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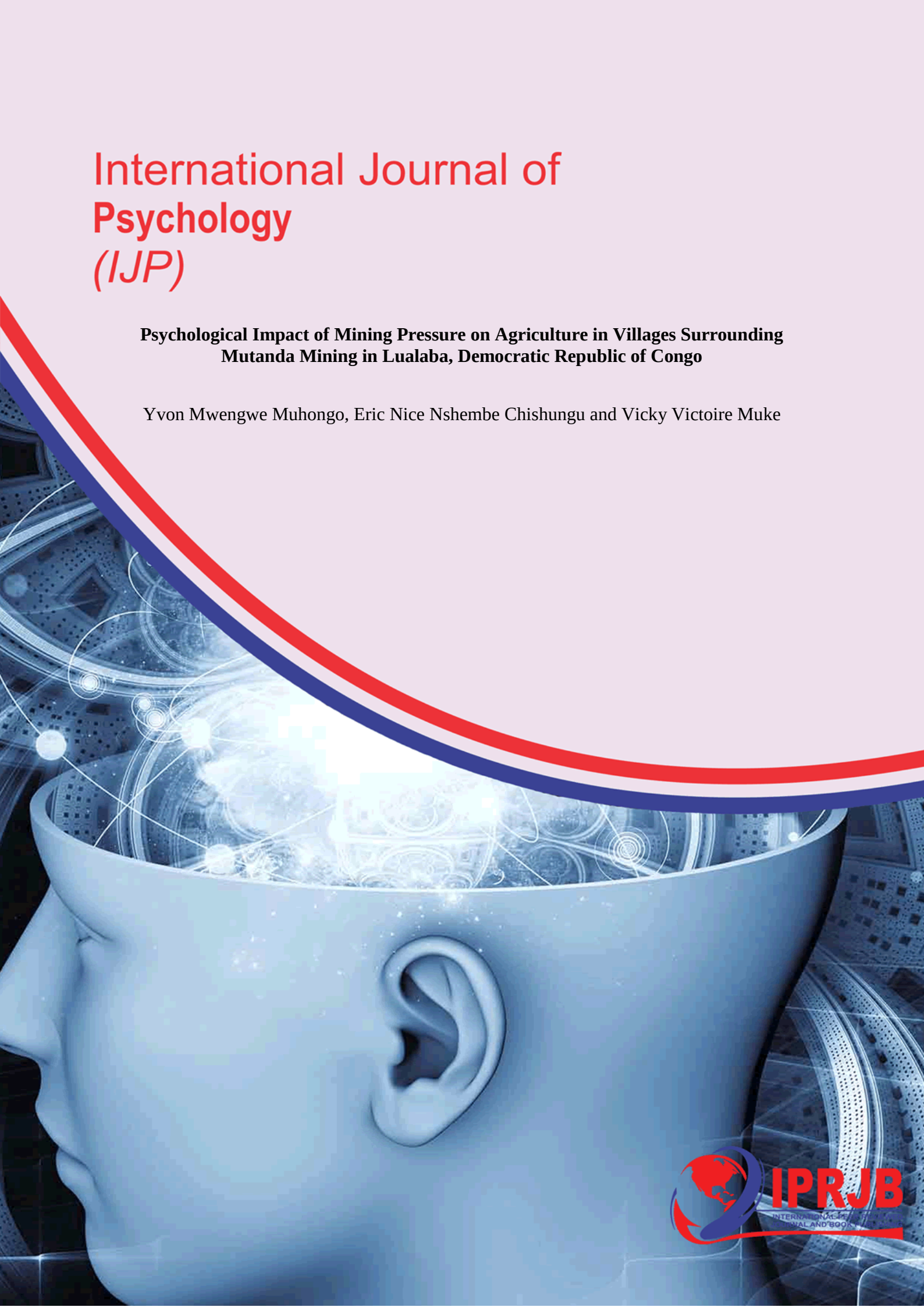

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Psychological Impact of Mining Pressure on Agriculture in Villages Surrounding Mutanda Mining in Lualaba, Democratic Republic of Congo

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Abstract

Purpose: This study investigates the socio-environmental and psychological impacts of large-scale mining on rural agricultural communities surrounding Mutanda Mining (MUMI) in Lualaba Province, Democratic Republic of Congo.

Methodology: Between May and August 2025, mixed-method data were collected from 15 villages within a 1–15 km radius of the mining concession, including household surveys (n = 150), focus group discussions (n = 5), and key informant interviews (n = 18).

Findings: Quantitative results show that 72% of households reported declining agricultural productivity over the past five years, while 64% experienced reduced access to arable land due to mining-driven land conversion. Environmental perceptions indicate that 81% observed increased dust emissions and 69% reported worsening water quality. Correlation analysis reveals a significant positive relationship between proximity to the mine and perceived environmental degradation ($r = 0.63$, $p < 0.01$), and a negative association between distance and livelihood vulnerability ($r = –0.47$, $p < 0.05$). Qualitative findings highlight psychological stress linked to deforestation, soil degradation, pollution fears, and weakening cultural identity.

Unique Contribution to Theory, Practice and Policy: The study concludes that mining activities impose substantial psychological, environmental, and socioeconomic pressures on rural communities. It calls for robust environmental monitoring, enhanced community participation, and the integration of mental-health-sensitive livelihood support measures.

