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Implication of Mining Activities to Socio-economic Transformation Among Communities Adjacent to Mining Centers in Tanzania

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ABSTRACT

The Socio-economic transformation of communities adjacent to mines is indeterminate, necessitating this study amid the rapid expansion of mining activities in mineral-endowed areas. This paper identified the contribution of mining activities to the socio-economic transformation of people living adjacent to mining sites in Tanzania, specifically in Patamela, Saza, Maleza, and Mbangala villages of Songwe District in Songwe Region. A cross-sectional design and mixed-methods approach were adopted, while random and purposive sampling were used. Household questionnaires, key informant interviews, and observation were used to obtain data, while SPSS and content analysis were used for qualitative and quantitative data analysis, respectively. Communities adjacent to mining centers have generated income, replaced low-quality housing, and met livelihood needs. Through mining activities, households have also acquired natural, financial, and human capital. Nevertheless, environmental pollution, disease outbreaks, damage to houses and infrastructure, and soil and land degradation are more prevalent in these areas. To improve livelihood transformation in these mining-adjacent communities, it is essential to provide financial education, establish environmental restoration programs, facilitate diversified income sources, create local employment and self-employment opportunities, and strengthen local supply chains.

Keywords: Communities, Livelihood, Mining centers, & Socio-economic Transformation

1. Introduction

Mining activities contribute significantly to Gross Domestic Product (GDP) in most nations with different mineral endowments (Baddianaah, 2021). In Africa, mineral endowment is found in many nations, including Congo, Tanzania, Malawi, Zambia, South Africa, and Botswana (Baguma et al., 2025). Mineral resource endowments in these countries contribute significantly to export earnings, state finances, and sustainable, trajectory growth (Ankenbrand et al., 2021). Among all minerals, gold accounts for the largest share of earnings generation; in Ghana, it contributes 13.5% of national GDP (Bowman et al., 2021).

With the largest share of mineral production in Africa, the question remains whether such mining contributes to livelihood transformations, economically and socially, in communities adjacent to mining centers in Africa (Baguma et al., 2025). Despite persistent poverty in Africa, often associated with the resource curse, the role of mining and minerals in transforming the livelihoods of adjacent communities, economically and socially, remains a key question (Benites, 2020; Purnomo et al., 2021). Despite Zambia being a leading country in copper production in Africa and contributing significantly to the global market, 60% of communities in these

mining areas still live below the poverty line and in a very low quality of life, even as the country's economic output doubled during 2015–2025 (Hatcher & Lander, 2023).

Across other social indicators in Africa, a mystery remains: despite rising per capita income, African mineral-endowed countries, including Angola, Gabon, Nigeria, and Congo, still show limited evidence that mining contributes to the availability and accessibility of social services and welfare (Poncian, 2023). In these areas, access to health, education, and other social services remains limited, while poor housing, hunger, and malnutrition still define these mining-adjacent communities (Abeid et al., 2022).

In Tanzania, the national economy benefits significantly, as gold exports contribute USD 1.3 billion to total annual exports, accounting for 90% of annual national mineral exports and 22% of all national exports (Pedersen, 2025). Tanzania is endowed with several mineral types, including Tanzanite in Mirerani, Gold in Geita, Songwe, and Kahama, Diamonds in Mwadui, gypsum in Tanga, Singida, and Mbeya, coal in Ruvuma, and Iron in Liganga and Mchuchuma (Pedersen, 2023; Nyaombo, 2024). In Tanzania, the mining sector generally contributes 3.5% of GDP, with projections to reach 15% by 2030 (Tycholiz & Polus, 2022). Additionally, the mining sector contributes significantly to the global mineral market, accounting for 1.5% of world gold mining output (Ulukan et al., 2022). In the nation, the largest benefits accrue at the central state level, and national priorities determine how mining income is allocated, with little consideration for communities in mining areas (BOT, 2018).

National efforts to end poverty link mining activities only minimally, and the sector's role in changing the livelihood forms of mining communities is often underappreciated (Haway, 2016; BOT, 2018). Underestimating this role limits the sector's potential to end poverty while ensuring sustainable livelihoods for communities adjacent to mining areas (Fernandes et al., 2020).

