kombolcha, where residents are involved in both agriculture-based and non-agriculture-based economies. Consequently, a significant proportion of respondents (36%) relied on farming for their livelihoods, while 20% owned businesses, showcasing entrepreneurial activities. Additionally, 23% were unemployed, and 12% were civil servants. In terms of education, 47% had completed primary education, and 32% had finished secondary education. A smaller percentage held a diploma (6%) or a bachelor's degree (1%), while 13% had no formal education. These findings highlighted occupational diversity, with a substantial number engaged in farming, and varied educational backgrounds among the respondents. Any actions taken to impact land size, such as development projects like railway infrastructure, necessitate long-term programs to train and support individuals with lower educational backgrounds in adapting to the resulting changes.

In terms of the age distribution among respondents, 31% fell within the range of 25-35 years, 23% between 35-45 years, 20% between 45-55 years, 13% between 55-65 years, 8% above 65 years, and the remaining 5% between 20-25 age ranges. The project-affected community's shows predominantly working-age demographics that necessitate job opportunities, with targeted training holding promise for fostering positive outcomes for individuals and the broader community.

4.5.2. Analysis and Discussion

Utilizing Ologit and PSM, the study examined the impact of the railway development project on diverse capital assets. This reveals the intricate interplay among human, natural, social,

physical, and financial capitals within the sustainable livelihood framework (Makacha et al., 2022). Thus, these assets play a pivotal role in influencing individuals' capacity to build and maintain their livelihoods (Dehghani Pour et al., 2018). Consequently, the research studied a scale of household livelihood elements, encompassing natural resources like water and forests, infrastructure, social networks, human capital emphasizing skills and education, and financial resources like savings.

Socioeconomic status significantly predicts quality of life, with individuals of higher socioeconomic status implying a better quality of life (Nutakor et al., 2023). To dissect the intricate interplay among factors impacting capital assets-spanning natural, financial, physical, social, and human capital-ordered logistic analysis was utilized to illuminate the dynamics of household livelihood, particularly within the context of railway development. Consequently, the results of the ordered logit analysis conducted in STATA are shown in Table 2, revealing a robust alignment of the model with the data concerning the pivotal variable of human capital. Noteworthy is the Chi-square value of 71.86, with a p-value below 0.001. Likewise, robust fits were evident across different capital assets such as: physical capital (Chi-square = 124.1, $p < 0.001$), natural capital (Chi-square = 68.22, $p < 0.001$), financial capital (Chi-square = 114.33, $p < 0.001$), and social capital (Chi-square = 107.04, $p < 0.001$), validating the null hypothesis. The statistical analysis indicates significant revelations concerning the sustainability of owning capital assets post-land displacement, as highlighted by a chi-square value of 87.468 and a p-value below 0.001.

Table 5: Ordered Logistic Regression for Sustainable Livelihood Elements

Outcome Variables (Capital Assets)							
Independent Variables		Human Coef (SE)	Physical Coef (SE)	Natural Coef (SE)	Financial Coef (SE)	Social Coef (SE)	overall_sust Coef (SE)
Sex		0.30 (047)	0.65(0.37)*	0.50(0.38)	0.65(0.60)	0.80(0.47)*	0.73(0.32)**
Age		0.04(0.01)**	0.01 (0.01)	0.05(0.04)***	0.17(0.03) ***	-0.03(0.02)*	0.05(0.01)***
Edu	Elementary	0	0	0	0	0	-
	Secondary	0.02(0.54)	0.45(0.53)	1.65(0.55)***	22.72(1409.99)	-1.72(0.64)***	0.95(0.47)**
	Certificate	1.90(0.66)***	1.18(0.63)**	2.24(0.66)***	21.331(1409.99)	-1.29(0.80)	2.27(0.56)***
	Tertiary	3.80(0.89)***	-1.51(1.04)	1.21(0.80)	20.34(1409.99)	-1.34(1.35)	1.50(0.71)**
Empt	On-farm	0	0	0	0	0	-
	Own-business	-1.87(0.68)***	-3.04(0.81)***	0.53(0.56)	5.32(1.31) ***	-2.82(1.15)**	-1.07(0.55)*
	Private-organization	-1.88(0.65)***	-0.65(0.57)	0.81(0.53)	5.54(1.30)***	-1.23(0.80)	-0.62(0.47)
	Government	-0.63(0.49)	-1.73(0.47)***	-0.02(0.43)	2.13(0.92) **	-0.37(0.64)	-0.70(0.43)
	Unemployed	-1.86(0.56)***	-0.71(0.46)	-0.67(0.49)	1.35(0.98)	-0.26(0.60) **	-1.27(0.41)***
Gotrepl		0.43(0.39)	0.53(0.40)	0.86(0.37)**	-0.28(0.73)	1.28(0.51) **	0.93(0.37) **
Sati2com		-0.66(0.45)	2.44(0.53)***	-1.52(0.43)***	-1.99(0.64) ***	3.33(1.22) ***	-0.29(0.37)
Miswater		0.72(0.41)*	1.34(0.39)***	0.74(0.36)**	0.04(0.74)	3.26(0.51) ***	1.99(0.35)***
Misforest		0.56(0.63)	2.06(0.80)***	-1.40(0.53)***	-21.27(1598.60)	-1.76(0.66) ***	-1.59(0.54)***
Constant		3.13(1.42)	9.12(1.66)	1.58(1.33)	7.53(2131.56)	9.82(2.74)	2.13(1.17)
Pseudo r-squared		0.179	0.272	0.152	0.523	0.318	0.1029
Chi-square		71.86	124.10	68.22	114.33	107.04	87.47
Prob > chi2		0.000	0.000	0.000	0.000	0.000	0.000
log likelihood		-165.26	-165.95	-190.29	-52.19	-114.65	-381.27

Source: Own Estimates**,** 2024. **Note:** P-values are denoted by *** for 1%, ** for 5% and * for 10% significance level; Coef & SE represents for Coefficient & Standard Error respectively.

4.5.2.1. Impacts on Human Capital

Recognizing the predictive impact of determinants such as sex, education, age of the household head, employment status, water and forest resources, as well as land displacement on the community's livelihood dynamics, a thorough investigation was conducted using the rigorous method of ordered logistic analysis. Female-headed households, particularly those with dependent children and no partner, faced distinct challenges compared to male-headed households (Boudet et al., 2018), prompting women to strive for a transformation in gender dynamics within the community's livelihood framework (De Haan, 2012). Household characteristics, as emphasized by Liu et al. (2022), can serve as indicators of an individual's work capabilities, skill gaps, and limited employment prospects, shedding light on the potential hardships individuals encounter during development-induced land displacement. Education levels and other independent variables were found to be interconnected with various facets of livelihoods, encompassing human, physical, natural, financial, and social capital, which collectively influence household sustainability, suggesting that individuals with differing educational backgrounds and other factors may be affected in distinct ways when these elements are considered.

The research revealed that variables like employment status, education level, and age demonstrated statistical significance concerning various capital assets. Interestingly, factors such as gender and access to forest resources did not exhibit significant correlations with the development of human capital assets.

An advancement in education from elementary to tertiary level was associated with a 3.80 increase in the likelihood of possessing enhanced skills, exposures, and training that enrich human capital, all while maintaining other factors constant. Similarly, progressing from elementary to certificate-training education was linked to a 1.90 increase in the probability of acquiring improved skills and networks that contribute to human capital, with all other variables remaining steady.

Moreover, factors like owning a business, working in the private sector, and experiencing unemployment were identified as statistically significant influencers on human capital development, unlike a civil servant status. Furthermore, an increased number of businesses owned, compared to owning a farm, resulted in a 1.87 decrease in the likelihood of developing strong skills and networks within human capital, with all other variables in the

model held constant. Consequently, farm-based employment is perceived to provide better opportunities for investing in education or other dimensions of human capital.

Similarly, an extended period of unemployment, compared to farm ownership, led to a 1.86 decrease in the likelihood of achieving a higher level of human capital, with all other variables held constant. Notably, this decrease rose to 1.88 for individuals in the private-organization category compared to owning a farm. Thus, farm ownership appears to foster greater human capital development compared to private-sector jobs, which may lack supportive benefits. (Please refer to Appendix III (A) for the STATA output.)

4.5.2.2.Impacts on Physical and Natural Capital of Displaced Households

As highlighted by Choi (2015), residents' physical capital suffered a decline in livelihood impacts due to displacement, primarily stemming from land clearance. The intervention's development further disrupted household and individual interactions, exacerbating these challenges. Concerning education, only the certificate level displays weak statistical significance compared to elementary school, while other education levels do not exhibit a significant relationship with households' physical capital in livelihoods. This suggests a limited and uneven impact of education levels on enhancing physical capital.

Regarding job opportunities, both owning a business and being a civil servant emerged as strong influencing factors compared to farm ownership. However, unemployment and private sector jobs do not show a significant influence on physical capital. In specific context, an upgraded business, as opposed to owning a farm, signifies a 3.04 reduction in the likelihood of reaching a higher level of physical capital, with all other variables remaining constant. Likewise, there is a 1.73 decrease in the likelihood of achieving a higher level with a rise in civil servant status compared to owning a farm. This indicates that owning businesses and government positions have a more pronounced impact on the physical aspects of households' capital assets.

Conversely, the presence of water enhances the likelihood of attaining a higher level of physical capital by 1.34 for each advance in water supply. Similarly, satisfaction with compensation yields a significant boost of 2.44 in the same direction. Additionally, access to forests exerts a notable impact, resulting in a 2.06 increase in the probability of achieving a superior level of physical capital with each progression. Hence, the availability of water,

accessibility of forests, and contentment with compensation all play essential roles in enriching the physical capital within household livelihoods.

As noted by Aboda et al. (2019), the loss of natural resources often leads to a loss of income and livelihoods. Household characteristics reflect an individual's work abilities, skill deficits, and limited job opportunities, highlighting how development interventions and reliance on natural resources can negatively affect individuals (Liu et al., 2022). Additionally, the depletion of natural capital further exacerbates these challenges (Ben & Agnes, 2023).
Liu et al. (2022) emphasizes that household characteristics act as indicators of an individual's work abilities, skill deficits, and limited job opportunities. This underscores the potential negative impacts of development interventions, particularly for those heavily dependent on natural resources. Furthermore, the depletion of natural capital intensifies these difficulties (Ben & Agnes, 2023).

Although employment status may not exhibit a significant influence, the level of education, particularly at the secondary and certificate levels, demonstrates strong effects compared to elementary education concerning natural capital. This implies that education plays a crucial role in mitigating the impact of development interventions on the natural capital assets of livelihoods. Secondary education shows a notable increase of 1.65 in the probability of reaching a higher level for each grade increase, while the certificate level displays a substantial difference of 2.24 in the same direction compared to elementary education. Additionally, age and satisfaction with compensation carry significant implications. Age indicates an increase in the likelihood of being at a higher level of natural capital for each year increase, whereas compensation satisfaction reveals a notable decrease of 1.52 in the opposite direction. Furthermore, displaced land and water availability show meaningful associations. Households with displaced land experience a significant increase of 0.86 in the likelihood of their living status for each incremental change, while water availability demonstrates a rise of 0.74 in the same direction. Therefore, secondary education, certificates, age, displaced land, and water availability positively influence attaining a higher level of natural capital. (Please refer to Appendix III (B & C) for the STATA outputs.)

4.5.2.3. Impacts on Financial and Social Capital of Displaced Households

As noted by Choi (2015), the impact of displacement extended beyond the customer base, disrupting the broader livelihood network that supported local businesses. Socioeconomic

status is a key predictor of quality of life, with higher status leading to better outcomes, suggesting that social capital may play a mediating role in these dynamics (Nutakor et al., 2023).

From the employment status perspective, age, and compensation satisfaction, statistically significant relationships are observed, while sex, education, water and forest resources, do not show meaningful thought regards to households' financial capital during land displacement. More specifically, when it comes to the influences of financial capital, one year increase in the household head's age results in a 0.17 increase, while compensation satisfaction shows a 1.99 decrease in the likelihood of being in higher groups of financial capital. In contrast, an enhanced investment in one's own business and advancement in private sector employment correspond to increases of 5.32 and 5.54, respectively, in the probability of being in higher financial capital groups. This suggests that the age of the household head has a modest positive effect, compensation satisfaction has a negative impact, and owning a business or working in a private organization significantly boosts the chances of being in higher financial capital groups, unlike sex, and education.

Education and employment categories, with the exceptions of secondary education and the own-business category, do not demonstrate statistical significance. On the other hand, some studies support the idea that access to economic resources, which contributes to social development, is influenced by various factors (Niaz, 2022). Among these factors, sex, age, compensation satisfaction, water resources, forest resources, and displaced lands show statistical significance, although the impact of sex and age is relatively weaker compared to the others.

The research findings suggest that being identified as a business owner is linked to a decreased likelihood of being in higher social groups. In this context, an improved status in own-business employment corresponds to a decrease of 2.82 in this likelihood. Furthermore, the variables of compensation satisfaction and water resources demonstrate significant impacts. A one-level increase in compensation satisfaction and water resources is associated with increases of 3.33 and 3.26, respectively, in the likelihood of being in higher social element groups. However, the forest resource variable shows a decrease of 1.76 in the probability of being in higher groups. Therefore, the research indicates that own-business ownership; compensation satisfaction, water and forest resources significantly influence social development. (Please refer to Appendix III (D & E) for the STATA outputs.)

4.5.2.4. Impacts on Sustainability

As noted by Aboda et al. (2019), development projects have been observed to induce vulnerability if sustainability is not adequately maintained afterward. Particularly, variables such as sex, age, education, employment (compared to the base category), and access to displaced land and water resources exhibit a significant association concerning the overall sustainability of owning capital assets post-land displacement. Compensation satisfaction, however, does not show a significant relationship with overall sustainability, setting it apart from these influential factors. (See Appendix III (F) for the STATA output.)

The meticulous analysis conducted using ordered logistic regression in Table 5 clearly demonstrates the significant impact of several key factors on the community's livelihood elements. These factors include education level, employment status, age of the household head, access to water and forest resources, as well as the displacement of plots of land. Each of these factors plays a pivotal role in shaping the various dimensions of households' livelihoods.

Education level emerges as a significant determinant, exhibiting strong associations with livelihood strategies across capital assets. Higher educational attainment consistently correlates with an increased likelihood of belonging to higher groups concerning these livelihood elements. This underscores the critical role of educational achievements in influencing the diverse dimensions of livelihoods, particularly in scenarios involving displacement due to development projects.

Moreover, employment status emerges as a pivotal factor, with own-business ownership, employment in the private sector, and unemployment showcasing significant relationships. The age of the household head and satisfaction levels with compensation notably influence the capital assets of households' livelihoods. Furthermore, access to water and forest resources, along with the displacement of land, exerts a detrimental impact on the physical and natural capital of households.

The study underscores the intricate interplay of socioeconomic, demographic, and environmental factors in molding the livelihood strategies of land-displaced households, especially within the framework of development projects.

The research utilized propensity score matching and non-parametric tests, such as the Wilcoxon rank-sum test, to explore the relationship between human capital and the advantages for households in education and skill training after land displacement. In this particular investigation, households experiencing land displacement were directly compared with those without displacement. Non-parametric tests, being less influenced by outliers and not requiring a normal data distribution, were deemed appropriate for studies with limited sample sizes while attaining a comparable statistical accuracy to parametric tests. The selection of non-parametric tests aligned with the research objective, which aimed to pinpoint notable distinctions between the two groups under examination, namely the treated and controlled groups (Mann & Whitney, 1947).

To estimate the propensity score and address potential treatment effects, observations were matched based on their propensity scores within each group (Austin, 2011). A probit regression model was subsequently applied to compare households affected by land displacement due to the railway project, while controlling for other factors that could influence the outcomes.

The study utilized the Two-sample Wilcoxon rank-sum (Mann-Whitney) test and obtained a p-value of 0.007 (Table 6). This result provides strong evidence to reject the null hypothesis, which posits no difference in the median human capital elements between households with land displacement and those without. Therefore, it can be concluded that there is a significant difference in the median human capital between the two groups.

Table 6: Two-sample Wilcoxon rank-sum (Mann-Whitney) test

Displaced land	Observation	Rank sum	Expected
0	78	9366	8346
1	135	13425	14445
Combined	213	22791	22791
Unadjusted variance	187785.00		
Adjustment for ties	-41417.04		
Adjusted variance	146367.96		
Ho: human(gotrepl==0) = human(gotrepl ==1)			
z = 2.666			
Prob >	Z	=	0.0077

Source: Own Estimates (2023); (Please refer to Appendix III (G) for the STATA output.)

As noted by Austin (2011), the statistical analysis of Treatment-effect Estimation aims to establish the causal impact of involuntary displacement on the human capital of affected households using PSM. Assessing the impacts on households affected by land displacement for railway projects is an important aspect to consider, given that land serves as a significant livelihood asset for the majority of rural communities, as highlighted by Aboda et al. (2019).

Table 7: Treatment-effects Estimation with and without Replaced Land

human	Coef.	SE	t-value	p-value	[95% Conf	Interval]	Sig
r1vs0	-.52	.142	-3.65	0	-.799	-.241	***
Mean dependent var	1.690	SD dependent var	0.873				

Source: Own Estimates (2023); p-values denotes *** *p<.01, ** p<.05, * p<.1, and '1' represents land displacement, and '0' without land displacement*

Within Table 7, the statistical outcomes are delineated to assess treatment effects, encompassing scenarios both with and without land displacement. The coefficient assigned to the 'human' variable stands at -0.52 (P-value < 0.001), suggesting an adverse association between human capital and the dependent variable in instances of land displacement, attributed to the railway development mandating households to give up their land.

This discovery implies that the occurrence of land displacement correlates with an average reduction of 0.52 in human capital. Various factors likely contribute to this 0.52 downturn in human capital across the two groups, including the absence of educational infrastructure in the new location after land displacement, the loss of assets from the original area, and challenges in accessing social networks and support systems due to the relocation. The impact of the development project adversely affects households' access to education, leading to a decline in their human capital. Consequently, the study's results reveal a significant negative impact on human capital resulting from land displacement. These outcomes underscore one of the detrimental effects of the development project on human capital in the project regions, specifically attributable to the presence of displacement.

As a result of employing both ordered logistic regression and propensity score matching (PSM), the study examined the complex interplay influencing the capital assets and livelihood strategies of land-displaced households due to railway projects. Ordered logistic regression reveals the significant impact of education level, employment status, age, and resource access on capital assets, underscoring the crucial role of education in shaping households' livelihood outcomes. Furthermore, PSM highlights the detrimental effects of

land displacement, with human capital assets demonstrating a negative association, resulting in a 0.52 decrease, influenced by factors such as the lack of educational infrastructure and asset loss.

These results show the many difficulties that affected households face and emphasize how important economic and environmental factors are in shaping their ability to bounce back after being forced from their lands. This means it is really important to carefully study and think through any development plans that might change how households make a living, to avoid causing them harm.

4.6. Conclusion

Research findings demonstrated that the critical importance of education, employment, and resource access in shaping land-displacement livelihoods, indicating the necessity for careful interventions to ensure long-term sustainability. Education emerges as a key factor influencing the capital assets of livelihoods, with higher education levels aligning with improved livelihood outcomes. This underscores the essential role of education in crafting livelihood strategies, particularly in scenarios of development-induced displacement. Therefore, policy interventions should prioritize educational opportunities to enhance overall livelihood prospects within development projects.

Furthermore, employment status significantly impacts livelihood groupings, with own-farm roles displaying stronger associations with higher livelihood tiers. Understanding these employment dynamics is crucial for targeted interventions aimed at elevating livelihood standards. Similarly, the age of the household head and satisfaction levels with compensation play significant roles in determining physical, natural, and financial capital within livelihoods. Addressing compensation issues and considering demographic characteristics are vital for promoting sustainable livelihood development post-displacement.