Keywords: *Mining Pressure, Psychological Stress, Rural Vulnerability, Community Resilience*

JEL Classification: *Q01, Q12, Q15, Q56, O13, O18, I31, I39, R11, R58*

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INTRODUCTION

Lualaba Province of the Democratic Republic of Congo (DRC), has become a major global center for industrial copper and cobalt extraction. Mutanda Mining (MUMI), a subsidiary of Glencore, stands among the most influential operators, significantly contributing to national revenue mining represented over 95% of Lualaba's provincial income in 2023 according to the Ministère des Mines. Yet this expansion has profoundly reshaped the rural landscape. Communities living around the MUMI concession, traditionally dependent on small-scale family farming, now face reduced access to arable land, soil and water contamination, declining yields, and a progressive shift toward mining-related incomes (Swii'ma, Rushigira & Munguakonkwa, 2017; Juma, 2024). These transformations not only undermine agricultural livelihoods but also generate uncertainty about the future and disrupt cultural and professional identities rooted in farming. While such socio-environmental pressures are widely recognized, their psychological consequences remain poorly documented in Lualaba.

Growing evidence from Southern Africa and other extractive regions demonstrates that proximity to mining operations often leads to chronic stress, anxiety, mental fatigue, and a sense of social displacement due to environmental degradation and weakening community structures (Havenga & Bester, 2025; Thorne & Walker, 2011; Cunsolo et al., 2020). In the DRC, existing studies focus mainly on environmental pollution and economic vulnerability (Swii'ma et al., 2017; Hilson, 2020; Juma, 2024), leaving aside the psychological dimensions of land dispossession, declining agricultural productivity, and increased livelihood instability factors known to produce long-term emotional strain (Ward & Jackson, 2021; Dapi, 2022). These deficiencies persist despite national health reports acknowledging mental health as a key determinant of rural resilience (Ministère de la Santé, 2022). The psychological impacts of mining-driven resource loss therefore represent a critical but understudied dimension of rural vulnerability in Lualaba.

To conceptualize these processes, this study draws on the Conservation of Resources (COR) Theory, which argues that real or perceived losses of essential resources such as land, income stability, social status, and cultural identity are major predictors of psychological stress (Hobfoll, 1989). In the context of mining expansion, these losses are likely to mediate the link between mining pressure and mental health outcomes, particularly stress, anxiety, depressive symptoms, and diminished subjective well-being (Cernea, 1997; Ward & Jackson, 2021). At the same time, research on community resilience shows that social cohesion, cultural continuity, shared beliefs, and collective coping strategies may buffer negative psychological effects by reinforcing a sense of belonging and stability in rapidly changing environments (Kowalski & Smith, 2023; Zandonai et al., 2019; Berry et al., 2018). Understanding how these protective mechanisms operate is essential for explaining why some households exhibit stronger resilience than others despite facing similar external pressures.

Against this backdrop, the present study examines how mining pressure from MUMI shapes the psychological well-being of farmers in adjacent villages. It identifies major sources of stress and anxiety linked to the coexistence of industrial mining and traditional agriculture, measures levels of psychological distress—including stress, anxiety, depressive symptoms, and subjective well-being—and analyzes the moderating role of social support, cultural cohesion, and community-based resilience. Three questions guide this research: (1) How does mining pressure affect the psychological well-being of farmers living around MUMI? (2) Through which mechanisms do land loss, declining agricultural productivity, and livelihood uncertainty contribute to psychological distress? (3) To what extent do social support networks and

community resilience mitigate these impacts? Based on prior evidence, the study hypothesizes that farmers closest to the mining concession exhibit higher levels of psychological distress (H1); that resource losses mediate the relationship between mining pressure and mental health outcomes (H2); and that community resilience moderates and reduces these negative effects (H3). By addressing these questions, the study contributes to a deeper understanding of the psychosocial transformations occurring in one of the DRC's most rapidly changing mining regions.

LITERATURE SURVEY

Existing scholarship on mining–agriculture interactions demonstrates that extractive expansion generates profound socio-environmental disruptions, yet the literature often presents findings descriptively rather than synthesizing broader patterns, contradictions, and gaps. Work by Bebbington et al. (2018) and Hilson (2020) converges on the argument that mining restructures rural economies by reducing access to arable land, degrading ecosystems, and fostering dependency on volatile mining income. However, these studies—while foundational—rarely offer an integrated explanation of how environmental degradation, livelihood destabilization, and social fragmentation jointly influence rural psychological outcomes. Moreover, most contributions rely on case studies from Latin America, Southern Africa, and Australia, with limited empirical grounding in the Democratic Republic of Congo (DRC), despite the country being one of the world's most mineral-intensive contexts. This geographic imbalance underscores a significant knowledge gap on how Congolese farming communities experience and interpret mining-induced pressures.

Cernea's (1997) impoverishment risks and reconstruction model provides a useful lens for understanding socio-economic stress under extraction, identifying land loss, displacement, and livelihood insecurity as key risk vectors. Yet many applications of the model in mining zones employ cross-sectional household surveys, self-reported stress measures, or small purposive samples, limiting causal inference and long-term understanding of psychosocial impacts. The same methodological constraints apply to studies focusing on mental health near extraction zones. For example, Havenga and Bester (2025), Cunsolo et al. (2020), and Albrecht (2011; 2012) document anxiety, ecological grief, and solastalgia among populations exposed to environmental degradation, but these findings often rely on localized qualitative samples or non-standardized psychological scales. This limits the generalizability of their results and raises questions about measurement validity—particularly regarding constructs such as *stress*, *anxiety*, *depressive symptoms*, and *subjective well-being*, which require standardized, cross-culturally validated instruments to be reliably assessed.