Furthermore, settlements near mining operations in Songwe District are extremely poor, as the district lags behind other districts in the Songwe Region in economic development. Living conditions for local communities near gold mines in Songwe District are manifestly substandard, lacking even the most necessities for human health (Songwe District Profile Report, 2015). In light of these empirical shortfalls, this paper sought to explore the factors behind the prevalence of poor living conditions among local communities living close to mining centers in Songwe District and identify the sectors contributing to livelihood transformation in these adjacent communities.

2. Methods

The study was carried out in four villages: Patamela, Saza, Maleza, and Mbangala of Songwe District in Songwe Region, Tanzania, located at coordinates 08 42' 38''S and 33 02' 90''E (Figure 1). The District and region are located in Tanzania's southwestern highlands, bordering Katavi and Rukwa regions to the west and Zambia to the south. According to the 2022 census report, the district is populated by 67,603 females and 66,189 males, who mainly engage in agriculture, livestock keeping, mining, fishing, forestry, hunting, and tourism.

The study adopted a cross-sectional research design using both quantitative and qualitative approaches. Respondents were selected through simple random sampling for the questionnaire survey and purposive sampling for key informant interviews. Observation and documentary review were also used to obtain information. For simple random sampling, the sample size was determined using the Yamane Formula;

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = required sample size, N = population size, E = margin of Error (.05)/ Degree of accuracy at 95% confidence level (0.05).

Therefore;

$$n = \frac{1566}{1+1566(0.05)^2} = 3.18.6 \approx 319$$

Furthermore, the study sample size was 319 respondents.