Moreover, access to water, forest resources, and adequate land plots profoundly influence the physical and natural capital of households. Interventions must prioritize sustained access to essential resources while mitigating the adverse effects of land displacement to support livelihood resilience. The study also points to a notable decline in human capital following land displacement, attributed to challenges like inadequate educational infrastructure, asset loss, and disrupted social networks. Targeted support mechanisms are essential to prevent human capital loss upon land displacement, necessitating a detailed examination of the long-

term impacts of railway development on socioeconomic factors, accounting for temporal variations for a comprehensive analysis.

CHAPTER FIVE

5. The Impact of Involuntary Resettlement on Households' Livelihood in Railway Induced Resettlement in South Wello Zone of Amhara Region, Ethiopia

Abstract

The study aimed to examine the impacts of involuntary displacement on household livelihoods caused by railway infrastructure development projects in the study area. As the number of people displaced by land acquisition for railway projects continues to rise, constitutional provisions for compensation and resettlement often prove insufficient to mitigate the negative consequences. The research integrates data from household surveys, key informant interviews, and focus group discussions to analyze these impacts comprehensively using a quasi-experimental design with propensity score matching (PSM). The findings revealed that the livelihoods of displaced households were adversely affected in terms of reduced income, financial instability, and social disintegration. Local governments are urged to provide fair and timely compensation, explore alternative livelihood packages, and ensure that feasibility studies prioritize the socioeconomic and environmental needs of displaced populations. Furthermore, involuntary displacement should be considered a last resort, with strategic interventions designed to safeguard household livelihoods and promote sustainable development.

Key words: *Involuntary displacement, Railway infrastructure, Livelihoods, Compensation and resettlement, and Ethiopia.*

5.1. Introduction

Development projects are often implemented with the aim of promoting national, regional, and local upgrading, leading to an improved quality of life. However, such projects can also have diverse effects related to involuntary displacement. Development-caused displacement and resettlement are serious challenges (Cernea & Maldonado, 2018) that can lead to the displacement of several people (De, 2020), creating perpetual opposition from affected communities and escalating tensions around displacement and resettlement (Nyaoro, 2018). Additionally, the lack of employment opportunities and disruption to the livelihoods of displaced households intensify the negative impacts of involuntary resettlement (Oppio et al., 2015). Development-induced displacement is critical because the required land for development is often significant, and people in rural areas are highly dependent on their land for subsistence (De, 2020). Therefore, displacement and resettlement are considered an international development agenda (Cernea & Maldonado, 2018).

The number of people displaced annually due to land takings for various purposes has been increasing (Hagen & Minter, 2020). This includes urban relocation due to slum clearance and renovation, as well as infrastructure provision for water projects, airports, dams, and mines (Siddiqui, 2012). Additionally, it includes industrial estates, large-scale housing

developments, tourism developments, industrial agriculture and forestry operations, major roads, bridges, railway lines, pipelines, and transmission corridors (Vanclay, 2017). It also encompasses irrigation and drinking water systems or the expansion of highway networks (Cernea, 2008). In the decade from 2011 to 2020, an estimated 20 million people were forcibly displaced each year due to development projects (Hagen & Minter, 2020; Cernea & Maldonado, 2018).

Railway transportation is a crucial infrastructure facility for achieving effective development and providing an efficient, cost-effective, and environmentally friendly transport system (Bešinović, 2020). Ethiopia has been working on developing its railway infrastructure to improve transportation within the country and enhance connectivity with neighboring countries (Rode et al., 2020). The country's current railway network comprises two main lines: the Ethio-Djibouti Railway and the Addis Ababa Light Rail Transit (AALRT) system. The Ethio-Djibouti Railway provides a crucial transportation link for Ethiopia, as approximately 95% of its imports and exports pass through the Port of Djibouti (Ranjan, 2020). The AALRT system eases traffic congestion in the city and provides an affordable means of transportation for its residents (Tekolla et al., 2021). The Awash-Woldia/Hara Gebeya Railway covers a distance of approximately 389 kilometres, connecting the town of Awash with the cities of Woldia and Hara Gebeya. However, it is not yet completed. Once finished, this railway infrastructure is expected to play a crucial role in Ethiopia's economic development (Chen, 2021).

It is important to note that the railway project has negative externalities for the community (Dires, 2021), as it involves land acquisition that leads to the displacement of numerous people (De, 2020). This process often suppresses indigenous forms of production and consumption (Hagen & Minter, 2020), resulting in perpetual opposition from project-affected people and escalating tensions related to displacement and resettlement (Nyaoro, 2018). Development-induced displacement is a critical issue as the demand for land for development is high, while people in rural areas highly depend on their land for subsistence (De, 2020).

According to the current Ethiopian constitution of 1995, anyone whose livelihoods have been adversely affected by government projects has the right to proportionate monetary or alternative means of compensation, including resettlement with adequate assistance. However, resettlement alone is insufficient to meet the expectations of the community and

can even be a source of conflict between the host community and the resettled households (Nyaoro, 2018).

Several studies, including Ty et al. (2023), Yadeta et al. (2022), Liu et al. (2020), Quetulio-Navarra et al. (2014), Rowan (2017), Wayessa & Nygren (2016), and Adam et al. (2015), have examined the impacts of resettlement on different populations in various contexts. These studies focus on the risks of impoverishment, food insecurity, and loss of livelihoods resulting from resettlement, and the need for effective resettlement planning and implementation. Most studies emphasize the importance of considering household-level analysis and cultural and social factors in mitigating the negative impacts of resettlement. Therefore, understanding the challenges and opportunities associated with involuntary resettlement is crucial, and exploring ways to mitigate its negative impacts on the livelihoods of affected households is necessary.

This study specifically examined the impacts of railway infrastructure-induced resettlement on households' livelihoods in the South Wello Zone of the Amhara Region of Ethiopia. By exploring the experiences of affected households, the study aimed to uncover the challenges and opportunities linked to involuntary resettlement. The findings can assist in assessing the effectiveness of efforts to address infrastructure gaps and promote inclusive growth through successful resettlement. By comprehensively understanding the impacts of involuntary resettlement, this study can inform policy and decision-making processes to ensure that infrastructure development projects are implemented in a sustainable and socially responsible manner that benefits impacted communities.

5.2.Development Induced Displacement, Compensation and Resettlement

Development is a multidimensional process that generates economic, technological, social, and institutional change to support the wealth of nations and comprehensive well-being of people in society (Coccia, 2019), aiming to reduce inequality and eradicate absolute poverty (Mensah, 2019). Infrastructure development encompasses the construction, expansion, or renovation of facilities that support economic and social activities. The development of infrastructure is seen as crucial for a country's development (McDermot et al., 2022). However, the increased rate of railway projects and operations in Africa presents significant social responsibility challenges, often resulting in the displacement of people (Bouraima et al., 2023; Koenig, 2001).

Railway infrastructure is one of several development projects in Ethiopia aimed at expanding the network and improving transportation services, which is seen as crucial for the country's economic development (Bouraima et al., 2023). However, infrastructure construction has resulted in the displacement of an estimated 15 million people per year worldwide (Randell, 2016), with China, India, Brazil, and Indonesia being among the countries with the highest number of people displaced. In Africa, the railway industry faces significant social responsibility challenges (Bouraima et al., 2023), and the incidence of involuntary resettlement requires close attention to mitigate development-induced displacement, which can lead to livelihood deterioration among affected communities (Randell, 2016).

According to the Ethiopian constitution of 1995, adverse effects of development projects should be compensated proportionately with monetary or alternative means of compensation, including resettlement with adequate assistance (Constitution, 1995). Similarly, compensation proclamation No. 1161/2019 stipulates that land can be assigned for infrastructure development through the expropriation process, with a corresponding value provided for the property either in cash or kind or a combination of both (Proclamation No. 1161, 2019). Although the proclamation reserves the land ownership right in the hands of the government, expropriation occurs when a public agency takes property for a purpose deemed in the public interest without the property owner being willing to sell it (Yirsaw, 2013).

Infrastructure development is a key component of Ethiopia's development plan, as it is seen as integral to achieving structural transformation (Nuru, 2019). However, eminent domain or expropriation is a government power that can negatively impact equity and transparency. Compensating affected individuals proportionately with monetary or alternative means, including resettlement with adequate assistance, is crucial to mitigate development-induced displacement. Cash assistance is often provided to those whose land is taken, but it fails to provide productive means or skills to restore livelihoods (World Bank, 2004). Consequently, numerous infrastructure development projects have failed to improve or enhance the livelihoods of project-affected households in Ethiopia (Gebre, 2008), leading to dissatisfaction among displaced people (Siltan, 2019).

To ensure positive socio-economic impacts of railway development, forced displacement must be mitigated and private property rights must be protected through fair compensation and confirming steady forms of public need for land. Furthermore, infrastructure development projects must aim to improve or enhance the livelihoods of project-affected

households. The positive socio-economic impacts of railway development should be appreciated and balanced with the adverse effects of development-induced displacement, which can lead to hardship and decreased agricultural productivity (George & Adelaja, 2021; Dires, 2021).

Liu et al. (2020) argue that disaster-related resettlement in China has a significant negative impact on household livelihood resilience. The authors propose observing the impacts of disaster-related resettlement in the Southern Shaanxi Disaster Resettlement area from the perspective of livelihood resilience. The study highlights the importance of understanding the linkage between livelihood resilience and disaster-related resettlement.

Ty et al. (2023) suggest that their study, which examines three communities in Thua Thien Hue province of Vietnam, reveals that resettled households are unable to regain their former standard of living due to the loss of cultivated land and restricted access to public property, exacerbating food insecurity. Unemployment, illiteracy, and low income further perpetuate poverty. The authors argue that deficiencies in policies and planning approaches exacerbate the inequalities arising from displacement and recommend socially responsible resettlement processes guided by principles of equity to address these issues. The study highlights the need for policymakers to adopt a comprehensive and intersectional perspective to ensure equity and sustainability for resettled communities and empower them to negotiate to protect their own interests, which is economically justified and morally imperative.

On the other hand, Rowan's study (2017) argues that resettlement action plans (RAPs) cannot be completed at the same time as social impact assessments (SIAs) and identifies challenges and risks to project scheduling. The study also presents measurement tools to improve livelihood restoration and builds social resilience, such as staggering cash compensation payments and providing in-kind assistance at the right time and for the right duration.

According to Yadeta et al. (2022), demographic, socioeconomic, and background factors of resettled individuals are the main triggers of deforestation. The authors call for a revisiting of government intervention strategies and resettlement policies in forest priority areas, specifically in the Oromia region of Ethiopia, to prevent further damage to biodiversity and ecosystem services. The article also emphasizes the need to consider the environmental, socioeconomic, and cultural impacts of resettlement programs to ensure equitable and sustainable outcomes.

All in all, infrastructure development, including railway projects, is crucial for a country's development, but it can also result in the displacement of people and cause adverse effects on their livelihoods. Compensating affected individuals proportionately with monetary or alternative means, including resettlement with adequate assistance, is crucial to mitigate development-induced displacement. Policymakers must adopt a comprehensive and intersectional perspective to ensure equity and sustainability for resettled communities and empower them to negotiate to protect their own interests. Finally, it is imperative to consider the environmental, socioeconomic, and cultural impacts of resettlement programs to ensure equitable and sustainable outcomes.

5.3. Methods

The study utilized a mixed-methods approach, incorporating both quantitative and qualitative research methods to ensure comprehensive and accurate findings. This approach allowed for a more thorough analysis of complex phenomena that could not be fully captured by either quantitative or qualitative methods alone, resulting in a more complete and robust analysis of the research problem.

To investigate the distinctions and similarities between the displaced and non-displaced groups and to evaluate the impact of involuntary displacement, a quasi-experimental design was implemented utilizing PSM. The study used quantitative methods, including propensity score matching, to analyze the income and expenditure gap between the displaced and non-displaced groups. Qualitative methods were also employed to examine livelihood-related issues and assess changes resulting from displacement. This mixed-methods approach provided a comprehensive understanding of the effects of involuntary displacement on the affected communities, incorporating both quantitative and qualitative data to offer a more complete analysis.

5.3.1. Propensity Score Matching Model (PSM)

To evaluate the impact of any intervention, assessments must be conducted to determine whether it has had a positive or negative effect on the community's livelihoods. For instance, large-scale infrastructure development (LSID) is an intervention that can directly affect some community members' livelihoods, while others may experience negative impacts due to land expropriation. In some cases, the community may lose valuable assets, such as farming skills required for livelihood activities, which may be challenging to replace.

To account for potential confounding variables, the study implemented PSM to match observations from the displaced and non-displaced groups based on their propensity scores (Kane et al., 2020). PSM enables the estimation of the propensity score, which can be used to match and evaluate the quality of the matching to determine the outcomes (Pan & Bai, 2016). By estimating the propensity score using logistic regression, the study analyzed the effects of land expropriation on the income and expenditure of the affected groups that constitute the basis of their livelihood. This approach allowed the study to compare the outcomes between the displaced and non-displaced observations and assess the intervention's impact.

The equation P(x) = P (D=1|x) = E (D|x) signifies that D is a binary variable that indicates whether the observation has received the treatment or not. In particular, D=1 for displaced observations and D=0 for non-displaced observations. The variable x represents the independent variables that influence the probability of being allocated to the affected group, such as age, education, marital status, gender, family size, income, and expenditure.

The propensity score represents the anticipated probability of being impacted by the project, taking into account the characteristics of the non-displaced group, X (Yang et al., 2019). By applying a kernel method, we match observations between the displaced and non-displaced groups based on their propensity scores. This allows us to compare the outcomes (y) between the affected and control observations and evaluate the effects of expropriation. The comparison can be expressed as:

$$y=\begin{cases} y1 \text{ if } D = 1 \\ y2 \text{ if } D = 0 \end{cases}$$

Kernel matching involves matching each affected observation (i) with multiple control observations, utilizing weights that are inversely proportional to the distance between displaced and non-displaced observations. The matching process is based on propensity scores, and the weight is determined as:

$$w(i,j) = \frac{K\left(\frac{Pj-Pi}{h}\right)}{\sum_{j=1}^{n} K\left(\frac{Pj-Pi}{h}\right)}$$

Here, K refers to kernel matching for the propensity score Pj of the non-displaced group, while Pi represents the propensity score of each affected observation in the project. The bandwidth parameter h determines the weight between the affected observations i and the control observation j.

The Treatment-Effects estimation involves weighting the displaced and non-displaced observations before computing the average treatment effect (ATE), which indicates the difference between the outcomes of these two groups.

$$\Delta = y_1 - y_0$$

$$ATE = E(\Delta) = E(y_1|x, D=1) - E(y_0|x, D = o)$$

Following the matching of propensity scores, the propensity score weighting method can be used to compare the outcomes of displaced and non-displaced observations.

$$ATET = E(\Delta|p(x), D = 1) = E(y1|\ p(x), D = 1) - E(y_0 \mid p(x), D = o)$$

5.3.2. Likert Scale

To evaluate households' perceptions of displacement-related issues, the study utilized the 5-point Likert scale for the qualitative parts of the analysis. This scale ranges from "1" indicating "strongly disagreed" to "5" indicating "strongly agreed." Respondents' scores falling within the range of 4.21-5.00 are considered as strongly agreeing, while scores ranging from 3.41-4.20 indicate agreement. A mean score between 2.61-3.40 is considered as neutral, and a score within the range of 1.81-2.60 indicates disagreement. Scores between 1.0-1.80 from the respondents indicate that they strongly disagree (Bekele et al., 2014; Zaidatol & Bagheri, 2009).

Using a standardized Likert scale allows for easy comparison and analysis of responses across different questions or groups of respondents. It provides a quantitative measure of attitudes or opinions, which can be useful in statistical analysis to identify patterns or trends. This approach can be beneficial in gaining insights into the perceptions of affected households regarding displacement-related issues (Yamashita & Millar, 2021).

5.3.3. Sample Design and size

The study employed a quasi-experimental design to examine the causal relationship between displacement and its impact on livelihoods. Focusing on project-affected households near the railway line, the research included both displaced and non-displaced groups, identified through administrative records. Proportional sampling was used to select participants from three resettlement sites, ensuring data relevance. Using Yamane (1967) formula, the sample was derived from 1,261 households, enabling a comprehensive analysis of displacement effects on livelihoods.

The formula used to calculate the sample size was as follows:

$n = N / (1 + Ne^2)$

Where; n represents the desired sample size, N represents the population size (1261), e represents the level of precision/sampling error (set at 5%), 1 designates the probability of the event occurring.

Using this formula, the sample size was calculated as follows:

$n = 1261 / (1 + 1261*0.05^2) = 304$

Therefore, the study determined that a sample size of 304 project-affected households (HHs) were necessary. In addition to the project-affected households, approximately 40 administrative staff members at all levels (Municipality, Woreda, Zone, and Region) were also a source of information for the study. The researchers conducted five focus group discussions in both structured and semi-structured formats and interviewed eleven key informants. These data collection methods ensured that the study's findings were based on the experiences and perspectives of the affected community members and relevant stakeholders.

5.3.4. Statistical Analysis

The study utilized a combination of statistical methods to analyze the data and evaluate the differences between the two groups being compared (displaced and non-displaced). Specifically, the study employed propensity score matching and non-parametric tests, such as the Wilcoxon rank-sum test.

Non-parametric tests were chosen because they are less sensitive to outliers and do not assume a normal distribution of the data. This makes them a suitable choice for studies with smaller sample sizes, and they can achieve the same level of statistical precision as parametric tests. The use of non-parametric tests was also consistent with the research question as the study aimed to identify significant differences between the two groups being compared.

The study utilized non-parametric tests to assess the effectiveness of propensity score matching in reducing bias and balancing the distribution of covariates between displaced and non-displaced groups in observational studies. By using these tests, the study was able to

determine whether the propensity score matching approach was effective in reducing bias and balancing the distribution of covariates.

5.4. Result and Discussion

The study distributed a total of 304 questionnaires, and 213 were returned, resulting in a response rate of 70%, which is considered acceptable in survey research (Fincham, 2008). Additionally, the study cited a study conducted by Holtom et al. (2022), which found that the average response rate in social science research surveys increased from 48% in 2005 to 68% in 2020.

The study's main focus was on the 154 respondents from displaced households who lost their plots of land and were considered the treated (displaced) group. The remaining 59 respondents were considered the control (non-displaced) group. To gather more information in the area, the data collection process involved not only a questionnaire survey but also key informant interviews and FGDs. The researchers obtained ethical approval beforehand.