From a psychological perspective, Hobfoll's (1989) Conservation of Resources (COR) Theory remains central to explaining how material, social, and symbolic resource losses generate chronic stress and emotional exhaustion. The literature widely cites resource loss farmland, income stability, land agency, and community cohesion as a trigger of psychological distress, but few studies explicitly model the mechanisms linking resource depletion to mental health outcomes. For instance, while Kowalski and Smith (2023) and Zandonai et al. (2019) highlight social support, cultural cohesion, and collective coping as potential buffers, the literature provides limited critical analysis of how these protective factors operate, under what conditions they fail, or how mining-induced social fragmentation weakens their efficacy. Research on group cohesion in rural African contexts (Tschakert et al., 2019) shows that when environmental stress intersects with governance uncertainty and compensation disputes, local

support networks often erode rather than strengthen—contradicting assumptions that resilience mechanisms automatically act as buffers.

In the African mining context, several scholars note that psychological stress increases when environmental degradation directly affects agricultural productivity, water quality, or food security, producing overlapping ecological and emotional burdens (Thorne & Walker, 2011; Havenga & Bester, 2025). Yet this body of work seldom articulates how agricultural disruption serves as a mediating pathway between mining pressure and mental health. Only a few recent studies (Parsons et al., 2023) have begun to illustrate these multi-step linkages, showing that livelihood erosion and reduced land agency heighten perceived powerlessness a strong predictor of anxiety and depression in rural settings.

Despite extensive research elsewhere, the DRC remains characterized by critical evidence gaps. Existing studies in Lualaba and Haut-Katanga focus predominantly on environmental pollution, artisanal mining conflicts, or economic vulnerability (Swii'ma et al., 2017; Juma, 2024; Hilson, 2020). Virtually no research systematically measures psychological distress among farming households exposed to industrial mining, nor investigates how Congolese cultural identity, customary land systems, or social organization shape psychological resilience. This absence of DRC-specific mental health data is particularly striking given growing national concerns over rural stress, land conflicts, and socio-environmental tensions reported by the *Ministère de la Santé* (2022).

Taken together, the literature reveals growing recognition that mining-driven land degradation, livelihood disruption, and resource loss influence psychological well-being—but current evidence remains fragmented, geographically uneven, and methodologically limited. Few studies integrate environmental, social, and psychological dimensions into a unified explanatory framework. To address this gap, the present study builds on COR Theory and recent environmental-psychology research to operationalize key psychological constructs (stress, anxiety, depressive symptoms, subjective well-being), and to develop a conceptual model linking mining pressure, agricultural disruption, mediating resilience factors (social support, cultural cohesion), and psychological outcomes. This integrative approach directly responds to the absence of Congolese evidence and provides a structured basis for analyzing mental health in one of the world's most dynamic mining frontiers.

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METHODOLOGY

Study Area

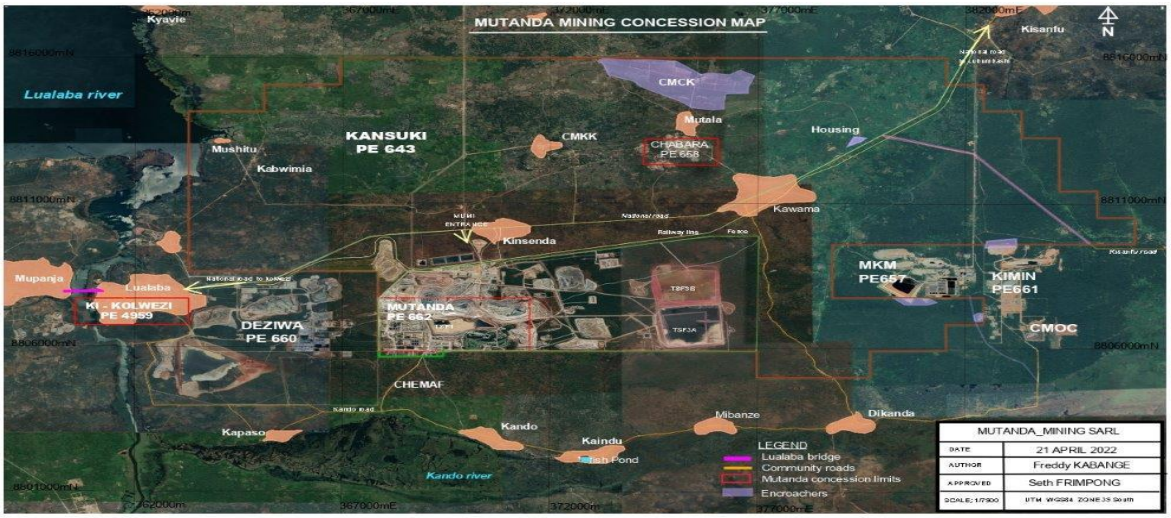

Figure 1: Fifteen Villages around Mutanda Mining, our Study Area

The study was conducted across fifteen villages located around the Mutanda Mining (MUMI) industrial site in Lualaba Province, southern Democratic Republic of Congo (DRC). This region is characterized by a complex coexistence between large-scale industrial mining and smallholder agricultural systems, generating substantial socio-economic and environmental pressure on rural households. The surveyed villages include Kawama, Kinsenda, Kyavie, Mutala, Kando, CMKK, Kahindu, Mupanja, Lualaba, Kabatanda, Dianda, Mushitu, Mibanze, Kapaso and Masumbu. These settlements present contrasting realities depending on their spatial proximity to the mining operations. Villages situated less than 3 km from the MUMI concession—such as Kawama, Kinsenda, Kyavie, and Mutala experience direct exposure to pollution, noise, land dispossession, and population displacement. In contrast, geographically distant villages such as Mibanze, Masumbu, Kapaso, and Dikanda primarily endure indirect impacts including progressive degradation of agricultural land, weakening of community cohesion, and increased psychological instability among households.