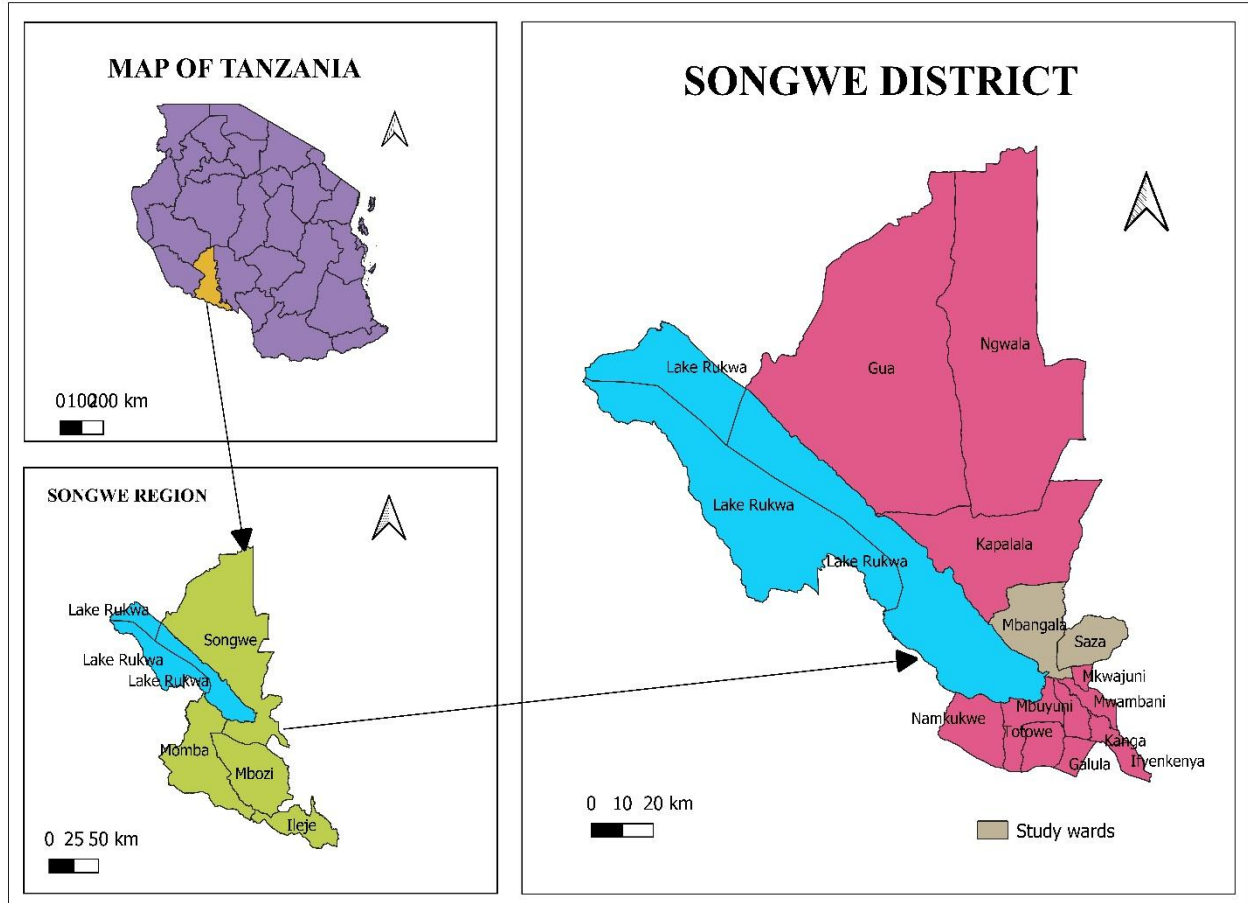


Figure1. A Map of Tanzania Showing Location of the Study Area.

3. Result and Discussion

3.1. Socio-economic characteristics of respondents

The study identified socio-economic characteristics of respondents, including age, gender, education, marital status, and occupation (Table 1). The study included respondents aged 18 years and above. The majority of respondents (72.1%) were aged 18 to 35, reflecting the age group that mostly provides labor in mining centers and other economic activities (Nyaombo & Majule, 2022).

The study included both males and females, with more respondents being male (52.3%), similar to other studies (Nkedianye et al., 2020) which show that mining activities engage more males than females. Also, in African communities, household heads are more often male than female (Nyaombo & Majule, 2024). In terms of respondents' education level, more than half of study respondents (58.7%) had attained only primary education. In African societies, most people attain only compulsory primary education, and few attain other higher levels of education (Chalchissa & Chala, 2020; Nyaombo, 2026).

The study identified respondents' occupation or main household income-generating activity. More than half (51%) of respondents practiced small-scale mining as their primary income source, along with other activities.

Table 1. Socio-economic Characteristics of Study Respondents

Socio-economic characteristics (N = 319)		Frequency	Percentage
Age	18 – 35	230	72.1
	36 – 50	59	18.6
	50+	30	9.3
Gender	Male	167	52.3
	Female	152	47.7
Education level	Informal Education	19	9.5
	Primary Education	118	58.7
	Secondary School	59	26.9
	Middle College	8	1.5
	University	13	3.5
Occupation	Small-scale mining	164	51.3
	Pastoralism	15	4.6
	Crop farming	62	19.5
	Employed	21	6.6
	Self employed	57	18
Marital status	Single	79	24.7
	Married	205	64.4
	Separated	12	3.6
	Divorced	18	5.7
	Widow/widower	5	1.5

3.2 Mining Activities and Rural Community Livelihood Transformation

Mining activities are considered the primary source of income for communities adjacent to mining centers. Most of the economic activities that are carried out in the adjacent communities are influenced by mineral extraction activities. Among respondents, 73.1% acknowledged that mining activities positively contributed to their livelihood development, while 26.9% reported no contribution. Mining activities enabled them to build modern houses, generate household income, secure clean water, and afford health services.

The study found that 37.6% of respondents replaced their local houses with modern houses built with cement bricks, burnt bricks, and iron sheet roofs instead of grass roofs. Furthermore, only 12.3% of respondents had modern houses before the New Luika Gold Mine commenced in the study areas, when community members began engaging in mining activities. Respondents claimed they earned well from mining activities, which contributed significantly to modernizing their houses.

The study also assessed income-source diversification and household-level income generation. Before mining began in the study areas, crop production was the dominant economic activity. Since mining began, 33.6% of respondents made mining their primary income source, along with other activities. The remaining 66.4% use mining as an alternative income source and therefore diversify household income.

Mining activities brought education services to communities adjacent to these mines. Among the Luika Gold Mine's contributions to adjacent communities was building a school in these areas, where pupils had to walk miles to get an education. More than half (74.8%) of respondents also managed to afford their children's and relatives' school requirements through income generated from mining. In a key informant interview, a key respondent reported a deficit of 87 classrooms in these adjacent villages, which was reduced when Luika Gold Mine built a school.