5.4.1. Demographic Characteristics of the Respondent

Table 8: Demographic Information

	Types of the Variable	Frequency	Percentage (%)
Sex	Male	164	77.0%
	Female	49	23.0%
Marital status	Single	30	14.1%
	Married	180	84.5%
	Widowed	3	1.4%
	Divorced	0	0.0%
Religion	Muslim	205	96.2%
	Orthodox	8	3.8%
Employment status	Farmer	76	35.7%
	Private organization employee	21	9.9%
	Government employee	25	11.7%
	Own business	42	19.7%
	No job	49	23.0%
Education	No formal education	28	13.1%
	Primary education	101	47.4%
	Secondary education	69	32.4%

	Diploma	12	5.6%
	Bachelor Degree	3	1.4%
Family Size	Below 3	22	10.3%
	4-7	169	79.4%
	Above 7	14	6.5%

Source: Sample Survey, 2023

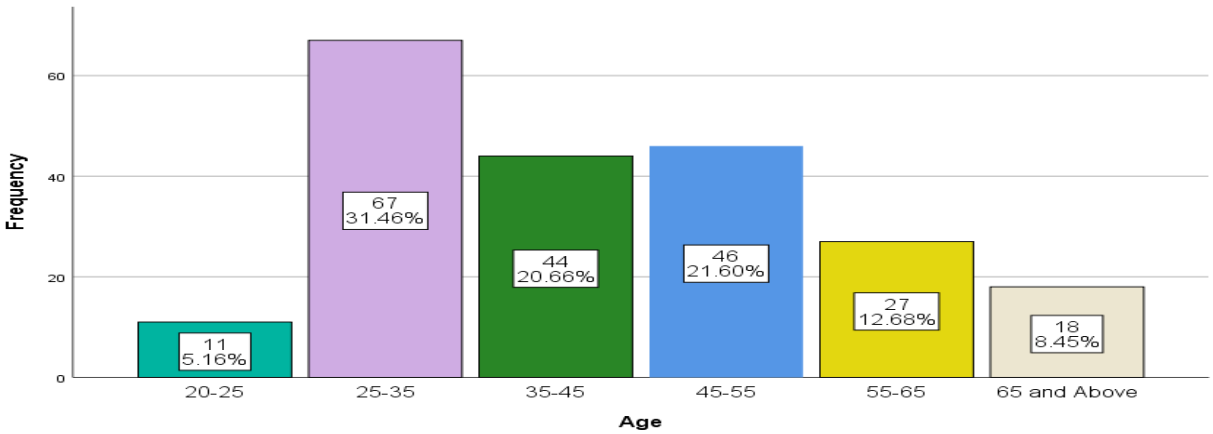
Table 8 shows the demographic information of the respondents, including gender, marital status, religion, employment status, age, education, and family size. Among the respondents, 77% were male, while 23% were female. The majority of respondents, accounting for 84.5%, were married, 14.1% were single, and the remaining 1.4% was divorced.

In terms of employment status, 76 (35.7%) were farmers, 49 (23%) were unemployed, 42 (19.7%) had their own business, 25 (11.7%) were government employees, and the remaining 21 (9.9%) were private organization employees. This suggested that the majority of respondents were farmers, and their livelihoods mainly relied on their land plots.

Concerning education, 101 (47.1%) of the respondents completed primary education, 69 (32.4%) completed secondary education, 12 (5.6%) held a diploma, 3 (1.4%) held a bachelor's degree, and the remaining 28 (13.1%) had no formal education.

Regarding family size, 169 (79.4%) had a family size of 4-7, 22 (10.3%) had a family size below 3, and the remaining 14 (6.5%) had a family size above 7.

Figure 9: Age of the respondents



Source: Sample Survey, 2023

In terms of age, 67 (31%) of the respondents were between 25 and 35 years old, 44 (20.66%) were between 35-45 years old, 46 (21.6%) were between 45-55 years old, 27 (13%) were between 55 to 65 years old, and 18 (8%) were above 65 years old, while the remaining 11 (5%) were between 20 to 25 years old.

5.4.2. Description about Paid Compensation

Table 9: Compensation for Involuntary Displacement

	Frequency		Percentage (%)
Got replacement land	Yes	99	64.3%
	No	55	35.7%
Get compensation due to involuntary resettlement	Yes	154	100.0%
	No	0	0.0%
Level of satisfaction with compensation	Satisfied	27	17.6%
	unsatisfied	126	82.4%
Compensation form	In cash only	23	14.9%
	In Kind only	0	0.0%
	Both	131	85.1%

Source: Sample Survey, 2023

Table 9 presented the compensation received by the respondents who were involuntarily displaced from their land. The table showed that 64.3% of the respondents received replacement land, while 35.7% of them did not. However, all of the respondents received financial compensation due to involuntary resettlement. Another study by Sintayehu (2016) found that 4.4% of the respondents received housing plots as compensation for their private houses, while 46.7% received condominium houses, and 44.4% received government or Kebele houses.

The table also indicated that about 82.4% of the respondents were unsatisfied with the compensation they received, while only 17.6% were satisfied. This is consistent with findings by Sintayehu's (2016), which showed that about 91.1% of the respondents were unhappy with the compensation they received. In terms of compensation form, the majority of the respondents (85.1%) received compensation in both cash and kind, while only 14.9% received compensation were in cash only.

The finding of the present study indicated that the compensation provided to the respondents was not satisfactory. As a result, the low level of satisfaction with compensation they

received could have an impact on the well-being of the displaced households and their ability to adapt to their new environment.

Table 10: Perceptions of Displaced Individuals Regarding Compensation

	S. Disagree[1]		Disagree		Neutral		Agree		S. Agree[2]			
Statement	F[3]	%	F	%	F	%	F	%	F	%	Mean	SD[4]
The compensation paid was equivalent to the value of the expropriated properties.	117	76.0%	32	20.8%	0	0.0%	5	3.2%	0	0.0%	1.31	0.64
Compensations made in kind for the removed properties were the same and equivalent to the value of the properties.	117	76.0%	32	20.8%	0	0.0%	5	3.2%	0	0.0%	1.31	0.64
The paid compensation for relocation was satisfactory.	124	80.5%	1	0.6%	3	1.9%	22	14.3%	4	2.6%	1.58	1.21
The payment made for compensation is insufficient to sustain livelihood.	109	70.8%	31	20.1%	0	0.0%	14	9.1%	0	0.0%	1.47	0.89
I complained about the compensation made for the land expropriation.	83	53.9%	28	18.2%	0	0.0%	0	0.0%	43	27.9%	2.30	1.73
Cash management is not the challenge yet on the paid compensation.	23	14.9%	24	15.6%	0	0.0%	48	31.2%	59	38.3%	3.62	1.49

[1] Strongly disagree
[2] Strongly agree
[3] Frequency
[4] Standard Deviation

Compensation paid in cash to change into permanent assets could	14	9.1%	15	9.7%	5	3.2%	48	31.2%	72	46.8%	3.97	1.31

Source: Sample Survey, 2023

A study by Zaidatol & Bagheri (2009) indicated that the mean score for the compensation paid for displaced households being equivalent to the value of the expropriated properties was 1.31, SD = 0.64. This indicated that the displaced households strongly disagreed that the compensation paid was sufficient. Furthermore, the displaced households disagreed with the statement that payment in kind for the removed properties was equivalent to the value of the properties and the paid compensation for relocation was satisfactory. The mean score for the payment being sufficient to sustain livelihood was 1.47, SD=0.89, indicating that the displaced households strongly disagreed that the payment was enough to sustain their livelihood. This suggested that the compensation was inadequate. In this regard, a study by Sintayehu's (2016) confirmed that 62.2% of the involuntarily resettled households reported dissatisfaction with the compensation they have received and complained to the concerned government body.

The mean score for cash management by the displaced households were 3.62, SD=1.49. This indicated that cash management is not a challenge for the displaced households despite inadequate compensation they have received. Moreover, the mean score for cash-to-permanent asset conversion was 3.97, SD=1.31. This showed that the cash compensation received could be easily converted into a permanent investment, which could otherwise help them in the long-term.

The findings of the study also highlighted issues with the compensation provided to the displaced households. The majority of the respondents strongly disagreed that the compensation paid was equivalent to the value of the expropriated properties and that compensations made in kind for the damaged properties were the same and equivalent to the value of the properties. In addition, the respondents strongly disagreed that the payment made for compensation was enough to sustain their livelihood. These findings raised concerns about the fairness and effectiveness of implementing the compensation policies and procedures in place for displaced households.

Therefore, the findings of the study emphasized the need for policymakers and authorities to ensure that compensation policies and procedures are transparent, fair, and effective in meeting the needs of the affected households. Addressing the issues raised by the study is crucial to ensure that the displaced households receive fair and adequate compensation for the properties they have lost.

5.4.3. Involuntary Displaced Resettlement Status

Table 11: Involuntary Displaced Households' Resettlement Perception

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree			
Statement	F[5]	%	F	%	F	%	F	%	F	%	Mean	SD[6]
The consumption of environmental resources like fuel woods increased	25	16.2%	10	6.5%	0	0.0%	71	46.1%	48	31.2%	3.69	1.40
Given resettlement due to the railway project, the social ties among the community disintegrated	18	11.7%	9	5.8%	35	22.7%	59	38.3%	33	21.4%	3.52	1.23
In this railway section, the current resettlement area is different from the previous one.	31	20.1%	19	12.3%	27	17.5%	31	20.1%	46	29.9%	3.27	1.50
Household income has substantially decreased after the resettlement.	18	11.7%	5	3.2%	0	0.0%	50	32.5%	81	52.6%	4.11	1.31
Household employment opportunities get worse off after displacement.	21	13.6%	27	17.5%	5	3.2%	34	22.1%	67	43.5%	3.64	1.51
Members of the household have an advantage in education after the resettlement.	28	18.2%	65	42.2%	38	24.7%	18	11.7%	5	3.2%	2.40	1.02

[5] Frequency
[6] Standard deviation

The disintegration of household economic ties exacerbates life after relocation.	12	7.8%	20	13.0%	0	0.0%	45	29.2%	77	50.0%	4.01	1.32

Source: Sample survey, 2023

Table 11 presents the results of a Likert scale analysis by Zaidaton and Bagheri (2009) assessing displaced households' perceptions of their resettlement experience. Key findings indicate an increased reliance on environmental resources, such as fuel-wood (M = 3.69, SD = 1.40), alongside a substantial decline in household income post-resettlement (M = 4.11, SD = 1.31). The study also highlights the disintegration of economic ties, exacerbating post-relocation challenges (M = 4.01, SD = 1.32), as well as weakened social cohesion due to displacement (M = 3.52, SD = 1.23). Additionally, respondents reported reduced employment opportunities (M = 3.64, SD = 1.51) and no perceived educational advantages (M = 2.40, SD = 1.02), while expressing neutral perceptions regarding differences between old and new resettlement areas (M = 3.27, SD = 1.50). Qualitative discussions revealed profound psychological distress among displaced households, driven by severed social connections and uncertain livelihood prospects. These findings are supported by Sintayehu (2016), who reported that 75.6% of respondents experienced income declines post-displacement, while only 4.4% saw improvements. Furthermore, 73.3% struggled to secure income-generating opportunities in their new communities, primarily due to limited job availability and high housing costs that hindered business operations.

Broader implications of displacement were explored by Ambaye and Abeliene (2015), who highlighted systemic challenges such as inadequate transportation and loss of site-specific livelihood assets. Similarly, Nguyen et al. (2006) found that while 87% of households displaced by the Son La hydropower project remained employed, only 66% sustained their pre-resettlement livelihoods, and 13% lost all income sources. Economic analyses by Bui and Schreinemachers (2011) revealed a sharp 66% drop in net household earnings (from $2,133.3 to $725.4 USD) post-resettlement. Although compensation payments partially mitigated losses (16% increase to $2,484.3 USD), cash incomes still plummeted to one-third of pre-displacement levels due to reduced productivity and market access.

Environmental and policy considerations also emerged from the research, as some households resorted to environmentally harmful practices, such as charcoal production, to compensate for income losses - further depleting natural resources like fuel-wood. These

findings underscore the urgent need for comprehensive compensation frameworks that address income, social ties, and employment, as well as sustainable livelihood programs to reduce environmental degradation. Additionally, policy reforms are critical to ensuring equitable resettlement outcomes and mitigating the long-term socioeconomic and ecological impacts of displacement.

5.4.4. Impacts of Involuntary Displacement on Income and Expenditure

In order to assess the impacts of railway development-induced involuntary displacement using econometric modelling, PSM was used to evaluate the quality of matching between the displaced and non-displaced groups (Pan & Bai, 2016). The observations were matched based on their propensity scores within each group, and logistic regression was utilized to estimate the propensity score and account for any potential treatment effects on the vector covariate.

Hypothesis Test

a) Wilcoxon Rank-Sum Test for Household Income

Table 12: Two-Sample Wilcoxon Rank-Sum (Mann-Whitney) Test

Displaced	Observation	Rank sum	Expected
0	59	8687.500	6313
1	154	14103.500	16478
Combined	213	22791	22791
Unadjusted variance	162033.67		
Adjustment for ties	-46.58		
Adjusted variance	161987.09		
Ho: income(displaced==0) = income(displaced==1)			
z =	5.900		
Prob >	z	=	0.0000

Source: Own Estimates (2023)

By conducting the Two-sample Wilcoxon rank-sum (Mann-Whitney) test, the study discovered a p-value of 0.000, which is meaningfully lower than the predetermined significance level of 0.05 (95% confidence interval). It provides convincing proof to reject the null hypothesis, which assumes that there is no difference in median incomes between the displaced and non-displaced groups. Therefore, it can be inferred that there is a substantial

contrast between the income medians of the two groups. (Please see Appendix III (H) for the STATA output.)

b) Wilcoxon Rank-Sum Test for Household Expenditure

Table 13: Two-Sample Wilcoxon Rank-Sum (Mann-Whitney) Test

Displaced	Observation	Rank sum	Expected
0	59	8038	6313
1	154	14753	16478
Combined	213	22791	22791
Unadjusted variance		162033.67	
Adjustment for ties		-41.45	
Adjusted variance	161992.22		
Ho: expenditure(displaced==0) = expenditure(displaced==1)			
z = 4.286			
Prob > z = 0.0000			

Source: Own Estimates (2023)

The study found that the p-value of the test using Two-sample Wilcoxon rank-sum is 0.000, which is significantly smaller than the pre-determined significance level of 0.05. This provides strong evidence for rejecting the null hypothesis, which states that there is no difference in the median expenditures between the displaced and non-displaced groups. Thus, it can be concluded that there is a significant difference between the medians of the two groups' expenditures. (Please see Appendix III (I) for the STATA output.)

Estimating Treatment Effect

The statistical analysis of Treatment-effect Estimation aims to establish the causal impact of involuntary displacement on the income and expenditure of affected households using PSM. This analysis involves comparing the income and expenditure levels of displaced and non-displaced households while controlling for other factors that may affect these outcomes, such as age, education, and employment status.

Table 14: Treatment Effect Estimation for Displaced and Non-Displaced Income

Income	Coef.	Std.Err.	t-value	p-value	[95% Conf	Interval]	Sig
r1vs0	-141407.14	41030.245	-3.45	.001	-221824.95	-60989.341	***
Mean dependent var	101079.822		SD dependent var		143248.479		

Source: Own Estimates (2023); Note: p-values *** p<.01, ** p<.05, * p<.1

Table 14 presents the estimated treatment effect between households that were displaced and those that were not. A logistic model was employed to predict each subject's propensity score, taking into account variables such as employment status, gender, age, education, and family size.

After matching the displaced and non-displaced groups, the study found that involuntary displacement had a significantly negative impact on income, resulting in a reduction of approximately 141,407.14 ETB (with a P-value of 0.001) for the involuntarily displaced respondents compared to the non-displaced respondents. The compensation provided to the displaced individuals was insufficient to enable them to sustain their livelihoods, indicating the long-term negative economic consequences of involuntary displacement.

The table provides important information on the estimated treatment effect of displacement on income. The findings indicate that displacement had a significant negative effect on the income of the affected households. The coefficient of -141407.14 suggests that the displacement led to a decrease in income for the affected households. The negative coefficient is statistically significant with a t-value of -3.45 and a highly significant p-value of 0.001.

Furthermore, the narrow confidence interval of -221824.95 to -60989.341 suggests that the true value of the coefficient is likely to fall within this range with a certain level of confidence. The reliable standard error of 41030.245 indicates that the coefficient is a dependable estimate of the treatment effect. The significance level of the coefficient emphasizes the highly significant negative effect of displacement on the income of the affected households.

The mean dependent variable of 101079.822 indicates the average income for the affected households, while the standard deviation of the dependent variable is 143248.479, suggesting that the income of the affected households varies widely. The negative coefficient indicates that the displacement had a negative effect on the income of the affected households,

highlighting the need to ensure that compensation policies and procedures are designed to mitigate the negative effects of displacement on the income of the affected households.

Therefore, the findings underscore the importance of considering the potential negative effects of displacement on the income of the affected households when designing and implementing displacement and resettlement programs. It is crucial to ensure that compensation policies and procedures take into account the diverse needs and circumstances of the affected households and aim to mitigate the negative effects of displacement on their livelihoods through fair and adequate compensation policies and support programs. (Please see Appendix III (J) for the STATA output.)

Table 15: Treatment Effect Estimation for Displaced and Non-Displaced Expenditure

Expenditure	Coef.	Std.Err.	t-value	p-value	[95% Conf	Interval]	Sig
r1vs0	-134032.17	46138.572	-2.90	.004	-224462.11	-43602.237	***
Mean dependent var	113028.535		SD dependent var		151954.974		

Source: Sample survey, 2023; Note *** p<.01, ** p<.05, * p<.1

The findings of table 15 indicate significant differences in the expenditure of displaced and non-displaced households after involuntary displacement. The study found that involuntarily displaced households had an average expenditure that was significantly lower by 134,032.17 ETB (P-value 0.004) compared to non-displaced households. This suggests that displacement results in a decrease in income, which affects the capacity of households to afford basic necessities. Several factors may contribute to this decline in expenditure, such as a lack of employment opportunities, loss of assets, and the inability to access social networks and support systems.

These results underscore the long-term economic consequences of involuntary displacement, which can lead to a cycle of poverty and financial instability, significantly impacting the livelihoods of affected households.

The negative coefficient of -134032.17 in Table 15 indicates that the negative impact of displacement on expenditure is a real effect that can be attributed to the displacement. The narrow confidence interval of -224462.11 to -43602.237 and the significant p-value of 0.004 suggest the estimate is precise and reliable.

The mean dependent variable of 113028.535 indicates the average expenditure of the households, while the high standard deviation of 151954.974 suggests that the expenditure of the households varies widely. This implies that displacement may affect households differently, depending on their initial financial situation and the level of compensation they receive.

The findings of Table 15 highlight the importance of designing and implementing fair and adequate compensation policies and support programs for the affected households. The negative impact of displacement on expenditure emphasizes the need to ensure that compensation policies take into account the diverse needs and circumstances of the affected households, particularly those with limited financial resources. By doing so, compensation policies and support programs can mitigate the negative effects of displacement on the financial well-being of the affected households, potentially leading to better long-term outcomes for them. (Please see Appendix III (K) for the STATA output.)

Household Livelihood Elements

Table 16: Involuntary Displacement Livelihoods

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree			
Statement	F	%	F	%	F	%	F	%	F	%	Mean	SD
Given the railway section, compensation, like life skill training, is enough for livelihood restoration activities.	68	44.2%	42	27.3%	8	5.2%	31	20.1%	5	3.2%	2.11	1.26
Given the paid compensation, the household's livelihood after resettlement has never been affected negatively.	56	36.4%	36	23.4%	5	3.2%	41	26.6%	16	10.4%	2.51	1.47
The daily consumption of environmental resources, like a forest for firewood, increased after the resettlement.	35	22.7%	24	15.6%	20	13.0%	41	26.6%	34	22.1%	3.10	1.49

Livelihood change due to resettlement has a disadvantage over the environment.	17	11.0%	19	12.3%	30	19.5%	37	24.0%	51	33.1%	3.56	1.35

Source: Sample survey, 2023

Table 16 presents the responses of respondents who were involuntarily displaced regarding their livelihoods after expropriation. The study found that the compensation provided to affected households, including life skill training, was inadequate for livelihood restoration activities. The mean response for the household's livelihood after resettlement was 2.51, with a standard deviation of 1.47, indicating that respondents disagreed that their livelihoods had not been affected after resettlement. Therefore, involuntary resettlement significantly and negatively impacts livelihoods.

The study also found that the daily consumption of environmental resources, such as forests for firewood, increased after resettlement. The displaced people, having lost their businesses through expropriation, resorted to selling firewood and charcoal to cover living expenses and survive, resulting in a negative impact on the environment.

Regarding the four statements in table 16, the findings suggest that involuntary displacement has a negative impact on the livelihoods of affected households. There was a relatively low level of agreement among respondents that compensation and life skill training alone were enough for livelihood restoration activities. Respondents were generally dissatisfied with the compensation and livelihood restoration programs provided to them, indicating the need for more comprehensive and sustainable programs that address the specific needs and circumstances of the affected households.