The study area is predominantly inhabited by the indigenous Sanga community, whose traditional livelihoods are rooted in family farming, fishing, and small-scale livestock keeping. These communities are joined by other ethnic groups—including the Ruund, Bemba, and Luba—who have migrated toward mining zones seeking economic opportunities. The rapid expansion of mining activities has produced a context of forced economic transition, heightened environmental stress, and profound social transformation. Agricultural households in particular face increasing uncertainty as their farming spaces diminish and mining-induced disturbances reshape their daily lives, sources of identity, and psychological wellbeing.

This study employed a mixed-methods research design integrating both qualitative and quantitative approaches to examine the psychological experiences of agricultural households living around the MUMI mining site. The target population included smallholder farmers whose livelihoods depend primarily on agriculture, as well as key community actors such as traditional chiefs, community leaders, youth, women, and former farmers who lost their agricultural lands.

A purposive sampling strategy was applied, consistent with methodological recommendations by Leung (2015), resulting in a total sample of 150 individually surveyed households and five focus group discussions. These focus groups were organized according to relevant sociological categories: two with women, two with men, and one with community leaders, each comprising between 17 and 30 participants. This structure allowed for in-depth exploration of collective psychological experiences and community-level interpretations of mining pressure.

Methodologically, the study was grounded in a qualitative, interpretive stance inspired by the phenomenological paradigm of psychology as articulated by Moustakas (1994). This orientation enabled access to participants' subjective experiences of environmental and socio-economic disruption.

Quantitative data derived from structured questionnaires were used descriptively to capture stress and anxiety scores, while qualitative data provided insight into emotional, cognitive, and social patterns associated with environmental and livelihood-related stress. Data collection techniques included semi-structured individual interviews, focus group discussions organized along sociologically meaningful lines, and participant observation, which offered a direct perspective on verbal and non-verbal expressions of distress and resilience within the communities.

Data analysis followed the thematic analysis framework developed by Braun and Clarke (2006). This involved a rigorous process of familiarization with the data, initial coding, development of major thematic categories, and construction of a localized psychological model illustrating farmers' responses to mining-induced pressures. The variables examined encompassed psychological dimensions (stress, anxiety, coping strategies, resilience), social factors (solidarity, cohesion, conflict), and economic indicators (loss of land, income fluctuations, food security), allowing for a multidimensional understanding of community experiences.

Ethical considerations were strictly observed in accordance with the American Psychological Association's ethical standards (APA, 2023). Participants provided informed consent, anonymity was ensured, withdrawal rights were guaranteed, and particular care was taken to prevent retraumatization during sensitive discussions. Finally, the interpretation of findings drew on a methodological triangulation integrating quantitative results, qualitative narratives, and direct observations, following the recommendations of Creswell and Plano Clark (2011). This triangulation strengthened the internal consistency, credibility, and robustness of the overall analysis.

RESULTS

General Household Characteristics

The results presented below describe the socio-demographic profiles, livelihoods, and household characteristics of participants, which are essential for understanding the psychological and socio-economic impacts of mining activities on local agricultural communities. Data were collected from 150 households across fifteen villages surrounding the Mutanda Mining (MUMI) site, with both quantitative surveys and focus group discussions providing complementary insights into the experiences of stress, anxiety, and coping strategies.

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Age of Household Head

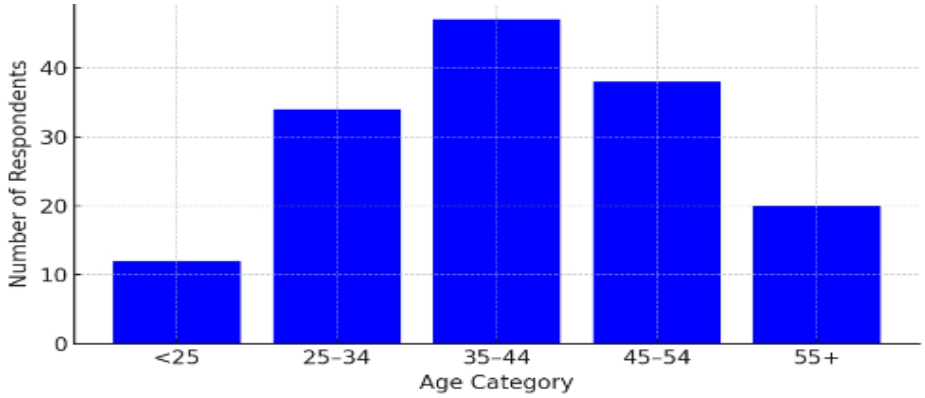

Figure 2: Age Distribution of Household Heads

The majority of household heads fall within the 35–44-year range, representing the most economically active segment responsible for both farming and household decision-making. This age group is particularly exposed to stress, as members are forced to balance agricultural production, household food security, and the pressures associated with proximity to industrial mining.