Luika Gold Mine also helped build classrooms in other schools, buy desks, and support schools in obtaining stationery, including Mbangala Primary School, Patamela Primary School, and Saza Primary School. Overall, the gold mining company has built 20 classrooms, 20 houses for teachers working in these schools, and 14

teachers' offices. The three school science laboratories were also built with support from the Luika Gold Mine. Furthermore, a key informant interview indicated that the mining company provided 90 scholarships to poor families in adjacent communities.

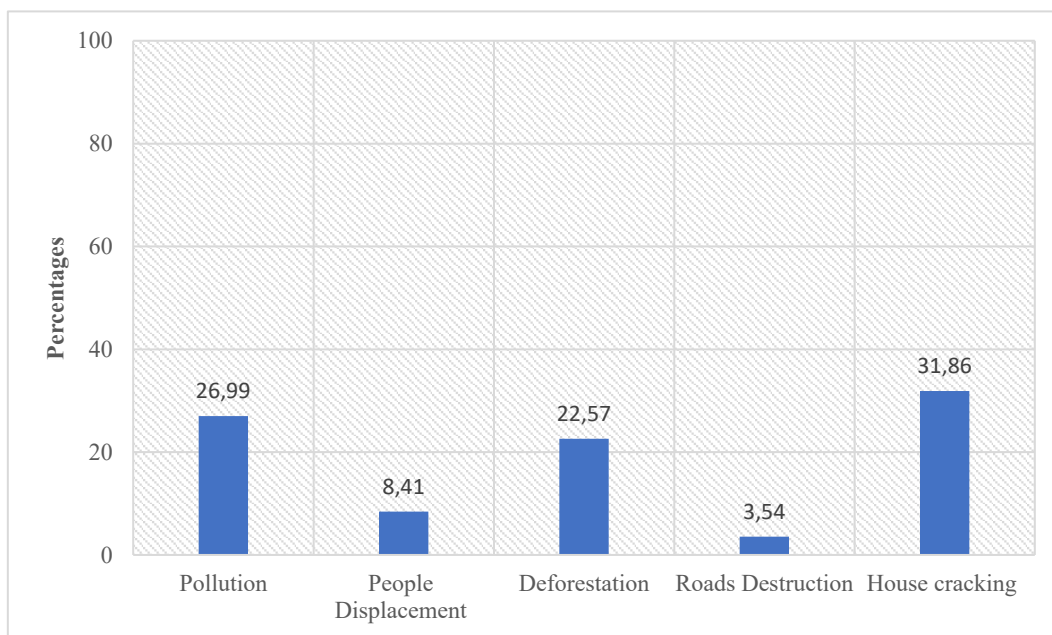
100% of study respondents living adjacent to mining centers accessed water services supplied by the mining centers, though the services were seasonal. The Shata Gold Mining Company made the water supply possible, and it was one of its returns to the surrounding community. Observations indicated 20,000-liter projects at Mbangala Primary School and a 7,000-liter water reserve at Saza Secondary School, supplying water to the whole Saza village. Some respondents reported that three water boreholes were dug in the study areas.

Although some respondents reported challenges with social services in the study areas, 74.6% were satisfied with the health care services provided by the mining companies. Communities adjacent to mining centers, such as Maleza and Mbongela villages, had to walk more than 4.5 km to access health services before the mining companies established a health center. Furthermore, the centers provided maternal health care services, and solar power was installed alongside housing built to accommodate health care staff. Therefore, the mining center improved access to health services for community members and better accommodated health workers, improving service delivery.

Overall, NLGM's presence and activities in surrounding villages contributed significantly to improved local livelihoods. Community members invested their earnings in transportation services, small petty businesses, and artisanal mining. Through these activities, households generated income, built better homes, met basic livelihood needs, and improved their access to livelihood assets.

3.3 The undesirable side of mining activities to adjacent communities

The study identified several adverse effects of mining activities in the study areas (Figure 2). Pollution, people's displacement, deforestation, land degradation, road destruction, and house cracking were noted.



Study findings indicated that 26.99% of respondents experienced pollution from mining activities in three different states, in liquid, solid, and air forms. Mining liquid wastes were left to flow into nearby communities due to poor disposal mechanisms, and some ended up in ponds and temporary dams. Poor solid waste disposal also increased waste dispersal in residential areas and led to foul-smelling air. These led to outbreaks of diseases such as cholera, diarrhea, and malaria (Arhin et al., 2022).