The second statement underscores the importance of adequate and effective compensation in compensating for the loss of livelihoods due to displacement, as even after receiving compensation; the livelihoods of the affected households were still negatively impacted.

The third and fourth statements highlight the environmental impacts of involuntary displacement, emphasizing the need for considerable attention to be given to the environmental impacts of displacement and take appropriate measures.

The findings of the study therefore indicate that involuntary displacement has a negative impact on the livelihoods of affected households and the environment. Infrastructure

development projects need to consider the perspectives and needs of the affected households when designing and implementing compensation and resettlement programs. This includes developing more comprehensive and sustainable programs that address the specific needs and circumstances of the affected households while also mitigating the environmental impacts of displacement.

Table 17: Elements of Livelihood after Resettlement

Livelihood Elements	Displaced			Non-displaced		
	Decreased	Increased	Remained Constant	Decreased	Increased	Remained Constant
Financial	122(79.2%)	0(0%)	32(20.8%)	18(31%)	6(10.3%)	34(58.6%)
Physical	57(37%)	60(39%)	37(24%)	24(41.4%)	8(13.8%)	26(44.8%)
Social	109(70.8%)	27(17.5%)	18(11.7%)	14(24.1%)	6(10.3%)	38(65.5%)
Human	90(58.4%)	23(14.9%)	41(26.6%)	6(10.3%)	6(10.3%)	46(79.3%)
Natural	89(57.8%)	42(27.3%)	23(14.9%)	20(34.5%)	6(10.3%)	32(55.2%)

Source: Sample survey, 2023

Table 17 provides a comprehensive overview of the impact of displacement on five livelihood elements after resettlement for both displaced and non-displaced households. The study found that for displaced households, their financial capacity had decreased for 122 (79.2%) respondents, while 32 (20.8%) reported that it remained constant; indicating that the compensation provided did not improve their financial situation. A study by Ambaye & Abeliene (2015) similarly found that the financial aspects of displaced households worsened due to extra housing expenses during the transitional period.

Regarding physical capital, 57 (37%) displaced respondents reported a decrease, 60 (39%) reported an increase, and 37 (24%) said it remained constant. In terms of social capital, 109 (70.8%) reported a decrease, 27 (17.5%) said it increased, and 18 (11.7%) reported that it remained constant. The disruption of social relationships due to resettlement often led to the need for the establishment of new social interactions in the new resettlement environment. Piggott-McKellar et al. (2020) found that resettling two or more communities in a new site or integrating new communities into existing ones almost always resulted in poor social effects, including conflicts beyond territorial disputes, power imbalances, and ethnic tensions. Nkansah-Dwamena (2021) found that displaced households experienced a significant deterioration in their social networks and trust within the village.

Concerning human capital, 90 (58.4%) displaced respondents reported a decrease, 23 (14.9%) reported an increase, and 41 (26.6%) said it remained constant. The effects related to loss of employment or job instability were frequent, and the transition from a subsistence lifestyle to urban areas with few job opportunities was mostly to blame. The senior population struggled to find secure and sufficient employment, and in a case study from China, unemployment rates varied among different age groups.

Regarding natural resources for displaced households, 89 (57.8%) reported a decrease, 42 (27.3%) reported an increase, and 23 (14.9%) said it remained the same. Losses to natural resources and accessibility to rivers, woods, natural foods, and animals had adverse effects.

The study indicated that displacement can have significant negative impacts on the livelihood elements of affected households. For displaced households, the majority (79.2%) reported a decrease in their financial capacity, indicating that the compensation provided did not improve their financial situation. Similarly, the majority (70.8%) experienced a decrease in social capital, which can be attributed to the disruption of social relationships due to resettlement. Displaced households also reported negative impacts on their human and natural capital, with the loss of employment opportunities and access to natural resources having adverse effects on their livelihoods.

For non-displaced households, the study found that their financial capacity remained constant for 34 (58.6%) respondents, decreased for 18 (31%), and increased for 6 (10.3%). Regarding physical capital, 24 (41.4%) reported a decrease, 26 (44.8%) said it remained constant, and 8 (13.8%) reported an increase. In terms of social capital, 38 (65.5%) said it remained constant, 14 (24.1%) reported a decrease, and 6 (10.3%) reported an increase. Finally, for natural resources, 32 (55.2%) said it remained the same, 20 (34.5%) reported a decrease, and 6 (10.3%) reported an increase.

Based on this data, non-displaced households experienced mixed effects on their livelihood elements. While the majority of respondents (58.6%) reported that their financial capacity remained constant, a significant portion (31%) experienced a decrease. In terms of physical capital, a higher percentage (41.4%) reported a decrease, while 44.8% said it remained constant and only 13.8% reported an increase. For social capital, a majority (65.5%) reported that it remained constant, but a significant number (24.1%) experienced a decrease. Finally, for natural resources, slightly more than half (55.2%) reported that it remained the same,

while 34.5% experienced a decrease and only 10.3% reported an increase. Overall, these findings suggest that while non-displaced households may not experience the severe negative impacts of displacement, they are not immune to the challenges that can arise from social and environmental changes.

5.5.Discussions

The research findings provide valuable insights into the economic impacts of involuntary displacement on railway project affected households. The study employed a logistic model to predict propensity scores, allowing for a comparison between displaced and non-displaced households all along the project area, railway section from Kemissie to Hayk. The results indicate that involuntary displacement had a significantly negative effect on income, with a reduction of approximately 141,407.14 ETB for the displaced respondents compared to the non-displaced respondents.

These findings highlighted the insufficiency of the compensation provided to the displaced individuals in sustaining their livelihoods from the financial perspectives. These types of negative economic consequences of displacement can have long-term effects on the income of affected households, which is intertwined with other livelihood elements. The significant negative effect on income emphasizes the need for comprehensive compensation policies and support programs that address the diverse needs and circumstances of the affected households.

Furthermore, the research findings underscore the importance of addressing the diverse circumstances of the affected households in compensation policies and support programs. The wide variation in the income of the affected households, as indicated by the standard deviation, suggests that a one-size-fits-all approach cannot be effective and its note a best mitigation response for the negative effects of displacement throughout individuals' lives. It is imperative to ensure that the compensation process and other supportive activities for displaced people consider the specific needs and circumstances of affected households, particularly those with limited financial resources.

The research findings also shed light on the impact of involuntary displacement on household expenditure. The study reveals that households that experienced involuntary displacement had significantly lower average expenditures compared to non-displaced households, with a difference of 134,032.17 ETB. This decrease in expenditure highlights the challenges faced

by displaced households in affording basic necessities and maintaining their standard of living.

The negative coefficient of -134,032.17 indicates that the decline in expenditure can be attributed to displacement. This finding further emphasizes the need for comprehensive compensation and other supportive programs that address the financial challenges faced by displaced households.

The study revealed that the compensation provided to these households, along with life skill training, was inadequate for restoring their livelihoods by highlighting the need for more comprehensive and sustainable programs that address the specific needs and circumstances of the affected households.

The research findings also indicated that involuntary displacement has had unintended environmental consequences. The increased consumption of environmental resources, such as forests for firewood, by displaced households underscores the need for careful consideration of the environmental impacts of displacement. Apart from the financial aspects of displacement, the natural aspects call for appropriate measures to mitigate these impacts and promote sustainable development.

So, the research findings provide valuable insights into the economic impacts of involuntary displacement on railway project-affected households. They highlight the insufficiency of current compensation policies and support programs in sustaining livelihoods and mitigating the financial challenges faced by displaced households. The findings also underscore the need for comprehensive and sustainable programs that address the specific needs and circumstances of affected households while also considering the paramount role of environmental impacts in displacement.

The research findings reminded us of the importance of putting the affected households at the center when developing compensation and resettlement programs, by considering infrastructure projects needs to prioritize the well-being of these households and provide them with the necessary support throughout the process.

Moreover, the findings highlighted the significant differences in spending between households that have been displaced and those that haven't displaced. This decline in

expenditure reinforces the need for comprehensive compensation policies and support programs that can address the financial difficulties faced by displaced households. By offering fair and sufficient compensation, policymakers can help alleviate the economic burdens and improve the overall quality of life for those affected.

The research also emphasized the need to carefully consider the economic consequences of involuntary displacement. By implementing comprehensive compensation framework besides supportive programs, it cater to the diverse needs and circumstances of affected households, and it can be managed the negative effects of displacement and ensured the long-term sustainability of their livelihoods.

Therefore, the study indicated the negative impacts of involuntary displacement on the financial aspects of livelihoods for railway affected households, particularly in terms of income and expenditure. Thus, promoting sustainable livelihoods action calls for developing comprehensive programs that consider the specific needs and circumstances of the development affected households.

5.6.Conclusion

The survey results revealed that the compensation provided to affected individuals was neither fair nor proportionate to the value of their expropriated land and lost developments. Inadequate compensation, coupled with a lack of sufficient life skills training, severely hindered their ability to sustain livelihoods. As a result, involuntary displacement led to a decline in livelihood assets, with long-term negative economic consequences for displaced households. The study emphasized the urgent need for fair and adequate compensation policies, as well as support programs, to mitigate these adverse effects. However, existing compensation measures failed to match the value of expropriated properties or provide sufficient means for livelihood restoration.

The findings indicated that involuntary displacement significantly reduced income, with displaced households earning an average of 141,407.14 ETB less than non-displaced households. Additionally, their average expenditure decreased by 134,032.17 ETB, reflecting a broader decline in financial stability. This income loss triggered a cycle of poverty, further destabilizing affected households. Moreover, the compensation and life skills training provided were insufficient to restore livelihoods, worsening the economic impact of displacement.

Environmental degradation also emerged as a critical concern, with displaced households increasingly relying on natural resources such as forests for firewood. This heightened consumption highlighted the ecological consequences of resettlement, underscoring the need for sustainable compensation and rehabilitation programs that address both socioeconomic and environmental challenges.

Both displaced and non-displaced households reported declines in financial and social capital, reduced employment opportunities, and diminished access to natural resources. These findings stress the necessity of inclusive, well-structured compensation and resettlement programs tailored to the specific needs of affected communities.

In conclusion, the study demonstrates that involuntary displacement severely undermines household well-being through income loss, financial instability, reduced access to natural resources, and disrupted social and economic networks. To address these challenges, compensation and resettlement policies must be transparent, equitable, and developed with active community participation. A holistic approach is essential - one that not only mitigates the immediate economic and social impacts of displacement but also promotes sustainable livelihood strategies and minimizes environmental harm. Effective policy implementation is crucial to ensuring long-term recovery and stability for affected households.

CHAPTER SIX

6. Analysis of satisfaction of household towards compensation payments: The case of displaced households in the South Wello Zone of Amhara Region, Ethiopia

Abstract

Development projects often create hurdles for local populations who have to shoulder the expenses, even if they receive compensation for families that are moved out. This study aimed at examining level of satisfaction on the compensation by households displaced by railway development in the study area. In this study, the research utilized contingent valuation methods alongside ordered logistic regression and probit analyses, paired with treatment-effects evaluations, to assess how well the compensation met expectations and to examine how different demographic factors influenced household satisfaction with sustainable living practices. Researchers gathered information from 154 out of 170 randomly selected households that were displaced, along with insights from key informants and discussions in focus groups. The study revealed that factors like marital status, religious beliefs, age, and educational background significantly affect how satisfied households feel about their compensation. This suggests that taking these elements into account in compensation schemes can lead to notable improvements. You can really notice a difference in what households think they should be compensated versus what they end up getting; they expect over three times more than what's provided. This really highlights how crucial it is to add in non-financial factors when designing compensation packages. This research highlights the need for customized compensation strategies that not only tackle financial issues but also protect the livelihoods of those impacted and reduce disruptions in their communities. This highlight creating compensation strategy is both effective and tailored to the specific context for achieving fair outcomes for the involuntarily displaced communities for railway.

Keywords: *Railway development, involuntary displacement, Compensation, Contingent valuation, willingness to accept*

6.1. Introduction

To think about how development projects affect communities, essential element is how compensation made satisfactory, particularly the money given for land taken away. All necessary resources that people rely on for their livelihoods incorporated their value in this compensation amount. Conserving ecosystem service, require recognizing the value through monetary assessment and tailored policy tools significantly boost the availability of these vital resources (Mutandwa et al., 2019).

Additionally, obstacles stemming from the non-market characteristics of the ecosystem services plus to the financial limitation hinder the achievement of favourable results (Kline et al., 2013). On the other hand, landowners don't receive compensation for sustainable land management practices and taking a toll on their willingness to protect these vital resources, they are essential for their survival (Calow, 2017). Investment has been discouraged by inconsistent management costs and a lack of proper information - ultimately weakens the

delivery of vital community services (Wright et al., 2017; Galik & Grala, 2017). Recognizing the importance of ecosystem services is essential since it guides conservation strategies and helps establish what should be prioritized (Mutandwa et al., 2019). By applying monetary values along with the right policy tools, we can boost the availability of these vital resources (Makkonen et al., 2015), making sure they remain sustainable for generations to come.

Traditionally, development initiatives have sought to foster advancement and enhance living standards. Still, it's important to note that these projects can lead to unexpected issues, like forcing people to leave their homes, which creates a real problem that shouldn't be ignored (Cernea & Maldonado, 2018). When communities face displacement, it often stirs up resistance and raises tensions, causing conflicts to linger (Nyaoro, 2018; Vanclay, 2017). Additionally, the shortage of job prospects and interruptions to people's livelihoods make the negative impacts of development-related resettlement even worse (Oppio et al., 2015).

In rural areas where people rely heavily on their land for their everyday needs, being forced to move due to development can really disrupt their lives, making it a crucial issue worldwide (De, 2020; Cernea & Maldonado, 2018). To truly move forward, we need to ensure full recovery through compensation, which evaluates how development projects affect ecosystems by considering the worth of services like water and recreational spaces (Sangha et al., 2022). Still, there are significant hurdles due to the fact that these ecosystem services often don't have market prices, along with financial limitations, and the absence of payment that fully reflects the economic and other values of the resources involved. These issues really impact how landowners feel about putting money into this area and also affect their way of living (Calow, 2017).

In Ethiopia, having access to land is super important for food security and people’s livelihoods, but getting that access can be tough (Leta et al., 2021). In Ethiopia, the expansion of railway networks not only leads to taking land but also displaces many people, which has serious effects on rural populations (Dires et al., 2021; De, 2020; Nyaoro, 2018; Hagen & Minter, 2020). At the heart of all this lies the need to grasp what drives people to accept compensation and how it ultimately shapes their livelihoods, which is vital for fostering sustainable development. As a result, displaced communities faced serious hurdles that really affect their ways of making a living and finding jobs. When working out compensation, it's essential to capture the value of ecosystem services and decide on the right amount to compensate those affected. This research aimed to provide insights for future development

interventions regarding the household's willingness to accept compensation for development-induced displacement in Ethiopia.

6.2. Compensation and Sustainable Livelihood Restoration

Infrastructure development is a crucial component of development aimed at supporting economic and social progress (McDermot et al., 2022; Coccia, 2019), despit its expansion that leads to an involuntary displacement worldwide (Bouraima et al., 2023; Randell, 2016). Ethiopia has undertaken many infrastructure projects including railways, but an estimated 15 million people are being displaced annually due to development (Bouraima et al., 2023). Although the Ethiopian constitution and compensation proclamation outlined to protect the displaced communities, issues remain unsolved regards to equitable treatment, livelihood restoration, and compensation satisfaction (Constitution, 1995; Proclamation No. 1161, 2019). Studies examining resettlement in China, Vietnam, and Ethiopia emphasized the resulting challenges - decreased livelihood resilience, impoverishment, and deforestation while planning and policies are deficient in addressing the multidimensional needs of those displaced (Ty et al., 2023; Yadeta et al., 2022; Liu et al., 2020). To leverage infrastructure's benefits while minimizing harms, fair compensation, sustainable resettlement support, participatory decision-making, and consideration of environmental and sociocultural impacts are needed (Rowan, 2017). A comprehensive, intersectional policy approach is imperative to ensure equitable and sustainable futures for communities impacted by development-induced displacement.

Compulsory land acquisition through expropriation is commonly used in Ethiopia to enable urban development and infrastructure projects, but it often generates substantial discontent and opposition among affected communities due to its detrimental socioeconomic impacts (De, 2020; Nyaoro, 2018; Tong et al., 2019). Forced displacement disrupts livelihoods, particularly for vulnerable farmers who depend on subsistence agriculture, reducing productivity and marginalizing populations (George & Adelaja, 2021). While the Ethiopian constitution protects the right to compensation and Civil Code proclamation aims to restore value lost through expropriation, inadequate compensation exacerbates hardships and fails to uphold property rights or promote a just approach to development (Ambaye & Abeliene, 2015).

Key challenges include land scarcity limiting cash or replacement land options, unclear valuation criteria, budget constraints hindering fair pay-outs, and lack of consideration for non-market resources like cultural sites (Dires et al., 2021; Abdo, 2016; Vanclay, 2017). Proclamation 1161/2019 and other efforts have been inadequate due to unjustified selection of compensation variables that disadvantage landholders (Singto et al., 2022). Accurately assessing total economic value and determining minimum willing acceptance values through contingent valuation are further hindered by diverse property types and estimating non-market resources (Abdelrhman et al., 2022; Ginsburgh, 2017; Hasan-Basri et al., 2015). As a result, expropriation often leaves affected individuals and communities shouldering losses beyond what is compensated (Abdo, 2016). More equitable and participatory approaches are needed to balance development aims with protecting livelihoods and property rights.

Land plays a vital role in Ethiopia, where agriculture significantly contributes to the economy and livelihoods (CSA, 2018). However, addressing infrastructure challenges compared to other African nations (Foster & Clark, 2018) requires considerate land access through expropriation to avoid displacement (Sabir et al., 2017). The development plan prioritizes infrastructure to promote transformation, utilizing land efficiently through institutions (Mahmood et al., 2020). While projects offer opportunities, expropriation risks include displacement, livelihood and environmental impacts without governance (Khanani et al., 2021). Disruption to communities and households through insufficient compensation necessitates prioritizing sustainability and population well-being, with stakeholder involvement, assessments, and impact mitigation (Kidido et al., 2015). Effective policies and institutions address complex land issues and promote inclusive growth, though women's representation in land management is limited (Mahmood et al., 2020; Ronja, 2021).

Land rights have historically shaped societies, balanced through just policies and governance (World Bank, 2020). Concerns around expropriation's valuation, compensation, rights violations and livelihood impacts require addressing, especially as cash alone cannot replace development's land needs (Chowdhry, 2022; Ghimire, 2017). Participatory approaches ensure project success, equity and sustainability to avoid displacement and social disruption (Robinson et al., 2020).

In Ethiopia, limitations to community involvement, revenue prioritization and scarce job opportunities undermine local benefits, necessitating community-sustaining projects (Thacker et al., 2019; Chen, 2021). Expropriation detrimentally displaces and tensions arise through

livelihood disruption lacking alternatives (Mahmood et al., 2020; Oppio et al., 2015). Rural subsistence networks face disproportionate overlooked impacts (De, 2020).

Challenges require stakeholder participation, planning, monitoring and liaison, yet reallocation dissatisfies (Chen, 2021; Tong et al., 2019). Farmers lack new farmlands, raising tension, while expropriation serves public land needs if conducted equitably (Alemu, 2015). Fair compensation addresses tensions and positively impacts lives (Roth et al., 2017). With empowering involvement, resettlement respects culture and livelihoods (Atnafu & Balda, 2018).

6.2.1. Adequate Compensation for Development-Induced Displacement

Expropriation, the government's compulsory acquisition of land for development, has detrimental effects on communities and individuals (De, 2020). Displacement disrupts lives and generates opposition to projects, hindering adaptation (Nyaoro, 2018). In rural areas, where subsistence farming is common, evictions from development projects marginalize vulnerable populations. Sadly, the government often overlooks the socioeconomic impacts, neglecting affected communities (De, 2020).