Education Level

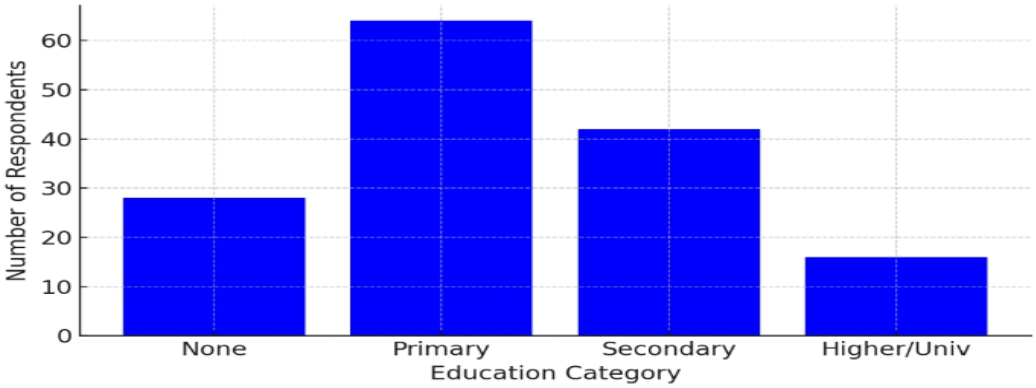

Figure 3: Education Level of Household Heads

Sixty-one percent of household heads have low formal education, limiting their understanding of environmental risks, land rights, and legal protections. This knowledge gap exacerbates feelings of powerlessness and heightens stress related to mining pressures.

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Main Household Activity

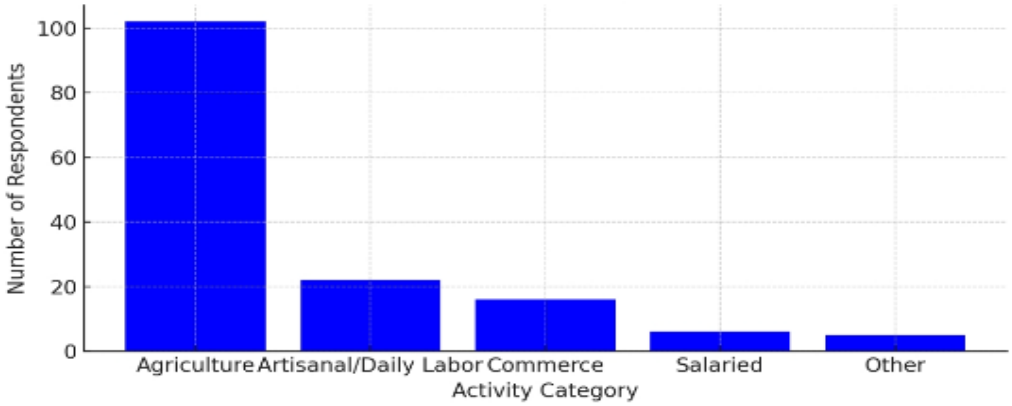

Figure 4: Primary Livelihood Activity of Households

Agriculture remains the primary occupation for most households. However, mining-related pressures have forced some households to diversify their income through petty trade or artisanal mining work. While this diversification serves as an economic coping mechanism, it also contributes to additional stress and anxiety due to unfamiliarity, instability, and health risks.

Table 1: Key Socioeconomic and Service-Access Characteristics of Surveyed Households

Variable	Categories / Values	Key Statistics	Interpretation
Gender of Household Head	Male / Female	Male: 70%; Female: 30%	Male dominance reflects traditional leadership norms; female-headed households often arise from widowhood or male migration, increasing psychosocial vulnerability.
Household Size Distribution	1–3 members / 4–6 members / 7–9 members / 10+	4–6 members: 55% (majority)	Larger households increase pressure on limited resources under mining stress, heightening food insecurity and psychological strain.
Average Household Income	<100 USD / 100–200 USD / >200 USD	66.7% earn <100 USD/month	Extremely low income exacerbates economic fragility and dependence on mining companies, reinforcing chronic stress.
Access to Water & Health Services	Access vs No Access	Water: 40% access; Health services: 35% access	Limited basic services generate anxiety, health concerns, and a heightened perception of risk.

Correlation Analysis

The results reveal a set of interconnected socioeconomic factors that collectively intensify psychological stress among households exposed to mining pressure. Female-headed households, which account for 30% of the sample, tend to experience higher levels of psychosocial vulnerability because they often face greater economic precarity and reduced

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social protection mechanisms. At the same time, the predominance of 4–6-member households (55%) illustrates a considerable demographic burden, as larger families require greater quantities of food, water, and financial resources. This demand becomes harder to meet in a context where mining activities reduce access to agricultural land and livelihood opportunities, thereby increasing household stress.

Income also plays a decisive role: with 66.7% of households earning less than 100 USD per month, economic insecurity is widespread. This low-income status correlates strongly with heightened psychological strain, as financially constrained households rely more heavily on mining companies for survival and frequently report anxiety related to food availability, income instability, and future uncertainty. Furthermore, limited access to essential services—only 40% having reliable water access and 35% being able to reach health facilities—contributes to elevated anxiety and perceived health risks. Restricted service access intensifies fears related to disease, environmental contamination, and the inability to respond to health emergencies.

Overall, these relationships demonstrate that socioeconomic vulnerability is multilayered and mutually reinforcing. Gender disadvantages, demographic pressures, chronic poverty, and limited service accessibility interact to magnify psychological distress in mining-affected communities. These findings are consistent with existing literature on extractive regions, which emphasizes that livelihood insecurity and environmental disruption significantly shape mental well-being and community resilience.

Perceived Mining Pressure Factors

Questionnaire results indicate that 84% of households perceive mining activity as a direct threat to their psychological wellbeing. The main perceived factors include loss of farmland, water and air pollution, and socio-economic inequalities.

Table 2: Perceived Mining Pressure Factors

Factor	% of Households Affected	Description
Loss of agricultural land	83%	Farmland ceded to mining companies; loss of personal identity and reference points.
Water and air pollution	77%	Contaminated water, skin diseases, fear of drinking from wells.
Socio-economic inequalities	72%	"The miners have everything, we have nothing." – Focus group, Mutala, June 2025

"Since the mine took our field, I feel useless. Even the children no longer believe in agriculture." – Farmer, Kahindu village, male, 54 years. The loss of identity and agency reflects what Lazarus (1984) describes as environmental acculturation stress a mismatch between perceived resources and environmental threats.