Furthermore, mining activities resulted in the displacement of 8.41% of people in adjacent communities. People were forced to flee their former residential areas so mining activities could be established there. Despite limited financial compensation, people struggled to find new places to live. Mining in several areas has resulted

in land alienation and land grabbing, leading to environmental refugees and people's displacement (Pedersen et al., 2021).

Study results indicated a 22.57% increase in deforestation in the study areas. Mining activities result in deforestation by opening areas where mining activities can be conducted. Also, tree logs are used in mining activities, which influences deforestation. Mining activities have resulted in forest loss, biodiversity loss, and species extinction in several regions where they are carried out (Nyaombo, 2026). Land degradation has been experienced by 6.64% of respondents, including soil erosion and soil degradation. Wearing and disintegration of the land surface reduce soil fertility and productivity and are commonly observed in mining areas (Agariga et al., 2021).

The study also observed infrastructure destruction and cracking from land shaking caused by mining explosions and found that 31.86% of respondents reported that blasting activities associated with mining negatively affected their livelihoods, particularly through damage to residential houses. These impacts include physical disturbances caused by mining, such as cracks in buildings and deterioration of surrounding infrastructure and the general environment. Respondents reported that intense noise and vibrations during blasting often caused wall cracks and, in some cases, severe damage to roofs and other parts of buildings. The problems became particularly severe during the blasting and fragmentation of gold-bearing rocks. Similar cases of cracked houses and damaged roads have also been widely reported in communities located near mining operations (Hilson et al., 2025).

3.4 Strategies to Enhance Livelihood Transformation by Mining to Adjacent Communities

Providing financial education to communities in the study areas and other mining-adjacent communities is a critical, core strategy for enhancing livelihood transformation. Respondents in the study areas revealed a strong demand for financial education to use mining income effectively to drive social and economic transformation. This is especially relevant in areas where people depend on natural resources for their livelihoods and economic development (Dubois, 2024). Financial literacy can transform livelihoods, as some improvements require investment.

Environmental restoration programs can reduce the large funding required to address environmental challenges resulting from mining activities. Regulations and policies should provide mechanisms to use a portion of mining income to restore degraded land and polluted environments. In some areas, the Polluter Pays Principle, waste-disposal cost-sharing, penalties, and sanctions effectively restore mining-degraded land and reduce potential impacts on adjacent communities (Sahoo et al., 2020). Rehabilitating mining areas supports sustainable farming and forestry, enhances ecosystem services and functions, and supports sustainable livelihoods.

Diversifying livelihood income sources is essential for sustainable mining practices and environmental conservation. Reducing overdependence on natural resources creates an opportunity to conserve resources sustainably while securing the future of the surrounding communities. Communities should diversify their income by securing capital, including natural capital, financial capital, and other livelihood assets. Petty business, commercial farming, livestock keeping, and other livelihood means could offer strong opportunities to diversify income sources in mining centers and reduce the potential effects of mining activities (BOT, 2018; Ofosu et al., 2024).

Study respondents suggested that mining should support skills development and create local employment. Mining should mean more, building human capital and not being limited to mineral extraction (Asare et al., 2024). Mining income could help establish vocational training centers, prioritize local and indigenous employment, sponsor and provide scholarships for community students, and formalize informal skills to improve employability in adjacent mining communities (Botchwey & Yankey, 2023).

Another potential means is strengthening local supply chains. Communities should benefit from mining revenues from mines located on their premises. Mining income could fund and support local procurement policies, train local entrepreneurs to meet quality and safety standards, and facilitate access to finance and local

supplies (Samuel et al., 2022). Such practices would help transform socio-economic conditions in these mining-adjacent communities.

4. Conclusion

Communities outside mining centers benefit little from mining income, especially when regulations restrict movement. To transform communities' livelihoods, they cannot depend solely on mining contributions; income diversification is also inevitable. Access to education, water, and food security is not enough; communities must secure a better standard of living to achieve livelihood transformation. Challenges such as land degradation, soil erosion, pollution, displacement, and deforestation must be addressed quickly through measures such as afforestation and reforestation to restore ecosystems while sustainably enhancing livelihoods.

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6. Conflict of Interest

The authors declare no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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