Ethiopia heavily relies on compulsory land acquisition for urban development, leading to substantial discontent (Tong et al., 2019). Displaced farmers compete for alternative farmland, exacerbating tensions. Lack of available land hampers meeting public requirements and undermines property rights (Alemu, 2015). Forced displacement, as a result, reduces agricultural productivity, impacting land size and labor efficiency (George & Adelaja, 2021). This further challenges communities' sustainability and contribution to the local economy.

To mitigate these impacts, the Ethiopian constitution ensures the right to equitable compensation for affected individuals (Constitution, 1995). Equitable compensation promotes a just approach to development (Roth et al., 2017). Thus, compensation, protected by the Civil Code Proclamation (1960), restores value to those harmed. Expropriation involves surrendering land for public purposes (Ambaye & Abeliene, 2015). Although adequate compensation provision is challenging due to land scarcity, it makes cash or land-based compensation impractical (Dires et al., 2021). Unclear definitions for terms like "comparable" and "fertility" further complicate the issue (Abdo, 2016). Additionally, resettlement often lacks proper remuneration for lost landscapes and sacred sites (Vanclay, 2017).

These challenges result in protests and delays due to issues with compensation methods (Singto et al., 2022). Inadequate compensation and distress raise concerns (Dires et al., 2021). Proclamation No. 1161/2019 established a compensation to be based on income from the preceding three years but has shortcomings (Singto et al., 2022). The selection of criteria fails to justify and disadvantaged landholders (Mahmood et al., 2020). Additionally, local governments often lack necessary resource, leading to reduced income and social fragmentation (Abdelrhman et al., 2022; Dires et al., 2021).

6.2.2. Total Economic Value and Willingness to Accept

The Ethiopian government's authorized to seize private land for public interest without consent as a legal provision in 1995 Constitution (Constitution, 1995). This limitation arises from the collective ownership of land by imposing constraints on individual entitlements (Mahmood et al., 2020), provides adequate and fair compensation for efficient land expropriation (Li et al., 2019). It depends on the concept of Total Economic Value (TEV) assessing the economic losses associated with land acquisition (Abdelrhman et al., 2022). The concept of Willingness to Accept streamlines the process of determining the minimum compensation required accepting loss or foregoing a positive outcome; meanwhile, the MWTA model calculation offers a direct approach for assessing WTA (Ginsburgh, 2017; Hasan-Basri et al., 2015).

Estimating the economic value of diverse properties is a challenging aspect of compensation process (Abdelrhman et al., 2022). Inadequate compensation devastates the situation for individuals affected by property expropriation that put them with losses, exceed the received compensation (Abdo, 2016). Therefore, accurately appraising land - effective restoring the livelihoods of affected communities, pose difficulties within the compensation procedures (Li et al., 2019).

6.3. Methods

The study focused on the impacts of railway development linked with the compensation made, it involved the application of a contingent valuation analysis - utilizing a "double-bounded" dichotomous survey methodology to measure the willingness to accept among households affected by displacement resulting from railway infrastructure projects. Moreover, an ordered logit model used to delve into the intricate relationships between various factors and the compensation levels provided to these households following their

involuntary displacement due to railway development. In addition to evaluating levels of satisfaction with compensation, the research delved into the implications of households receiving replacement land on the natural environment through treatment-effects estimation techniques.

In the research methods were conceptually explored by Sendi, emphasized the Willingness to Accept (WTA) acts as a dependable metric indicating satisfaction levels concerning compensation (Sendi et al., 2020). Considering both monetary and non-monetary aspects in valuation arrange for a more comprehensive reflection of fair value - leads to higher satisfaction levels. Building upon this notion, Abdelrhman highlighted the efficacy of the contingent valuation method (CVM) in estimating the WTA for non-market goods and services (Abdelrhman et al., 2022). In the context of assessing the value of non-monetary attributes related to displacement during compensation, the process facilitates the Marginal Willingness to Accept (MWTA) approach (Tadesse et al., 2021).

6.3.1. Probit Model

The Probit model used to analyze factors such as education, sex, marital status, compensation, expenditure, and employment as independent variables and households' satisfaction with the compensation paid as the dependent variable. The model was formulated as follows:

$$P(Y = 1 \mid X) = \Phi (\beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k)$$

Examining the interaction between the dependent variable (satisfaction level) denoted by the formula $P(Y = 1 \mid X)$, and the independent variables X_1, X_2 ... and X_k was conducted to calculate MWTA. This analysis determined individuals' probability of satisfaction with compensation levels based on the values of these independent variables, with β_0, β_1, β_2. β_k represent the coefficients signifying the impact of each independent variable. The dependent variable reflects a discrete choice regards to the satisfaction levels; a value of 1 indicates satisfaction with the compensation amount received, while 0 indicates otherwise.

Therefore, in the context of involuntary displacement caused by a railway development project, the MWTA for both non-monetary and monetary variables can be determined thoroughly. The formula calculates the ratio between the non-monetary and monetary attributes (Li et al., 2019; Liu et al., 2022). In addition, several studies adopted a contingent

approach with variations to measure willingness at different levels by taking into account the household characteristics and size (Liu et al., 2022; Liu et al., 2019).

The MWTA formula, expressed as: MWTA = $-\beta_0/\beta c * C$

The formulation shows the estimation of the minimum compensation necessary in cases of compensation made for involuntary displacement. In this context, the variable C signifies the amount of compensation provided and β_c represents the coefficient corresponding to the expected compensation for displacement. Additionally, β_0 denotes the value assigned to the cost of loss or inconvenience.

6.3.2. Ordered logistic regression

With the outcome variable of compensation satisfaction having more than two categories, the relationship between households' natural elements of livelihood and their reliance on land resources can be analyzed using the ordered logistic regression model. This approach enables the identification of factors that have the most influence.

The model is formulated as follows;

For a single latent variable Y^*,

$$Y_i^* = X'_i \beta + \varepsilon_i \quad \text{..... (1)}$$

$$Y_i = j \;\; if \;\; a_{j-1} < Y_i^* < a_j \quad \text{..... (2)}$$

Where; Y_i^* represents a unobservable variable for the compensation satisfaction with j alternatives, and

X'_i Represents the explanatory variables related to land taken as repressor of the function which determines the probability of compensation satisfaction down to expropriations.

β denotes the coefficient for each respective explanatory variable

a_j Represents the cut of point (intercepts) between the two thresholds among the j categories

U_i Represents the error terms of the unexplained part of the dependent variable

The probability that observation i will select alternative j, P_{ij} is:

$$p_{ij} = p(Y_i = j) = p(a_{j-1} < Y_i^* < a_j) = F(a_j - X'_i\beta) - F(a_{j-1} - X'_i\beta) \quad \ldots\ldots (3)$$

For ordered logit, F is the logistic CDF could be explained as;

$$F(z) = e^z/(1 + e^z) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The ordered logit model with jj alternatives features a single set of coefficients and j−1j−1 intercepts, representing an ordered choice framework that allows for multiple intercepts. Consequently, the model includes jj alternatives, each associated with its own set of marginal effects for the corresponding explanatory variables.

Thus, the marginal effects for the ordered logit model could be shown mathematically. The marginal effect of an increase in repressors on the probability of selecting alternative j is:

$$\partial p_{ij}/\partial X_{ri} = \{F'(a_{j-1} - X'_i\beta) - (F'(a_j - X'_i\beta)\}\beta_r \quad \ldots\ldots\ldots\ldots (5)$$

From this, the marginal effects of each variable on the different alternatives sum up to zero, and we can conclude that each unit increase in the independent variable increases/decreases the probability of selecting alternative j by the marginal effect expressed as a percentage.

6.3.3. Sample Design and Size

The study was meticulously conducted in the South Wello Zone of the Amhara region, selected for its suitability to examine the impacts of on-going railway infrastructure development on a community operating within the national framework and without any exceptional characteristics. A probit model was applied to analyze data from a randomly sampled group of 154 out of 170 displaced households. Out of the 1261 households affected by the railway project in the study area, 295 households were completely displaced and the sample was determined based on this. Randomly a sample of 170 households was selected using Yamane's formula (Yamane, 1973). From such selections, a statistically significant sample was obtained that enabled the research team to gather valuable insights from a representative group of households, in addition to the key informants and focus group discussions (FGDs).

6.4. Results and Discussion

The study analysed a total of 154 completed questionnaires out of the distributed 170, resulting in a representative response rate of 90.58%. All respondents had experienced land loss and its impact on their livelihoods due to the railway development.

Table 18: Variables for WTA Compensation in Railway Development

	Variables	Mean	SD	Min	Max	Descriptions
Independent	age	43.62	13.62	20	70	Age
	comamt	568366.4	904723.3	100000	7200000	Paid compensation
	comform	2.7	0.72	1	3	Compensation form (cash, kind & both)
	disp	1	0	1	1	Displacement (1 if yes, 0 if no)
	edu	2.24	0.78	1	4	Schooling status of the household head education (1 Elementary School; 2 Secondary School; 3 Certificate; 4 Tertiary Education)
	empy	0.72	0.45	0	1	Employment status
	exp	85486.47	81358.4	6000	315200	Consumption expense
	fam	5	1.81	2	10	Family size
	incom	95464.77	166801.4	300	747550	Income
	lcomamt	12.65	0.97	11.51	15.79	Log forms of paid compensation
	lincom	10.43	1.67	5.7	13.52	Log forms of income
	lsatcom	1552718	2066949	114000	12000000	log forms of expected compensation
	marl	1.81	0.4	1	2	Marital status
	relg	1.05	0.22	1	2	Religion
	repl	0.64	0.48	0	1	replaced land
	satcom	1552718	2066949	114000	12000000	Expected compensation
	sex	0.82	0.39	0	1	Sex of the household head (1 if male, 0 if female)
Dependent	Satis	0.18	0.39	0	1	Compensation satisfaction (1 if yes, 0 if no)
	Natural	1.68	0.87	1	3	The current resettlement area isn't different naturally to the previous one (1strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree)

Source: Own Estimates (2023)

An overview of the dependent and independent variables have been arranged on Table 18 above that includes statistical features like means, standard deviations, and the range of minimum to maximum values. Certain variables were transformed into logarithmic forms to

compress the expansive values, aiming to redirect the reader's attention towards the substantive implications rather than the numerical scale.

6.4.1. Demographic Information

Table 19: Demographic Information of the Household Head

	Types of the Variable	Frequency	Percentage
Sex	Male	126	81.82
	Female	28	18.18
Marital status	Single	30	19.48
	Married	124	80.52
	Widowed	0	0.0
	Divorced	0	0.0
Religion	Muslim	146	94.81
	Orthodox	8	5.19
Employment status	Farmer	76	49.35
	Private	11	7.14
	Government	14	9.09
	Own business	10	6.49
	No job	43	27.92
Education	Elementary school	22	14.29
	Secondary School	83	53.90
	Certificate	39	25.32
	Tertiary	10	6.49
Family Size	Below 3	19	12.34
	4-7	116	75.33
	Above 7	19	12.34

Source: Sample Survey, 2023

When examining the survey results, it is found that some interesting demographic features among the participants, most notably a striking 81.82% of them were men in the sampled group. It can be seen the significant gap between genders is linked to cultural and societal

dynamics that prevent women from being involved in managing land and similar household issues.

Among those surveyed, a striking 49.35% identified themselves as farmers, highlighting a significant aspect of their occupational distribution. This point really highlights how losing land deeply affects these people's ability to make a living, showing just how tough things are for this particular group of workers. The results of the survey really highlight the tough challenges that displaced people encounter while trying to find new job opportunities, especially considering that a staggering 27.92% unemployment rate looms over those impacted by the railway project in the area studied.

When it comes to education levels, a striking 53.9% of the participants shared that they had only completed primary school. Such widespread educational limitation raise red flag about how well they can push for better pays or find the other ways to improve their livelihoods. Additionally, the survey highlighted that many households had larger family sizes, generally between 4 and 7 members. Essentially, this suggests that the effects of displacement are not isolated to individual families, but rather spread out, affecting the community as a whole.

Most of the people who answered the survey, about 65%, were younger than 50. This indicates a large segment of the community that could really affect the dependency ratio. This really points out the kind of disruption that young folks, who are only beginning their careers, have to navigate because of displacement. On the flip side, it's important to recognize that even older individuals faced their own struggles and disruptions in their lives. Looking at age demographics helps us understand the complex effects of displacement on different community groups, highlighting the urgent need for customized support and targeted programs to meet each group's unique needs.

6.4.2. Shapiro-Wilk W test

The importance of confirming that continuous variables match a normal distribution for non-parametric inferences was made clear when we carried out a Shapiro-Wilk test. We carefully examined the calculated statistics to see if they went beyond the significance threshold, which would suggest that we can assume a normal distribution for the continuous variables. Researchers, including Mishra and colleagues in 2019, used this approach in various studies to validate that the data followed a normal distribution.

Table 20: Shapiro-Wilk W test

Variable	Obs	W	V	z	Prob>z
comamt	154	0.519	57.299	-1.380	0.916
satcom	154	0.645	42.239	-1.380	0.916
incom	154	0.498	59.746	-1.380	0.916
exp	154	0.797	24.107	-1.380	0.916

Source: Own Estimates (2023)

The statistical review in this study confirmed that the main variables like compensation amount, income of the household follows a normal distribution, which helps us better grasp their traits. In Table 20, researcher ran a Shapiro-Wilk test analyzing expected compensation, paid amounts, income, and expenditures, pulling data from 154 observations. With the calculated statistics exceeding the p=0.05 significance level, it seems researcher have no choice but to accept the null hypothesis, which posits that all continuous variables are normally distributed. Ultimately, there is enough evidence to indicate any significant shifts away from considered normal. The normality test results indicated that the continuous variables - including expected compensation, paid compensation amounts, income, and expenditure - display normal distributions. If you want to see the STATA results, check out Appendix III (L).

6.4.3. Inferential Analysis of WTA Compensation

The features of a household really play a big role in how people decide to accept compensation, with satisfaction being the main factor behind these choices. Probit analysis looks into how satisfied displaced families are with the compensation they receive. Afterwards, the analysis using ordered logistic regression uncovers significant factors influencing livelihoods, placing a spotlight on the importance of land resources. This analysis digs deeper into how changing land use affects the environment, especially in farming communities, and why it's really important for keeping households healthy and thriving.

6.4.3.1. Probit Analysis for Compensation Acceptance

Household characteristics have been recognized as significant factors in determining the decision to accept compensation, as motivated by an individual's pursuit of satisfaction (He et al., 2018). To gauge the satisfaction of displaced households in accepting paid compensation, probit analysis was employed as the analytical approach.

Table 21: Probit Regression

Variables	Coef.	St.Err.	t-value	p-value	Sig
lcomamt	2.854	.628	4.55	0	***
lsatcom	-2.818	.651	-4.33	0	***
sex	-.905	.582	-1.55	.12	
marl	2.334	.846	2.76	.006	***
relg	2.326	.829	2.81	.005	***
empy	.084	.512	0.16	.869	
age	.002	.021	0.08	.938	
edu	.791	.304	2.61	.009	***
fam	-.013	.193	-0.07	.947	
lincom	.003	.137	0.02	.981	
repl	.893	.567	1.58	.115	
Constant	-8.889	4.4	-2.02	.043	**

Mean dependent var	0.182	SD dependent var	
Pseudo r-squared	0.635	Number of obs	
Chi-square	92.798	Prob > chi2	
Akaike crit. (AIC)	77.237	Bayesian crit.(BIC)	

Source: Own Estimates (2023), (Please see Appendix III (M) for the STATA output.)

In Table 21, it is detailed look at how household satisfaction ties into various independent factors, sharing results from a probit analysis that sheds light on this connection. This analysis looks closely at how both paid and expected compensation influences satisfaction, using logarithmic models and also considering other household traits represented as binary variables. Niaz (2022) points out that there's a connection between better social standing or development and improved access to economic resources. Interestingly, the coefficient for paid compensation, which stands at 2.854, strongly suggests that any logarithmic increase in the amount of compensation can lead to a striking 285.4% boost in household satisfaction. This finding is particularly significant. Here, the coefficient shows statistical significance, emphasizing the beneficial impact of compensation on household satisfaction. This highlights just how crucial it is to provide sufficient payments to really ensure that households impacted by railway projects feel satisfied.

On the other hand, the coefficient for expected compensation shows a negative -2.818, which means that as expected compensation increases logarithmically, there's actually a significant

drop of 281.8% in the chances of households feeling satisfied. This coefficient is statistically significant, indicating there's a negative link between what people expect to be paid and how satisfied they feel overall. It seems that when individuals anticipate greater compensation, their satisfaction levels often take a hit. You can also see similar patterns when looking at marital status and religious beliefs, which play a big role in shaping how satisfied people feel.

The findings here strongly indicate that a person's education level is closely tied to their satisfaction, and this was unveiled through the probit analysis. To put it simply, a single unit boost in education level is tied to a striking 79.1% increase in the chance of feeling satisfied, which really drives home the idea that education is vital for satisfaction levels. Even though some household characteristics don't show strong statistical significance, the pseudo-R-squared value for the model suggests it can explain more than 63% of the differences seen in satisfaction levels. Liu and colleagues (2022) highlight that various elements, including how much compensation is given, one's marital situation, faith, level of education, and expectations around fair compensation - all reaching a 99% confidence level - are likely to play a major role in determining how satisfied people feel with their compensation.

6.4.3.2. Analysis of Compensation Amount

The provision of compensation, whether to individuals or groups, holds implications for the likelihood of satisfaction, as it determines the extent to which individuals or groups are content with the outcome.

Table 22: Marginal effect of the Variable

Average marginal effects Number of obs = 154
Model VCE : OIM
Expression : Pr(satis), predict()
dy/dx w.r.t. : lcomamt lsatcom sex marl relg empy age edu fam lincom repl

		Delta-method				
Variable	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
lcomamt	0.275	0.045	6.070	0.000	0.186	0.364
lsatcom	-0.272	0.049	-5.600	0.000	-0.367	-0.176
sex	-0.087	0.055	-1.600	0.109	-0.194	0.020
marl	0.225	0.074	3.030	0.002	0.079	0.371

relg	0.224	0.067	3.340	0.001	0.093	0.356
empy	0.008	0.049	0.160	0.869	-0.089	0.105
age	0.000	0.002	0.080	0.938	-0.004	0.004
edu	0.076	0.026	2.910	0.004	0.025	0.128
fam	-0.001	0.019	-0.070	0.947	-0.038	0.035
lincom	0.000	0.013	0.020	0.981	-0.026	0.026
repl	0.086	0.052	1.650	0.098	-0.016	0.188

Source: Own estimates (2023), (Please see Appendix III (N) for the STATA output.)

Table 22 indicated some compelling insights into how different compensation factors relate to levels of household satisfaction, all while leaving out other influencing variables. The findings indicated that even a small logarithmic increase in paid compensation can raise the chances of being satisfied with that compensation by 27.5%. Alternatively, higher expectations of compensation lead to a decrease in satisfaction, with a notable drop of 27.2% in the likelihood of feeling satisfied for each step up in expectations. Additionally, changes in marital status and religious beliefs play a significant role in influencing how satisfied people feel. Increasing your educational level seems to significantly boost the chances of feeling satisfied, with a noteworthy increase of 7.6%. These findings have important consequences, shedding light on crucial data that can help create smart strategies for achieving fair results after displacement.