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Dominant Psychological Symptoms

Table 3: Observed Psychological Symptoms among Households

Symptom	% of Households Affected	Intensity (1–5)
Persistent stress and anxiety	69%	4.3
Insomnia and chronic fatigue	61%	4.1
Anger / resentment	64%	4.0
Feelings of injustice / powerlessness	58%	4.2
Depression / despair	46%	3.8

Symptoms manifest differently by gender and age. Women report stress related to food insecurity and contaminated agricultural products, men express anger and loss of "head farmer" status, while youth exhibit frustration and often migrate to Kolwezi city for daily wage labor in mining. These findings align with Bonanno (2004) and Hobfoll (1989), confirming that material resource loss leads to cumulative emotional exhaustion.

Psychological and Community Coping Strategies

Table 4: Psychological and Community Coping Strategies

Strategy	% Usage	Nature of Coping	Observation
Prayer and religious recourse	72%	Emotional	Faith provides reassurance and spiritual support.
Community mutual support (tontines, communal fields)	57%	Social	Provides collective psychological support.
Dialogue with mining authorities	34%	Problem-focused	Often perceived as ineffective due to lack of responsiveness.
Diversification of activities (small trade, livestock)	43%	Problem-focused	Reduces partial dependence on agriculture but adds workload stress.
Withdrawal and temporary migration	19%	Avoidance	Fleeing response to extreme stress.

"When our heads burn, we pray, because there is no one to listen to our worries here." – Woman, CMKK focus group, November 2025. These strategies indicate predominantly emotional coping mechanisms, typical in rural African contexts where faith, rituals, and social solidarity often substitute for professional psychological support (Hobfoll, 1989; WHO, 2021).

Anxiety Levels by Proximity to Mining Sites

Table 5: Average Anxiety Levels according to Distance from Mining Sites

Distance from Mining Sites	Mean Anxiety Score (1–5)	Interpretation (%)
< 2 km	4	80% (high)
2–5 km	3	60% (moderate)
> 5 km	2	40% (low)

Households located within 2 km of mining sites report anxiety levels twice as high as those situated beyond 5 km, highlighting the direct influence of industrial mining on mental wellbeing. Stressors include machine noise, vibrations, land disputes, economic uncertainty, and fear of expropriation. Thematic analysis using NVivo identified three major dimensions of psychological distress:

1. Loss of identity: Farmers feel "like strangers on their own land," reflecting disruption of traditional ties to land and intergenerational continuity.
2. Psychosocial insecurity: Persistent fear of expropriation generates constant uncertainty and emotional strain.
3. Learned resignation: Passive acceptance of injustice emerges from accumulated emotional fatigue, lack of effective recourse, and perceived powerlessness against dominant economic actors.

Quantitative analysis confirmed a significant positive correlation between proximity to mining sites and self-reported anxiety ($r = 0.68$; $p < 0.05$). Households in Kawama, Kando, and CMKK—located less than 2 km from MUMI operations—exhibit the highest stress scores, indicating a strong relationship between immediate mining exposure and psychological pressure.

Discussion

The findings of this study suggest that mining pressure from Mutanda Mining (MUMI) substantially influences the socio-economic and psychosocial conditions of rural households in the villages surrounding this mining site in Lualaba. Quantitatively, the predominance of male household heads (81.3%) largely aged 35–44 years, engaged in agriculture (68%) and earning less than USD 100 per month, reflects marked structural vulnerability. Qualitative testimonies reinforce this observation: respondents frequently described heightened uncertainty, diminished control over daily life, and growing frustration linked to shrinking agricultural spaces and deteriorating environmental conditions. Although these relationships cannot be interpreted as strictly causal, the convergence between statistical indicators and local narratives suggests that mining-related livelihood disruptions are closely associated with increased psychological strain. This interpretation becomes clearer when the results are connected to the study's conceptual frameworks. In line with Lazarus and Folkman's (1984) transactional model, many respondents appear to experience stress when environmental demands—such as land loss, pollution, unpredictability of yields exceed their coping capacity. Similarly, Hobfoll's (1989) Conservation of Resources Theory helps explain how the depletion of land, income, social recognition, and community belonging may contribute to emotional exhaustion. Qualitative accounts from villages closest to MUMI, particularly those reporting severe land pressures, align with Cernea's (1997) impoverishment risks model, in which livelihood disarticulation and displacement are associated with increased psychosocial vulnerability. A pattern emerges in which mining pressure is linked to resource loss, social disruption, reduced coping capacity, and, ultimately, psychological vulnerability without implying deterministic causality but highlighting intertwined processes.

The study's results also illustrate profound social and cultural transformations. Respondents described a progressive weakening of social cohesion, a sense of communal fragmentation, and the erosion of traditional support networks. These observations resonate with Durkheim's (1897) notion of anomie, later applied by Elliott et al. (2017) to African mining communities undergoing rapid change. Households reported ambivalent feelings toward mining: on one hand, mining represents economic opportunity; on the other, it threatens agricultural identity, disrupts family organization, and erodes moral and social landmarks. This duality echoes Jenkins' (2014) psychological exploitation cycle, in which communities oscillate between aspirations for economic integration and disappointment stemming from unfulfilled expectations.