Many households voiced their concerns about how well the compensation measures, especially the in-kind benefits, were really working, and they weren’t happy at all. According to Bereket's research from 2020, the main type of compensation provided was through in-kind benefits. Most households, around 82.4%, expressed dissatisfaction with the compensation they received (Bereket, 2020). Although the aim of cash and relocation alternatives was to enhance flexibility, those from economically challenged backgrounds faced significant hurdles, as highlighted by Shaw & Saharan (2019). As a result, the unsatisfactory satisfaction rate points to serious problems such as poor replacement land options, inadequate compensation, and a failure to engage with the community. This points out how the compensation measures that were put in place haven't really worked well to tackle the losses and difficulties that the affected households are experiencing.

6.4.3.3. Ordered Logistic Regression

The analysis has revealed that there has been a significant association between specific variables and the intrinsic components of livelihood, particularly focusing on those attached to land resources. To examine the interactions among these factors, an ordered logistic analysis identifies the factors that exert greater influence in conjunction with these interactions on the satisfaction level.

Table 23: Ordered logistic regression

Natural (dependent variable)	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
marl	1.501	.657	2.29	.022	.214	2.788	**
relg	-14.601	939.648	-0.02	.988	-1856.278	1827.076	
Secondary School	1.413	.602	2.35	.019	.234	2.593	**
Certificate	3.992	.862	4.63	0	2.303	5.682	***
Tertiary School	20.8	1818.172	0.01	.991	-3542.752	3584.351	
age	.084	.021	4.04	0	.043	.125	***
Constant	-5.75	939.65	.b	.b	-1847.43	1835.93	
Constant	-4.679	939.65	.b	.b	-1846.359	1837.001	

Mean dependent var	1.682	SD dependent var	0.869
Pseudo r-squared	0.273	Number of obs	154
Chi-square	79.843	Prob > chi2	0.000
Akaike crit. (AIC)	228.827	Bayesian crit. (BIC)	253.122

Source: Own Estimates (2023); p-values denote*** *p<.01, ** p<.05, * p<.1* (Please see Appendix III (O) for the STATA output.)

Table 23 from the regression analysis revealed that a coefficient of 1.5, suggesting there's a strong and meaningful link between being married and valuing natural livelihood elements. It seemed that people who are married tend to place more importance on the natural aspects of their livelihoods, especially when it comes to their land resources (Liu et al., 2022). Additionally, it's clear that the loss of natural resources makes it even harder for people to adapt to shifting livelihood situations (Ben & Agnes, 2023).

On the other hand, for those who completed secondary school, the coefficient sits at 1.41, indicating a clear and meaningful positive link between this educational level and natural livelihood factors. You can really see this connection when it comes to land resources and the

compensation that people get for using them. Households with a secondary school education tend to place more importance on their land assets compared to those who have just an elementary education. This difference really highlights a significant gap when we compare it to those who have a college degree. In the same vein, individuals holding a certificate-level education show a similar result, reflected in a coefficient of 3.99.

So, it turns out that factors like whether someone is married, their age, and how much education they have really affect the ecological aspects of what sustains us. This is especially true for those with just a secondary school diploma or a certificate, as noted by Liu and colleagues in 2022 and 2019, particularly regarding how closely they feel tied to land resources. People who are married, those with a high school diploma or certificate, and older folks seem to really value the natural aspects of living that tie to their land resources. In contrast, factors like religion and having a degree don't really show a meaningful impact on the natural aspects of households' livelihoods, especially concerning land resources.

6.4.3.4. Treatment-Effects Estimation

The primary aim of estimating treatment effects was to look into how replaced land, our dependent variable, relates to the natural environment, which serves as our outcome variable and plays a vital role in people's livelihoods assets. We really need to look closely at these factors because they have a huge impact on how households make a living, particularly in farming communities.

Table 24: Treatment-Effects Estimation for Replaced Land and Natural Environment

Natural	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
r1vs0	-.519	.081	-6.44	0	-.678	-.361	***
Mean dependent var	1.682		SD dependent var		0.869		

Source: Own Estimates (2023); p-values denotes *** p<.01, ** p<.05, * p<.1 (Please see Appendix III (P) for the STATA output.)

By controlling factors like education, age, spending habits, income, how satisfied people are with their compensation, and their access to clean water, we found that the estimated coefficient for replaced land came out to -0.52. This shows a noteworthy negative effect on the Natural Environment outcome. What we've found really lends credibility to the alternative hypothesis, highlighting a major treatment effect, which is shown by a p-value of 0.000 and t-value of -6.44.

As a result, analysing treatment effects reveals a notable and positive impact of factoring in replaced land when assessing the Natural Environment outcome, despite considering other important variables. In addition, the coefficient of 0.52 adds more weight to the connection we see between replaced land and a positive shift in the natural environment.

6.4.4. Focus Group Discussions on Displacement

From the discussions held with community members, it became clear that there are additional challenges concerning displacement and compensation in the context of development projects. When land is acquired for development, it often leads to families losing their homes, farms, and other important assets, as highlighted in the research by Aboda et al. (2022). During the discussions, people raised concerns about whether the compensation they were offered was enough. They pointed out that it didn't really cover the true value of what they lost, like their homes and farms, nor did it support their on-going needs for survival. In the focus group discussion, participants highlighted communities' involvements and active participate plays vital role especially the compensation alternatives go beyond just cash - like job training and programs that help generate income. These alternatives support and encourage sustainability of the communities affected. Moreover, those taking part in the discussion highlighted the grievance resolution systems should be fair and easy to access for communities impacted by development projects, a pointed clearly in Ghimire's study from 2017. The group pointed out compliance addressing mechanisms tended to be overly bureaucratic and hard to navigate, which really limits the chances for those affected to speak out and get the justice they deserve.

The focus group discussion highlighted how it is vital to involve the community, maintain transparency, and ensure accountability in projects that relate to infrastructure, particularly in land rights and compensation for those impacted. To provide on-going support and create a sustainable future, it's really important to offer job training and programs that help generate income. Additionally, creating easy-to-access and just grievance resolution systems can help empower communities to raise their issues and look for solutions to their problems.

Through interviews and various studies, it's clear that finding new land for families who have been forced to move is a really important issue that needs to be tackled for the sake of their livelihoods (Wang et al., 2022; Liu et al., 2019). But, you know, the whole process is rather tricky and it carries the risk of pushing aside some groups within the relocated communities

that had jobs before. When development projects take place, they can really shake up the local economy and society, often leaving people without land and taking away their chances to make a living or support themselves after being displaced. During the railway development, a significant number of people found themselves displaced, either fully or partially losing their land, according to Aboda et al. (2022). (2022). Well, that was a year to remember, right? These development projects don't just impact individuals; they can ripple through entire communities, leading to far-reaching consequences. Discussions with the Compensation Valuation Committee shed light on how the method for assessing compensation for lost land relies on market values, something backed up by research from Ghimire (2017), Alemu (2015), and Ambaye (2015). But, as a livelihood restoration expert mentioned, just leaning on market prices doesn't really reflect the true economic value of what's been lost on the land. This way of figuring out compensation value doesn't properly address the complete economic worth, failing to include both monetary and non-monetary loss aspects, which ends up giving inadequate compensation. Liu et al. (2019) pointed out that key aspect to have been factored into the compensation calculations were ignored, resulting in unequal pay for those affected. People involved in the focus group discussion showed a strong reluctance during their land being taken just to get paid in advance for compensation. This recognized how it is complicated and to make sure finding land for those being affected to bounce back fully from the negative impacts of displacement.

If the socioeconomic impacts of displacement are not handled properly, it single out the true value and advantages of those who have been displaced. This leads to unfair compensation and it has harmful consequences for individuals and their communities. Given the intricate nature of this situation, it's crucial to develop tailored compensation strategies that really tackle the various challenges linked to land acquisition and compensation. Creating these strategies demands a thoughtful and detailed approach, firmly rooted in a solid grasp of how they impact livelihoods and the complex social dynamics present in the affected communities. Research conducted by Wang and others in 2022, along with Liu and colleagues in 2020, backs up this claim quite convincingly.

6.4.5. Marginal Willingness to Accept Compensation

The current research applies a quantitative framework to determine the minimum acceptable level of compensation by examining the link between household features and satisfaction standards. This study builds upon earlier research carried out by Liu and colleagues. In their

study from 2019, Irham and colleagues explored this topic. Following the lead of researchers such as Liu et al. (2022) and Wang et al. (2022), we employ a nuanced strategy to capture willingness to accept measures that reflect the diverse characteristics and dimensions of households.

Table 25: Marginal Willingness to Accept Compensation

Significant Variables	Coefficient (Bi)	Mean	Bi*Mean
lcomamt	2.85	12.65	3.59
marl	2.33	1.81	4.21
relg	2.33	1.05	2.45
edu	0.79	2.24	1.77
Sum Bi*Mean			12.01
lsatcom	-2.82	13.65	3.65
MWTA	$-\beta_0/\beta c * C$	12.01/3.65	3.29

Source: Own Estimates (2023); Note: Both (lcomamt and lsatcom) variables' values were converted from their natural logarithmic forms.

Table 25 presented a striking finding, as the Marginal Willingness to accept, measured at 3.9, and surpasses the actual compensation received by a significant margin, exceeding it by more than threefold. This substantial disparity serves as a clear indicator of the strong opposition encountered in response to land expropriation followed by displacement of households. The finding indicated that households clearly prioritized the retention of their possessions over monetary compensation, which underscored the need for tailored compensation schemes satisfying individual preferences and non-monetary considerations as indicated in the works of Li et al. (2017) and Liu et al. (2022). On the other hand, the pervasiveness of discontent among affected households underscored the pressing need to devise compensation schemes that are expected to address their unique circumstances and safeguard livelihoods, as emphasized by Hasan-Basri et al. (2015). Consequently, a departure from prevailing practices is crucial that necessitated the need for designing compensation schemes capable of accommodating the diverse needs of households and populations, as advocated by Ginsburgh (2017).

6.4.6. Implications of the Findings

This study sheds light on the complex interactions among different factors and how they relate to individuals' feelings of satisfaction regarding compensation in the context of land

displacement. This study reveals a clear and positive link between providing replacement land and achieving better environmental results, echoing the earlier findings of Liu (Liu et al., 2022). Clearly, the adequacy of compensation is a major factor influencing how satisfied households feel. That said, it’s wise to be careful about setting your hopes too high, because having lofty expectations can actually make you feel less satisfied, as noted by Ben and Agnes (2023) and Niaz (2022). Additionally, factors like whether someone is married, their faith, and how much education they have play a significant role in determining how satisfied they feel during times of upheaval caused by development initiatives. What makes this study so crucial is that it combines many different factors in the design of compensation schemes, aiming to really respond to the specific needs and preferences of the people impacted.

Various elements like how much people get paid, what they hope to earn, their marital situation, their religious beliefs, and their education level play crucial roles in determining how satisfied people feel. The compensation plan is not only reflect individual needs but also take into account non-monetary aspects. This has been strongly supported by the research from Liu et al. (2019) and Irham et al. (2024). The difference has been seen between what people were willing to accept in compensation and what they actually received by highlighting to protect people's livelihoods and considering their unique situations when ever creating compensation plans. As a result, the findings from this research hold significant consequences for policymakers for a fair compensation system.

6.4.7. Conclusion

Dive into this intriguing study where we uncover the complex factors affecting satisfaction and ecological considerations linked to the displacement caused by Ethiopian railways. Unearth the diverse dimensions of satisfaction by examining how aspects like the land that’s been replaced, the compensation individuals receive, what they hope for, along with their marital status, religious ties, and education levels, shape their overall contentment. Interestingly, this study reveals that there’s a strong link between the land that gets replaced and how well the natural environment is preserved, highlighting just how crucial it is to protect ecological resources during the compensation process.

Getting paid fairly is really important for keeping households happy and satisfied. It's also really important to manage expectations to avoid people feeling disappointed when reality doesn't match what they hoped for. Finding the sweet spot between fulfilling financial needs

and managing expectations around compensation is key to enhancing overall satisfaction. Additionally, a person's marital status, their religious beliefs, and how much education they've had play a big role in how satisfied they feel about their compensation. This calls for customized strategies that recognize personal traits and situations, aiming for fairer results that truly meet the needs of various communities.

The factors we've pinpointed are crucial when creating compensation plans, making sure they're fair and meet the varied needs and wants of the households impacted. This research reveals a notable gap between what people are willing to accept as compensation and what they actually receive, highlighting that households are hesitant to leave their homes. We need to keep in mind that there are non-monetary factors at play, like the need to retain possessions and safeguard livelihoods, when designing compensation schemes. Addressing the non-monetary elements is vital for ensuring that compensation meets the broader needs of the households involved.

The study also points out a strong link between a person's marital status and their level of education. It seems that those who are married or have completed secondary or certificate-level education tend to value their land resources more highly. It seems that those who are married, along with people who have at least secondary education or a certificate, really value their land resources more than others.

To wrap things up, it's crucial for policymakers to take these key factors into account when creating compensation plans for people displaced by development. When policymakers take into account factors like the land that has been replaced, the compensation that was paid, what people expect to receive, their marital situation, their religious beliefs, and their educational background, they can create strategies that are not only more thoughtful but also more suited to the unique needs of communities affected by displacement, ultimately leading to fairer results and supporting sustainable growth.

To uncover the complex factors affecting satisfaction and ecological considerations linked to the displacement caused by Ethiopian railways, it needs a through consideration. To see the dimensions of satisfaction by examining land that’s been replaced, the compensation individuals receive, what they hope for, along with their marital status, religious ties, and education levels, shape their overall contentment. Interestingly, this study revealed a strong link between the land that gets replaced and how well the natural environment is preserved, highlighting to protect ecological resources during the compensation process.

Getting paid fairly is really important for keeping households happy and satisfied along with manage their expectations by avoiding their disappointments. Finding the sweet spot between fulfilling financial needs and managing expectations around compensation enhances the overall satisfaction. Additionally, a person's marital status, their religious beliefs, and how much educations they have had play a big role to satisfy them. This enquires strategies that recognize personal traits and situations, aiming for fair results that meet the needs of various communities.

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CHAPTER SEVEN

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Introduction

The dissertation displays that railway-created involuntary displacement results in notably damaging effects on affected households' income together with expenditures and livelihoods and environmental conditions as well as household's satisfaction. People displaced from their homes suffer from earnings decline while receiving insufficient compensation and struggling to full-fill basic requirements (Cernea & Maldonado, 2018). Displacement leads to income reduction because people face restricted work choices in addition to losing assets combined with weakened social ties. Numerous effects of displacement emerge from household financial standing before displacement and the amount they obtained in compensation payments. The study identify important implications about building compensation programs that match specific needs of project impacted communities. The analysis requires examining various factors which include compensation values together with marital status and employment conditions as well as educational history and predicted compensation standards.

The study detailed the longstanding practice of insufficient land-taking compensation (De, 2020) while demonstrating the need for balanced and inclusive land compensation procedures. The dissertation showed that fairness in land takings relies on thorough public outreach together with transparent financial support systems and vocational programs and business development programs which supply enduring assistance and equal results. The study presents insights about difficulties in securing appropriate land for displaced families along with the necessity of implementing job training and business assistance as alternative solutions.

The dissertation shows education together with employment plays a fundamental part in determining the strategies and results of people's lives after resettlement. The advancement of human capital happens most significantly through education because moving into tertiary education from elementary studies or completing certificate training maximizes the acquisition of necessary knowledge and skills. The stability and resilience of livelihood sustainability determined by heavily on employment status; whereas, self-owned farming demonstrates higher sustainability than private business or organizational work.

The dissertation found detailed causal interactions existed between various aspects of livelihood and factors such as age alongside compensation satisfaction and the availability of new land parcels for displaced households. These factors mixed together determining the capital assets that resettled households accessed for achieving both the rebuilding and sustained their livelihood capabilities. The research identified essential interrelations to generate meaningful knowledge about supporting socio-economic development for communities being affected by resettlement programs. An active intervention is needed to make education and employment and resource distribution focused on improved post-resettlement livelihood performance.

7.2.General Conclusions

The dissertation showed an involuntary displacement creates severe consequences which affect household finances and their purchasing habits and survival techniques as well as their feelings of satisfaction. Displaced households faced an income decrease and they are inability to secure proper payment combined with difficulties satisfying basic needs. This exacerbated by facing employment restrictions and losing assets and breaking down social connections. The dissertation gave details how both financial starting position and payment amount determined the outcome of displacement and its ramifications.

Based on the research findings, specific compensation methods designed for individual population needs stand as more essential than using standardized national policies. Multiple elements related to compensation factors connected with marital situation and faith membership and educational attainment coupled with expected compensation requirements must receive special consideration. The vital part exists to address inadequate compensation practices. During land expropriations, a modern compensation methodology is expected to capture the values of expropriated property.

The obstacles to providing proper solution, it is vital to implement an alternative assistance through business support and skills training programs. The barriers can be overcome by developing customized training programs together with community involvement and strong governance structures combined with interventions that aid women single household heads. Educational attainment and employment status acted as primary factors which directed resettlement success through their influence on livelihood strategies.

The dissertation detected the causal factors between different aspects of livelihood in combination with age factors and compensation satisfaction and land access and environmental impact measurements - providing beneficial insights about livelihood possibilities during development projects and resettlement activities.

In essence, this dissertation highlights the negative impacts that involuntary displacement has on households and emphasizes the need for personalized compensation plans, involvement from the community, different solutions, and attention to issues like education and jobs. The dissertation provides crucial insights for those in charge of policy, highlighting the need for equitable and inclusive compensation systems, clear processes, community involvement, and strong governance to mitigate the harmful impacts of displacement and support sustainable growth.

7.3.Recommendations

It's evident from extensive studies that when people are displaced involuntarily by development projects, it has a profound effect on their livelihoods. Right now, the way compensation and community involvement work is not practicing it for tackling these issues. To improve such situations for displaced households due to development projects, here are some detailed suggestions that the study puts forward:

- ✓ A complete analysis of the potential impacts of displacement, covering environmental and social aspects alongside livelihood assessments, is essential in development project feasibility studies. Using this approach for analysis can spark vital developmental actions that foster overall progress and create benefits at all levels.

- ✓ The government should develop fair valuation procedures which accurately portray expropriated property values for Compensation purposes. The use of independent assessors through a fair procedures produce unbiased evaluations based on contemporary market price alongside social and environment components to achieve fair and accurate compensation methods.

- ✓ Alternative compensation options consisting of job placement opportunities after training along with income-generating programs and credit eligibility availability should become available. A tailored-made compensation strategy based on

individual needs and contextual aspects could improve the ability to have best strategies to minimize displacement-related adverse effects.

- ✓ The development intervention will achieve better engagement with affected communities throughout the process by implementing an open consultation session that discloses best practices together with mechanisms to resolve community complaints. Culture-based grievance resolution systems promotes communication by providing project-affected populations with open platforms to voice concerns and get equal redress while creating accountable relationships.

- ✓ The process of resettlement should ideally keep relocated families in the same area or zone such arrangement provides psychological and social advantages – support them not to be out of social connections and other interactions. Educational support should be provided to minimize the disturbances in the sides of school children. The implementation of business development programs with industrial partnerships along with support for small business operations is a necessary intervention. It allows creating employment opportunities and improves local communities' income stability.

By choosing a balanced and sustainable method that secures proper values for properties being compensated, leaders can effectively lessen the adverse effects of people being displaced without adding to their difficulties. To make sure everyone reaps the benefits of infrastructure projects, it's essential to focus on fair property valuations, provide various options, engage with the community, set up easy ways to address grievances, and offer educational support.

7.4.Contribution of the Dissertation

Conceptual Contributions: The dissertation delivers conceptual understanding about the adverse effects which involuntary displacement creates for household incomes together with spending patterns and livelihood practices and lifestyle satisfaction. The study demonstrates how forced relocation results in decreased income levels with insufficient payment amounts plus barriers to buy everyday needs. Several factors create connections between these adverse impacts through job limitations and asset losses and social network reduction. The dissertation shows that how displacement affects individuals depends both on their financial standing before displacement and the money they receive from compensation.