Psychological mechanisms further clarify these dynamics. Farmers experiencing significant land constraints and reduced productivity expressed feelings of powerlessness, aligning with Bandura's (1997) notion that perceived self-efficacy diminish when individuals believe they cannot influence their environment. Limited educational attainment and restricted access to information appear to compound this sense of helplessness, consistent with Ajzen's (1991) argument that knowledge underpins adaptive behavior. Although the analysis cannot claim direct causation, the observed associations suggest that structural constraints linked to mining may weaken perceptions of control and heighten emotional distress.

Gendered dynamics also play a significant role. Female-headed households, representing 18.7% of the sample, reported heightened economic stress, social burden, and psychological vulnerability. This aligns with prior research in the DRC (Nillesen & Verwimp, 2010; WHO, 2022) showing that women in rural settings exposed to socio-economic adversity often display more pronounced stress symptoms. These findings also support Yoon et al. (2019), who demonstrate that gendered inequalities intensify psychosocial pressures in resource-dependent communities. The present results therefore extend the literature by offering detailed empirical evidence from a rural mining zone in Lualaba a context rarely examined using a mixed-methods approach integrating psychological dimensions.

Environmental pressures emerge as another important factor. Communities near Kawama, Kando, and CMKK raised concerns about water contamination, dust emissions, deforestation, and disturbed ecosystems. Some respondents described recurrent headaches, fatigue, and irritability, which may reflect psychosomatic responses to chronic environmental stress. This pattern echoes similar findings in Zambia (Hilson, 2010) and Ghana (Tschakert & Singha, 2007), where rural households exposed to mining pollution reported ecological grief and environmental anxiety. Here again, the study does not claim direct causality but suggests that environmental degradation combines with livelihood instability to intensify stress.

Coping strategies observed across the study area further illustrate the cumulative nature of vulnerability. Households adopt income diversification, temporary migration, and community-based support as coping mechanisms. These strategies appear to provide short-term relief, consistent with Folkman and Moskowitz (2000), who argue that emotion-focused coping helps manage immediate stress but may remain insufficient in the face of persistent structural pressures. Hruschka et al. (2020) similarly note that collective resilience, while crucial, cannot fully offset enduring resource depletion and institutional neglect. The findings therefore underscore the precariousness of these coping responses, especially in contexts marked by chronic land scarcity and weak rural services. Taken together, these results support the cumulative vulnerability perspective (Turner et al., 2003; Thunberg et al., 2020; Clayton, 2020), whereby poverty, land dispossession, declining agricultural capacity, and lack of education interact over time to produce long-lasting psychological wear. Feelings of environmental injustice were particularly strong in villages adjacent to mining concessions, where residents reported sentiments of abandonment, exclusion from decision-making, and unequal distribution of benefits. These perceptions correspond with Schlosberg's (2007) framework of environmental justice and Bar-Tal's (2007) concept of a "collective memory of suffering," which describe how communities narrate and internalize experiences of systemic marginalization. In this regard, the study contributes new insights by illustrating how environmental injustice intersects with psychological vulnerability in rural mining regions of the DRC.

Despite the strength of a mixed-methods approach, some limitations should be acknowledged. The cross-sectional design restricts causal interpretations, meaning observed associations cannot be assumed to represent cause–effect relationships. Self-reported measures may reflect subjective perceptions influenced by recent events or community discourses. Additionally, the qualitative sample, while rich, remains limited relative to the broader population, which may affect representativeness. Environmental and socio-economic data collected during one season may not capture long-term variations. These limitations suggest cautious interpretation of the results while highlighting the need for longitudinal and interdisciplinary follow-up studies.

Overall, the study significantly contributes to the growing literature on mining impacts by integrating socio-economic, psychological, and environmental dimensions—an approach still rare in the DRC. It extends existing theories such as the Conservation of Resources Theory, cumulative vulnerability, and environmental justice by grounding them in detailed empirical evidence from a rural mining district. The findings also nuance the dominant narrative equating mining with rural development by revealing the complex and ambivalent psychosocial consequences experienced by farming households. They further underscore the need for integrated interventions combining mental health support, social mediation, land governance reforms, and environmental education to strengthen the wellbeing and resilience of rural communities facing intense mining pressures.

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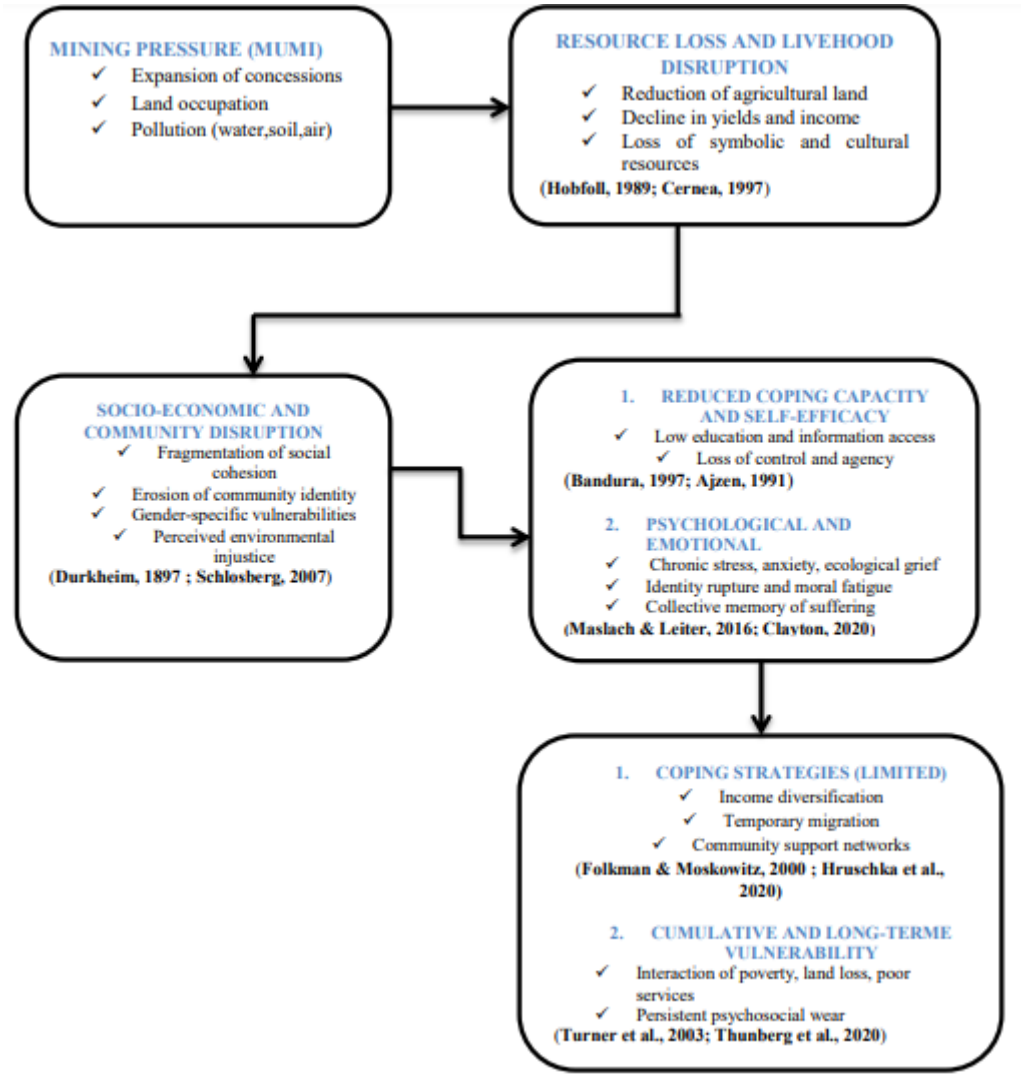

Figure 5: Conceptual Framework

This figure presents the conceptual framework summarizing the relationships observed in the study. The model illustrates how mining pressure interacts with resource loss, socio-economic disruption, reduced coping capacities, and environmental injustice to shape psychological vulnerability among rural households. It is not a causal model but rather an associative structure integrating quantitative results, qualitative narratives, and theoretical perspectives.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that the mining pressure exerted by Mutanda Mining (MUMI) generates significant psychological stress among farming households in the villages surrounding this mining site in Lualaba.

Land dispossession, declining soil and water quality, disrupted agricultural livelihoods, and weakened community cohesion create chronic emotional strain, manifesting as anxiety, uncertainty, and loss of identity. These effects illustrate cumulative vulnerability, where economic precarity, environmental degradation, and limited access to services interact to reduce coping capacity. Women are disproportionately affected due to structural gender inequalities and limited participation in local governance, while the absence of community-based mental

health services reinforces feelings of powerlessness and marginalization. Mining pressure in Lualaba thus represents not only an economic and ecological concern but a growing rural mental health crisis requiring integrated, multisectoral responses. In response, actionable interventions should focus on both psychosocial support and sustainable livelihoods.

Establish community mental health and social cohesion programs. Within 12 months, local health authorities and NGOs should create village-level psychosocial support groups providing monthly counselling sessions and stress-management workshops, with bi-annual wellbeing surveys to monitor effectiveness. Strengthen local governance and policy integration. By 2027, the Lualaba provincial government should integrate psychosocial risk assessments and land-compensation monitoring into mining governance frameworks, with a multi-stakeholder committee including communities, customary leaders, and mining firms meeting quarterly to evaluate social impacts. Promote agroecological recovery and diversified livelihoods. Within 24 months, implement community nurseries, soil restoration projects, and training for at least 300 households on beekeeping, market gardening, and agroforestry, tracking progress through annual income data and land-rehabilitation indicators. Create a rural mental health and environmental observatory. By 2026, establish a local observatory to collect data on environmental conditions, household wellbeing, and livelihood trends, producing annual monitoring reports to guide evidence-based interventions.

Collectively, these actions can restore psychological resilience, strengthen governance, and promote more equitable and sustainable rural development in Lualaba.

Future Scope

The present study provides valuable insights into the psychological impacts of mining pressure on agricultural households around Mutanda Mining (MUMI); however, several limitations should be acknowledged. Data collection occurred over a relatively short period, from May to August 2025, which may not capture seasonal variations in agricultural activities, income fluctuations, or psychosocial stress linked to climatic or market cycles. The sample, while purposively selected to include diverse household types, may not fully represent all social and economic strata in the study area, limiting the generalizability of findings. Additionally, self-reported measures of stress and anxiety could be influenced by social desirability or recall bias. Despite these constraints, the study offers a robust mixed-methods perspective combining quantitative assessments with rich qualitative narratives.

Future research could adopt longitudinal designs to monitor changes in psychological wellbeing across different agricultural seasons and over longer periods of mining expansion. Comparative studies involving multiple mining sites in the Lualaba province or other regions of the Democratic Republic of Congo would further enhance understanding of context-specific factors. Moreover, integrating physiological measures of stress alongside self-reports could provide more objective assessments of psychosocial impacts. Finally, investigating the effectiveness of community-based mental health interventions and adaptive coping strategies would offer practical insights for policymakers and mining companies seeking to mitigate the adverse effects of industrial activities on rural populations.

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