The study demonstrates that using a standardized compensation approach leads to difficulties during the implementation of national-level compensation mechanisms. This study demonstrates that compensation method research must account for compensation sums alongside marital status and religious background and educational attainment level and predicted compensation levels. The research stresses that history has documented subpar land taking compensation which requires new models that provide fair compensation for affected individuals. The researcher emphasizes the requirement for community involvement together with full disclosure of information along with alternative compensation plans such as job training programs and income-producing programs to obtain sustainable support and fair results.

The dissertation examines the difficulties faced when trying to provide suitable land for displaced households so it refers readers to investigate possible alternatives through job training and business support. The findings reveal the necessity for specific training programs and community involvement and government leadership and direct support for women-single-household homes to resolve these difficulties effectively. Education level together with employment status plays an essential role in determining how households construct and perform their resettled livelihood strategies.

The dissertation establishes various links between different aspects of livelihood with variables including age and compensation satisfaction and replacement land availability and natural resource management. The obtained research information helps to develop important comprehension about livelihood development potential within development projects and resettlement efforts.

Therefore, this dissertation really adds to our understanding of the topic by shedding light on how involuntary displacement harms households. It sought to tackle these issues with customized compensation plans, involving the community, providing different options, and taking into account education and job opportunities.

Empirical Contributions: by combining research methods, the analysis involved qualitative data collection for social and economic consequences of involuntary displacement together with quantitative methods that measured and quantified these impacts. The research utilized Propensity Score Matching together with Ordered Logit and probit regression and Treatment Effect models as a combination of statistical methods to quantify impacts through causal

effect measurement. The empirical evidence currently enables better comprehension of displacement-related negative effects while enabling comprehensive evaluation of interventions for minimizing their impact.

Methodological Contributions: Structural and statistical models along with quantitative and qualitative research methods equipped the dissertation to show how involuntary displacement harms the families who experience it. The research utilized propensity score matching as well as ordered Logit and logistic regression models together with treatment effect models and additional statistical tools. The chosen models show effective application for intended outcome visualization in the dissertation despite acceptance that different models have their respective limitations. Rich qualitative information demonstrates that the selected model establishes clear explanations about the defined targets.

Theoretical Contributions: The dissertation advances theoretical concepts through its challenge to present models and its focus on developing customized compensation systems and community involvement initiatives as well as diverse alternative measures and educational plus employment considerations. Research findings show how successful solutions exist to minimize negative effects of forced displacement on households' livelihood during the process of development advancement.

7.5.Future Research Areas

The study of railway development alongside other development sectors will generate better knowledge about displacement effects on resettlement and livelihood transformations. Research that focuses on the Amhara region of Ethiopia remains the main focus at present but studies about similar circumstances in other sectors present unseen opportunities to discover shared experiences and management strategies. Such comparative research extends beyond the railway case scenario so researchers can extract more generalized knowledge.

Research into displacement together with resettlement and livelihood alteration in multiple development sectors enables the identification of key elements that affect these processes within each sector. Such research would reveal specific difficulties that target different communities operating in different geographical domains. Infrastructure development projects such as railways led to various impacts of resettlement and displacement compared to other sectors that include mining, energy and urban development. Through this analysis

researchers could discover important details about how specific groups of affected individuals deal with development sector obstacles.

Researches that span multiple development sectors enable researchers to find main themes which connect various contexts. The valuation of compensation as well as finding replacement occupations and establishing meaningful community engagement and setting up proper grievance procedures presents identical obstacles no matter what sector is studied.

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APPENDICES

APPENDIX I: GLOSSARY

In the context of the current study, the following definitions are provided for the basic concepts and terms:

Displacement: is the forced or involuntary movement of individuals or groups from their homes, land, or habitual places of residence. It typically occurs due to various reasons such as natural disasters, conflicts, development projects, or government policies.

Involuntary Displacement: is forced or involuntary movement of individuals or communities from their homes or lands due to development projects, often resulting in the loss of livelihoods and disruption of social networks.

Development Project: is an initiative or activity undertaken to promote economic, social, or infrastructural progress in a particular region or community.

Compensation: is a financial or non-financial benefit provided to individuals or communities affected by development projects as a means of mitigating the loss of property, livelihoods, or social connections.

Resettlement: is the process of relocating affected individuals or communities to new areas or settlements.

Livelihood Change: is alteration or disruption in the means of subsistence, income generation, and overall economic activities experienced by individuals or communities as a result of involuntary displacement and resettlement.

Community Engagement: is an active involvement, participation, and consultation of affected community in decision-making process related to development projects and resettlement.

Human Capital: Encompasses the skills, knowledge, education, health, and abilities that individuals possess, enabling them to engage in productive activities.

Social Capital: Refers to relationships, networks, and social structures that provide individuals and communities with support and access to resources.

Natural Capital: Includes natural resources such as land, water, forests, fisheries, and biodiversity, upon which people depend for their livelihoods.

Physical Capital: Consists of infrastructure such as roads, transportation systems, irrigation facilities, machinery, and technology, which facilitate economic activities and improve productivity.

Financial Capital: Represents the financial resources available to individuals or communities to support their livelihoods.

Appendix II: Household Survey Questionnaire

Addis Ababa University

School of Development Studies

Centre for Environment and Development Studies

1) Household Survey Questionnaire

Dear respondent,

The objective of this questionnaire is to collect information related to large scale infrastructure development induced displacement, resettlement and environmental degradation in the Kombolcha railway section. The data collection is meant to fulfil the requirements for the PhD in Environment and Development at the School of Development Studies. Hence, I request your honest and fair responses to fill up this questionnaire. Your participation in this survey is therefore completely voluntary and your responses are of utmost confidential and will be used only for the intended purpose alone.

Are you willing to proceed with the survey Yes ☐ No ☐

GENERAL INFORMATION

Household code: _____	Zone:_____
Date of enumeration: _____	Woreda: _____
Enumerator's Name:_____	Kebele: _____
Signature: _____	Checked status:_____

Please put this ⟩ mark in front of your answer.

Household Information

1. Sex	2. Marital status	3. Religion	4. Employment status
☐ Male	☐ Single	☐ Orthodox	☐ Farmer
☐ Female	☐ Married	☐ Muslim	☐ Own Business
	☐ Divorced	☐ Protestant	☐ Private organization
	☐ Widowed	☐ Catholic	☐ Government office
		Other, specify _____	☐ No job

5. Age: _____
6. Highest years of schooling completed (for household head): _____
7. Family size (including head of the household): _____
8. Current household annual income

A. Annual on-farm income

Annual income from	Income (in Birr)
a. Crops	
b. Vegetables	
c. Fruits	
d. Sale of livestock	
e. Sale of livestock by-products	
f. Sale of Poultry	
g. Sale of Poultry's egg	
Total income	

B. Annual off-farm income

Annual Income from	Income (in Birr)
a. Inheritance	
b. Rent	
c. Remittance	
d. Daily labor	
e. Trade activities	
f. Commission works	
g. Local beverage sells	
h. Other source	
Total income	

9. Household annual expenditure

1) Expenditure for Education

Expenditure for Education	Average expenditure (in Birr) per person (a)	Number of people (b)	Total expenditure (a*b)
Elementary school			
High school			
College/ TVET			
University			
Other expenditures			

2) How much do you spend on average (in birr) on clothes, annually? _____

3) How much do you spend (in birr) on social capital like 'edir', on an annual basis?_

4) Expenditure for agricultural equipment and inputs

Equipment and input type	Average expenditure (a)	Size (in number) (b)	Total expenditure (a*b)
1.			
2.			

5) How much do you spend (in birr) on health care annually?_____

6) How much do you spend (in birr) on food, on an annual basis? _____

7) How much do you spend on average on other forms of consumption annually?____

COMPENSATION AND RELATED INFORMATION

10. Did you have a house in the railway right of way, ROW section?

☐ Yes ☐ No

If your answer is yes, what size was your plot of which the house was built on (in meter square)? _____

11. Did you have a plot of land in the railway right of way, ROW section?

☐ Yes ☐ No

If your answer is yes, what size was your plot (in hectares)?_____

12. What types of land had you been expropriated? (Possible to select more than one.)

☐ Cultivated land ☐ Grazing land ☐ Forest land ☐ Residential Others, specify: _____

13. Have you got a replacement land?

☐ Yes ☐ No

14. Currently, are you living in your own house?

☐ Yes ☐ No

15. Did you get compensation for your property removed in Kemissie to Hayk railway section?

☐ Yes ☐ No

16. If your answer for question number (15) is yes, please give an answer for the following statements under the table.

	Compensation, Resettlement and Livelihood	Scale				
		1	2	3	4	5
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Compensation	a. The compensation paid was equivalent to the value of the expropriated properties.					
	b. Compensations made in kind for the removed properties were the same and equivalent to the value of the properties.					
	c. The paid compensation for relocation was satisfactory.					
	d. The payment made for compensation is insufficient to sustain livelihood.					
	e. I complained about the compensation made for the land expropriation.					
	f. Cash management is not the challenge yet on the paid compensation.					
	g. Compensation paid in cash to change into permanent assets could not be a challenging one.					
Resettlement	h. The consumption of environmental resources like fuel woods increased after being resettled.					
	i. Given resettlement due to the railway project, the social ties among the community disintegrated.					
	j. In this railway section, the current resettlement area is different from the previous one.					
	k. Household income has substantially decreased after the resettlement.					
	l. Household employment opportunities get worse off after displacement.					
	m. Members of the household have an advantage in education after the resettlement.					
	n. The disintegration of household economic ties exacerbates life after relocation.					
	o. Given the railway project section, displaced households are					

	disadvantaged over the social connection.					
Livelihood	p. Given the railway section, compensation, like life skill training, is enough for livelihood restoration activities.					
	q. Given the paid compensation, the household's livelihood after resettlement has never been affected negatively.					
	r. The daily consumption of environmental resources, like a forest for firewood, increased after the resettlement.					
	s. Livelihood change due to resettlement has a disadvantage over the environment.					

17. How have you been paid the compensation, compensation form?

☐ In cash ☐ In kind ☐ Both (cash and in kind)

18. How much compensation have you been paid in the form of cash (in Birr)?_____
19. How much have you been paid in the form of cash per square meter of the plot (in Birr)? _____
20. How much would you have been paid to a square meter of your house to get satisfied, in the form of cash (in Birr)?_____
21. How much would you have been paid to a square meter of your plots feels you satisfied, in the form of cash (in Birr)?_____
22. What types of environmental resources have you consumed to sustain your livelihood after resettlement? (Possible to select more than one.)

Environmental resources	Week based consumption of environmental resources	
	Amount/ number	Price (market value)
Fire wood		
Grazing land (cattle on field)		
Forest		
Water		
Other, specify: _____		

23. Which elements of the livelihood are being affected after expropriations? Put a tick mark on your appropriate choices.

Livelihood elements	Increase	Decrease	Remain constant
Financial			
Physical			
Social			
Human			
Natural			

24. What types of environmental resources have you missed after relocation? (Possible to select more than one.)

☐ Water ☐ Grazing land ☐ Forest ☐ Fire wood ☐ All of these

Others, specify: _____

25. Which of the following are the major causes of environmental degradation related to the land expropriation, given the railway section? (Possible to select more than one)

☐ Deforestation ☐ Over cultivation ☐ Cultivation of steep slopes
☐ Over grazing ☐ Poor EIA practice Other, specify: _____

26. Do you have any information on how the environmental damages are under-control throughout the project plan in your section?

☐ Yes ☐ No

If your answer for question number (26) is yes, please give an answer for the following statements under the table.

Environmental Impact Assessment (EIA)	**Scale**				
	1	**2**	**3**	**4**	**5**
	Very poor	**Poor**	**Fair**	**Good**	**Very good**
a. There is a resettlement program that is practiced ahead of the project.					
b. The EIA plan is being practiced well in this section.					
c. The environmental rehabilitation work maintains the existing situations all through the section.					
d. The environmental rehabilitation work preserves the existing situations in the quarry site.					
e. Life skill training practiced under the given railway section meets to shoulder the challenges of livelihood change.					
f. Practicing livelihood restoration activities are a good part of the compensation.					

27. Do you have any more comments regarding the EIA;

Strengths: _____
_____

Weakness: _____
_____

Opportunities:_____
_____

Threats:_____
_____

Thank you!

2) SURVEY QUESTIONNAIRE (HHs in controlled group)

The objective of this questionnaire is to collect information related to large scale infrastructure development induced displacement, resettlement and environmental degradation in the Kombolcha railway section. The data collection is meant to fulfil the requirement for the Ph.D. program in Addis Ababa University. Hence, I request your honest and fair responses to fill up this questionnaire. If there are some questions you do not want to answer, you do not have to. Your participation in this survey is therefore completely voluntary and your responses are utmost confidential and will be used only for intended purpose.

Please put this ⌉ mark in front of your answer.

GENERAL INFORMATION

Enumerator's Name ---------- Sign. ---------- Date----------

Household Information

1. Sex ☐ Male ☐ Female
2. Age: _____
3. Marital status ☐Single ☐Married ☐Divorced ☐Widow
4. Religion

   ☐Orthodox ☐Muslim ☐Catholic

   ☐ Protestant others, specify_____
5. Highest years of schooling completed (for household head): _____
6. Family size (including head of the household): _____
7. Employment status

   ☐Own Business ☐ Private organization ☐Government ☐No job
8. Monthly income (in Birr)
   A. On farm income:_____
   B. Cattle base income: _____
   C. Inheritance income:_____
   D. Rental income:_____
   E. Other sources: _____
9. How much do you consume monthly out of your generated income (in Birr): _____
10. Did you have a plot of land or house around the railway section?

☐ Yes ☐ No 11. What type of land do you have in this section?

If your answer is yes; What was the size of the plot (in hectares)?_____

What was the size of the house (in meter square)?_____

☐ Cultivated land ☐ Grazing land ☐ Forest land ☐ Residential Others, specify: _____

12. Have you got any externalities for being around the railway section?

☐ Yes ☐ No

13. If your answer is yes, what type of externalities do you face with? _____

_____

14. What is the impact of railway development on your livelihood status?

Strengths: _____

Weakness: _____

Opportunities:_____

Threats:_____

15. Which elements of the livelihood are being worse off after expropriations? Put a tick mark on your appropriate choice.

Livelihood elements	Increase	Decrease	Remain constant
Financial			
Physical			
Social			
Human			
Natural			

16. Do you think that there is a large scale infrastructure induced environmental degradation in your area?

☐ Yes ☐ No

17. If your answer for question number 15 is yes, what types of environmental degradation have you notified? _____

Thank you!

3) Key Informant Interview Guide

INTERVIEW QUESTIONS (OFFICIALS)

The objective of this interview is to collect information related to large scale infrastructure development induced displacement, resettlement and environmental degradation in the Kombolcha railway section. The data collection is meant to fulfil the requirement for the Ph.D. program in Addis Ababa University. Hence, I request your honest and fair responses to the questions below.

Thank you for sparing your time for this interview.

PART 1: INTERVIEWEE INFORMATION

Interview Number: _____

Start time:_____ End time:_____

Position held: _____Years of experience in the position: _____

Specialty (profession): _____

Contact phone No:_____ Email: _____

PART 2: DISPLACEMENT, RESETTLEMENT AND ENVIRONMENTAL DEGRADATION RELATED INFORMATION

1. What is your role in land expropriation, compensation and resettlement for public purposes?
   A. Land expropriation roles: _____
   _____
   B. Compensation roles: _____
   _____
   C. Resettlement roles: _____
   _____
2. Would you say land is easily accessible for a large scale infrastructure development?
   _____
   _____
3. Do you think project affected persons are willing to accept compensation? Why?
   _____
4. What are the challenges associated with displacement and resettlement under land expropriation in the Kombolcha railway section?
   A. Displacement challenges: _____
   B. Resettlement challenges: _____

5. What are the effects of displacement and resettlement on the environment in the Kombolcha railway section?

_____

6. Do you think that environmental impact assessment (EIA) is fully practiced in this section of the railway project?

_____

   A. What are the strengths?_____

   _____

   B. What are the challenges?_____

   _____

7. How would you see the environmental rehabilitation work in this section of the railway?

_____

_____

_____

8. Do you think the resettlement programs for those households being displaced in this section practiced well? Why?

_____

_____

9. What is your opinion towards the livelihood restoration program for those whose landholdings were being expropriated for public purposes?

_____

_____

10. Do you have any more comments?

_____

_____

Thank you!

SURVEY QUESTIONNAIRE (OFFICIALS)

The objective of this questionnaire is to collect information related to large scale infrastructure development induced displacement, resettlement and environmental degradation in the Kombolcha railway section. The data collection is meant to fulfil the requirement for the Ph.D. program in Addis Ababa University. Hence, I request your honest and fair responses to fill up this questionnaire. If there are some questions you do not want to answer, you do not have to. Your participation in this survey is completely voluntary and your responses are utmost confidential and will be used only for intended purpose.

Please put this ⌉ mark in front of your answer.

PARTICIPANT'S INFORMATION

1. Sex ☐ Male ☐ Female
2. Age:_____
3. Highest level of schooling completed:_____
4. Position held
   ☐ Officer ☐ Team leader ☐ Director
   ☐ Manager others, specify_____
5. How many years of professional experience do you have in this type of area: _____

DISPLACEMENT, RESETTLEMENT AND ENVIRONMENT RELATED INFORMATION

6. According to the information related to displacement, resettlement and environment degradation, please give an ordinal answer for the following statements under the table.

DISPLACEMENT, RESETTLEMENT AND ENVIRONMENTAL DEGRADATION RELATED LARGE SCALE INFRASTRUCTURE DEVELOPMENT	Scale				
	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The paid compensation was equivalent with the value of the property.					
The compensation made for relocation was satisfactory.					
There is a complainant about the paid compensation that was not fair.					
The paid compensation is not enough to sustain the livelihoods of households after relocation.					
Having compensation without a total loss of properties to sustain livelihood is a good part of expropriation.					
The paid compensation would be enough if it were managed well by the expropriated property owner.					
Changing cash compensation into permanent assets is not a challenge.					
Compensations made in kinds were the same and equivalent to the extent of the property being expropriated.					
Kind compensations like life skill training are enough to practice with livelihood restoration activities.					
There is a disintegration of social ties given the resettlement.					
The current resettlement area is not totally different from the area before relocation.					
Livelihoods of expropriates have never been worse off after resettlement.					
The income of households after resettlement is better off.					
Employment opportunities after relocation are better than before.					
Economic links were not cut off during household resettlement.					
Consumption of environmental resources is increased after resettlement.					
Livelihood change due to expropriation observably affects the environment.					

7. How much have households been paid compensation per each meter square for their plots in the form of cash (in Birr)?_____

8. How much have households been paid compensation per each meter square in the form of cash (in Birr) for their demolished houses?_____
9. What type of environmental resources households are used to sustain their livelihood after resettlement? _____
10. Which element of the livelihood of the households is being worse off after expropriations? _____
11. According to the information related to Environment Impact Assessment (EIA), please give an ordinal (1 to 5) answer for the following statements under the table.

Environment Impact Assessment (EIA) under the railway section from Kemissie to Hayk	Scale				
	1	2	3	4	5
	Very poor	Poor	Fair	Good	Very good
There is an awareness level of EIA by all stakeholders.					
EIA plan fulfilled the standards under the preparation stage.					
In contents wise, EIA plan holds the necessary elements.					
EIA is being implemented according to the plan.					
There is an environmental rehabilitation activity like a refill the quarry site.					
The resettlement programs are effective.					
Life skill training matches to shoulder the costs of livelihood change.					
The livelihood restoration activities are being practiced according to the plan.					
There is an effective management to minimize the effects of livelihood change on the environment.					
Monitoring activities is being done according to EIA plan					
The evaluation of EIA implementations is done on a timely base.					
An effective measure has been taken after evaluating EIA implementations.					
There is a possible way out to revision the EIA plan.					

12. What were the main failed parts of the EIA implementation, within the given section?

_____

_____

13. What are the advantages of EIA implementation you prefer over the other?

    _____

    _____

14. What types of the environmental resources do the expropriated households miss after relocation?

    ☐ Water ☐ Grazing land ☐ Forest Others

    .

15. Which of the following are the major causes of environment degradation related to land taking in the form of expropriation in the given railway section?

    (Possible to select more than one)

    ☐ Deforestation ☐ Over cultivation ☐ Cultivation of steep slopes

    ☐ Over grazing ☐ Poor EIA practice Other_____.

16. Do you have any more comments regarding the EIA;

    Strengths: _____

    _____

    Weakness: _____

    _____

    Opportunities:_____

    _____

    Threats:_____

    _____

Thank you!

APPENDIX III: STATA Result (Output)

A. Ologit for outcome variable Human Capital

```
. ologit human sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood =  -201.1922
Iteration 1:   log likelihood = -166.11714
Iteration 2:   log likelihood = -165.26688
Iteration 3:   log likelihood = -165.26276
Iteration 4:   log likelihood = -165.26276

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =      71.86
                                                Prob > chi2       =     0.0000
Log likelihood = -165.26276                     Pseudo R2         =     0.1786
```

human	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.3038963	.4201735	0.72	0.470	-.5196286	1.127421
age	.036347	.014449	2.52	0.012	.0080274	.0646666
edu						
2	.0182716	.5428938	0.03	0.973	-1.045781	1.082324
3	1.90342	.6583693	2.89	0.004	.6130396	3.1938
4	3.804471	.8912528	4.27	0.000	2.057648	5.551295
empt						
2	-1.865961	.6807582	-2.74	0.006	-3.200223	-.5316992
3	-1.882971	.625532	-3.01	0.003	-3.108992	-.6569511
4	-.6286676	.4868036	-1.29	0.197	-1.582785	.3254499
5	-1.863999	.5595198	-3.33	0.001	-2.960638	-.7673607
gotrepl	.4340426	.3995403	1.09	0.277	-.3490419	1.217127
sati2com	-.6643502	.4479307	-1.48	0.138	-1.542278	.2135778
miswater	.7223414	.4094813	1.76	0.078	-.0802271	1.52491
misforest	.5595436	.6285846	0.89	0.373	-.6724595	1.791547
/cut1	3.130938	1.41549			.3566289	5.905247
/cut2	4.033614	1.429462			1.23192	6.835308

B. Ologit for outcome variable Physical Capital

```
. ologit physical sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood = -228.00372
Iteration 1:   log likelihood = -167.59727
Iteration 2:   log likelihood = -165.96083
Iteration 3:   log likelihood = -165.95443
Iteration 4:   log likelihood = -165.95443

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =     124.10
                                                Prob > chi2       =     0.0000
Log likelihood = -165.95443                     Pseudo R2         =     0.2721
```

physical	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.6487473	.3700517	1.75	0.080	-.0765408	1.374035
age	.0107696	.0138793	0.78	0.438	-.0164333	.0379725
edu						
2	.4469495	.5337522	0.84	0.402	-.5991856	1.493085
3	1.17809	.6347388	1.86	0.063	-.0659756	2.422155
4	-1.513533	1.039503	-1.46	0.145	-3.550922	.5238558
empt						
2	-3.036342	.8081534	-3.76	0.000	-4.620293	-1.45239
3	-.651953	.570646	-1.14	0.253	-1.770399	.4664927
4	-1.726002	.467812	-3.69	0.000	-2.642896	-.8091073
5	-.7078731	.4604759	-1.54	0.124	-1.610389	.1946431
gotrepl	.5264654	.3950019	1.33	0.183	-.2477241	1.300655
sati2com	2.440155	.5323604	4.58	0.000	1.396748	3.483562
miswater	1.339805	.3905689	3.43	0.001	.5743037	2.105306
misforest	2.056416	.7995297	2.57	0.010	.4893663	3.623465
/cut1	9.10836	1.655558			5.863525	12.35319
/cut2	11.65666	1.738482			8.249295	15.06402

C. Ologit for outcome variable Natural Capital

```
. ologit natural sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood = -224.40266
Iteration 1:   log likelihood = -191.39382
Iteration 2:   log likelihood = -190.29847
Iteration 3:   log likelihood = -190.29277
Iteration 4:   log likelihood = -190.29277

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =      68.22
                                                Prob > chi2       =     0.0000
Log likelihood = -190.29277                     Pseudo R2         =     0.1520
```

natural	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.5027915	.3809435	1.32	0.187	-.2438439	1.249427
age	.0563885	.0138288	4.08	0.000	.0292845	.0834924
edu						
2	1.646632	.5511598	2.99	0.003	.566379	2.726886
3	2.237083	.6561797	3.41	0.001	.9509949	3.523172
4	1.206875	.8024112	1.50	0.133	-.3658216	2.779572
empt						
2	.5326924	.5610527	0.95	0.342	-.5669508	1.632336
3	.8053038	.5251472	1.53	0.125	-.2239657	1.834573
4	-.0243955	.4339082	-0.06	0.955	-.8748399	.8260489
5	-.6731517	.4867863	-1.38	0.167	-1.627235	.2809321
gotrepl	.8637342	.3652931	2.36	0.018	.1477728	1.579696
sati2com	-1.523198	.4349073	-3.50	0.000	-2.3756	-.6707952
miswater	.738433	.3632846	2.03	0.042	.0264083	1.450458
misforest	-1.404184	.5280356	-2.66	0.008	-2.439114	-.3692528
/cut1	1.579019	1.33345			-1.034494	4.192533
/cut2	3.882843	1.365228			1.207045	6.55864

D. Ologit for outcome variable Financial Capital

```
. ologit financial sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood = -109.35228
Iteration 1:   log likelihood = -71.503033
Iteration 2:   log likelihood = -56.347508
Iteration 3:   log likelihood = -52.823048
Iteration 4:   log likelihood = -52.311974
Iteration 5:   log likelihood = -52.215492
Iteration 6:   log likelihood = -52.193079
Iteration 7:   log likelihood = -52.188022
Iteration 8:   log likelihood = -52.186934
Iteration 9:   log likelihood = -52.186747
Iteration 10:  log likelihood = -52.186727
Iteration 11:  log likelihood = -52.186723

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =     114.33
                                                Prob > chi2       =     0.0000
Log likelihood = -52.186723                     Pseudo R2         =     0.5228
```

financial	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.6534979	.6034695	1.08	0.279	-.5292806	1.836276
age	.1658135	.0341398	4.86	0.000	.0989007	.2327262
edu						
2	22.72438	1409.987	0.02	0.987	-2740.799	2786.247
3	21.33187	1409.986	0.02	0.988	-2742.191	2784.854
4	20.33849	1409.986	0.01	0.988	-2743.184	2783.861
empt						
2	5.32499	1.30937	4.07	0.000	2.758671	7.891309
3	5.537241	1.297988	4.27	0.000	2.993232	8.081251
4	2.12647	.9165336	2.32	0.020	.330097	3.922843
5	1.349703	.9781782	1.38	0.168	-.5674907	3.266897
gotrepl	-.2828192	.7323079	-0.39	0.699	-1.718116	1.152478
sati2com	-1.995232	.6371106	-3.13	0.002	-3.243946	-.7465185
miswater	.0439269	.7353633	0.06	0.952	-1.397359	1.485213
misforest	-21.27204	1598.594	-0.01	0.989	-3154.458	3111.914
/cut1	7.530394	2131.564			-4170.259	4185.319

E. Ologit for outcome variable Social Capital

```
. ologit social sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood = -168.16819
Iteration 1:   log likelihood = -123.41448
Iteration 2:   log likelihood = -115.17861
Iteration 3:   log likelihood = -114.65407
Iteration 4:   log likelihood = -114.64724
Iteration 5:   log likelihood = -114.64723

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =     107.04
                                                Prob > chi2       =     0.0000
Log likelihood = -114.64723                     Pseudo R2         =     0.3183
```

social	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.8012115	.4671164	1.72	0.086	-.1143198	1.716743
age	-.0294567	.0168487	-1.75	0.080	-.0624796	.0035663
edu						
2	-1.718438	.6432708	-2.67	0.008	-2.979225	-.45765
3	-1.293994	.7979034	-1.62	0.105	-2.857856	.2698678
4	-1.339943	1.350138	-0.99	0.321	-3.986165	1.306279
empt						
2	-2.826915	1.154709	-2.45	0.014	-5.090104	-.5637267
3	-1.229411	.7975712	-1.54	0.123	-2.792621	.3338002
4	-.3735311	.6456549	-0.58	0.563	-1.638991	.8919291
5	-.2607727	.5972346	-0.44	0.662	-1.431331	.9097855
gotrepl	1.275402	.5075878	2.51	0.012	.2805481	2.270256
sati2com	3.335253	1.215826	2.74	0.006	.9522769	5.718228
miswater	3.264779	.5072904	6.44	0.000	2.270508	4.25905
misforest	-1.76211	.6621314	-2.66	0.008	-3.059864	-.4643565
/cut1	9.823961	2.735975			4.461549	15.18637
/cut2	11.60929	2.775459			6.169491	17.04909

F. Ologit for outcome variable Overall Sustainability

```
. gen overall_sust = ( human+ physical+ natural+ financial+ social)/5

. ologit overall_sust sex age i. edu i. empt gotrepl sati2com miswater misforest

Iteration 0:   log likelihood = -425.00572
Iteration 1:   log likelihood = -383.13871
Iteration 2:   log likelihood = -381.28259
Iteration 3:   log likelihood = -381.27178
Iteration 4:   log likelihood = -381.27178

Ordered logistic regression                     Number of obs     =        211
                                                LR chi2(13)       =      87.47
                                                Prob > chi2       =     0.0000
Log likelihood = -381.27178                     Pseudo R2         =     0.1029
```

overall_sust	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
sex	.7261388	.3195547	2.27	0.023	.0998231	1.352455
age	.0474172	.0120821	3.92	0.000	.0237368	.0710976
edu						
2	.949521	.474434	2.00	0.045	.0196474	1.879395
3	2.269885	.5633639	4.03	0.000	1.165712	3.374058
4	1.500571	.7069951	2.12	0.034	.1148866	2.886256
empt						
2	-1.067988	.5512939	-1.94	0.053	-2.148504	.0125286
3	-.617679	.474931	-1.30	0.193	-1.548527	.3131687
4	-.6982124	.4260921	-1.64	0.101	-1.533338	.1369128
5	-1.265332	.409009	-3.09	0.002	-2.066975	-.4636896
gotrepl	.9282186	.3667267	2.53	0.011	.2094474	1.64699
sati2com	-.293485	.3730486	-0.79	0.431	-1.024647	.4376769
miswater	1.990214	.3513236	5.66	0.000	1.301632	2.678796
misforest	-1.589488	.5447219	-2.92	0.004	-2.657123	-.5218525
/cut1	2.129467	1.178488			-.1803272	4.439261
/cut2	3.873121	1.173856			1.572405	6.173836
/cut3	4.983398	1.194403			2.642411	7.324386
/cut4	5.461747	1.20432			3.101323	7.822171
/cut5	5.982278	1.217285			3.596444	8.368113
/cut6	6.60039	1.232174			4.185373	9.015407
/cut7	8.022512	1.26687			5.539491	10.50553

G. Two-sample Wilcoxon rank-sum (Mann-Whitney) test

```
. ranksum human , by ( gotrepl )

Two-sample Wilcoxon rank-sum (Mann-Whitney) test
```

gotrepl	obs	rank sum	expected
0	78	9366	8346
1	135	13425	14445
combined	213	22791	22791

```
unadjusted variance    187785.00
adjustment for ties    -41417.04
                       ----------
adjusted variance      146367.96

Ho: human(gotrepl==0) = human(gotrepl==1)
                z =    2.666
    Prob > |z| =    0.0077
```

H. Wilcoxon rank-sum test (Non-parametric test) for Income

```
. ranksum income , by( displaced)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test
```

displaced	obs	rank sum	expected
0	59	8687.5	6313
1	154	14103.5	16478
combined	213	22791	22791

```
unadjusted variance    162033.67
adjustment for ties       -46.58
                       ----------
adjusted variance      161987.09

Ho: income(displa~d==0) = income(displa~d==1)
                z =    5.900
    Prob > |z| =    0.0000
```

I. Wilcoxon rank-sum test (Non-parametric test) for Expenditure

```
. ranksum expenditure , by( displaced)

Two-sample Wilcoxon rank-sum (Mann-Whitney) test

   displaced |       obs    rank sum    expected
-------------+---------------------------------
           0 |        59        8038        6313
           1 |       154       14753       16478
-------------+---------------------------------
    combined |       213       22791       22791

unadjusted variance   162033.67
adjustment for ties      -41.45
                     ----------
adjusted variance     161992.22

Ho: expend~e(displa~d==0) = expend~e(displa~d==1)
              z =    4.286
    Prob > |z| =    0.0000
```

J. Treatment Effect of the Income

```
. teffects psmatch (income) (displaced employment sex age education familysize)

Treatment-effects estimation                    Number of obs      =        213
Estimator      : propensity-score matching      Matches: requested =          1
Outcome model  : matching                                   min =          1
Treatment model: logit                                      max =          5
------------------------------------------------------------------------------
             |               AI Robust
      income |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ATE          |
   displaced |
   (1 vs 0)  | -141407.1   41030.25    -3.45   0.001    -221824.9   -60989.34
```

K. Treatment Effect of the Expenditure

```
. teffects psmatch (expenditure) (displaced sex employment age education familysize)

Treatment-effects estimation                    Number of obs      =        213
Estimator      : propensity-score matching      Matches: requested =          1
Outcome model  : matching                                      min =          1
Treatment model: logit                                         max =          5
```

expenditure	Coef.	AI Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ATE						
displaced (1 vs 0)	-134032.2	46138.57	-2.90	0.004	-224462.1	-43602.24

L. Normality Test

```
. swilk comamt satcom incom exp , lnnormal
```

Shapiro-Wilk W test for 3-parameter lognormal data

Variable	Obs	W	V	z	Prob>z
comamt	154	0.51854	57.299	-1.380	0.91613
satcom	154	0.64509	42.239	-1.380	0.91613
incom	154	0.49798	59.746	-1.380	0.91613
exp	154	0.79744	24.107	-1.380	0.91613

M. Probit Regression

```
. probit satis lcomamt lsatcom sex marl relg empy age edu fam lincom repl

Iteration 0:   log likelihood = -73.017454
Iteration 1:   log likelihood = -36.359305
Iteration 2:   log likelihood = -28.604335
Iteration 3:   log likelihood = -26.680277
Iteration 4:   log likelihood =  -26.61851
Iteration 5:   log likelihood = -26.618374
Iteration 6:   log likelihood = -26.618374

Probit regression                                 Number of obs     =        154
                                                  LR chi2(11)       =      92.80
                                                  Prob > chi2       =     0.0000
Log likelihood = -26.618374                       Pseudo R2         =     0.6355
```

satis	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lcomamt	2.854211	.6278795	4.55	0.000	1.62359	4.084832
lsatcom	-2.818253	.6508868	-4.33	0.000	-4.093967	-1.542538
sex	-.9050793	.5822652	-1.55	0.120	-2.046298	.2361395
marl	2.334335	.8462185	2.76	0.006	.6757768	3.992893
relg	2.325933	.8290091	2.81	0.005	.7011049	3.950761
empy	.0843167	.5123773	0.16	0.869	-.9199244	1.088558
age	.0016604	.0213528	0.08	0.938	-.0401904	.0435112
edu	.7912911	.3035946	2.61	0.009	.1962567	1.386326
fam	-.0127437	.193274	-0.07	0.947	-.3915537	.3660663
lincom	.0032125	.1366867	0.02	0.981	-.2646884	.2711134
repl	.8934091	.566958	1.58	0.115	-.2178081	2.004626
_cons	-8.888688	4.399682	-2.02	0.043	-17.51191	-.2654707

N. Marginal Effects

```
. margins, dydx(lcomamt lsatcom sex marl relg empy age edu fam repl)

Average marginal effects                        Number of obs     =        154
Model VCE    : OIM

Expression   : Pr(satis), predict()
dy/dx w.r.t. : lcomamt lsatcom sex marl relg empy age edu fam repl
```

	Delta-method					
	dy/dx	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lcomamt	.2751041	.0453262	6.07	0.000	.1862663	.3639419
lsatcom	-.2716381	.0485446	-5.60	0.000	-.3667838	-.1764923
sex	-.0872361	.054501	-1.60	0.109	-.1940561	.019584
marl	.2249961	.0743676	3.03	0.002	.0792382	.370754
relg	.2241851	.0670938	3.34	0.001	.0926836	.3556866
empy	.0081261	.0494596	0.16	0.869	-.0888129	.105065
age	.00016	.0020567	0.08	0.938	-.003871	.0041911
edu	.0762688	.0262005	2.91	0.004	.0249168	.1276208
fam	-.0012284	.0186285	-0.07	0.947	-.0377395	.0352827
repl	.0861111	.0520581	1.65	0.098	-.0159209	.1881432

O. Ordered logistic regression

```
. ologit natural marl relg edu_dummy2 edu_dummy3 edu_dummy4 age

Iteration 0:   log likelihood = -146.33501
Iteration 1:   log likelihood =  -107.8805
Iteration 2:   log likelihood =  -106.7076
Iteration 3:   log likelihood = -106.47966
Iteration 4:   log likelihood = -106.42747
Iteration 5:   log likelihood = -106.41626
Iteration 6:   log likelihood = -106.41394
Iteration 7:   log likelihood = -106.41342
Iteration 8:   log likelihood = -106.41329
Iteration 9:   log likelihood = -106.41327
Iteration 10:  log likelihood = -106.41326

Ordered logistic regression                     Number of obs     =        154
                                                LR chi2(6)        =      79.84
                                                Prob > chi2       =     0.0000
Log likelihood = -106.41326                     Pseudo R2         =     0.2728
```

natural	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
marl	1.500888	.656553	2.29	0.022	.2140672	2.787708
relg	-14.60127	939.6484	-0.02	0.988	-1856.278	1827.076
edu_dummy2	1.413436	.6016947	2.35	0.019	.2341359	2.592736
edu_dummy3	3.992206	.8620557	4.63	0.000	2.302607	5.681804
edu_dummy4	20.79955	1818.172	0.01	0.991	-3542.752	3584.351
age	.0840187	.0207878	4.04	0.000	.0432754	.1247619
/cut1	-5.749641	939.6499			-1847.43	1835.93
/cut2	-4.679087	939.65			-1846.359	1837.001

P. Treatment Effects Natural element on Displaced Household

```
. teffects psmatch (natural) ( repl edu relg age lincom)

Treatment-effects estimation                   Number of obs      =        154
Estimator      : propensity-score matching     Matches: requested =          1
Outcome model  : matching                                  min =          1
Treatment model: logit                                     max =          5
```

natural	Coef.	AI Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ATE						
repl (1 vs 0)	-.5194805	.0806776	-6.44	0.000	-.6776057	-.3613553

1. More explanations with some pictures from the field

1.1. Focus Group Discussion Photo

Source: Author, 2023

1.2. Key Informant Photo

Source: Author, 2023

1.3. Key Informant Photo

Source: Author, 2023

2. Displaced Household Resettlement Areas without Infrastructure (Kombolecha Area)

Source: Author, 2023

3.Displaced Household Resettlement Areas without Infrastructure

Source: Author, 2023

4.Displaced Household Resettlement Areas without Infrastructure

Source: Author, 2023

5.Railway Section

Source: Author, 2023

6.Railway Section

Source: Author, 2023

7.Railway Section

Source: Author, 2023

8.Railway Section

Source: Author, 2023

9.Railway Section

Source: Author, 2023