

Evaluating the Multiplier Effect of Micro-Insurance on Climate Resilience among Motorcycle Taxi Drivers in Dar es Salaam

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Abbreviations

AfCFTA	African Continental Free Trade Area
CHI	Community Health Insurance
CRI	Climate Resilience Index
DCC	Dar es Salaam Campus College
GDP	Gross Domestic Product
MFI	Microfinance Institution
MoF	Ministry of Finance
NGO	Non-Governmental Organization
NBS	National Bureau of Statistics
NHIF	National Health Insurance Fund
SACCOs	Savings and Credit Cooperative Societies
SDG	Sustainable Development Goal
SHI	Social Health Insurance
SP	Social Protection
SSA	Sub-Saharan Africa
TZS	Tanzanian Shilling
UDBS	University of Dar es Salaam Business School
WRI	World Resources Institute

Abstract

This study investigates the multiplier effect of micro-insurance on climate resilience and socio-economic stability among motorcycle taxi (boda-boda) drivers in Dar es Salaam, Tanzania. Boda-boda drivers are among the most climate-exposed in the informal sector. They frequently experience income disruptions and equipment damage due to extreme weather conditions such as floods and heavy rainfall. The study employs a mixed-methods approach, combining survey data from 400 drivers with interviews conducted among four micro-insurance providers. The quantitative findings reveal that more than 84% of the drivers have experienced income loss due to weather-related shocks, and most of them rely on savings or cost-cutting measures to cope with this loss. However, drivers with micro-insurance demonstrate significantly greater resilience. These drivers scored higher on a constructed Climate Resilience Index (CRI), recovered faster after experiencing income loss, and were less dependent on high-stress coping strategies. Qualitative interviews further revealed that, although insurers acknowledge climate risks, most micro-insurance products currently do not cover weather-related damages. Low awareness concerns about affordability, and trust issues hinder uptake. Nevertheless, micro-insurance has shown potential not only in supporting individual recovery but also in reducing financial vulnerability and improving long-term stability. The study concludes that, with improved product design and targeted awareness campaigns, micro-insurance can serve as a scalable tool for climate adaptation in informal urban economies. The findings provide valuable insights for policymakers, insurers, and development actors working to build climate-resilient livelihoods in African cities.

Key Words: Micro-insurance, Climate Resilience, Boda-boda Drivers, Informal Sector, Tanzania, Urban Risk, Social Protection, Extreme Weather

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1. Introduction

In many African cities, motorcycle taxis, commonly known as *boda-bodas*, have become an essential mode of transportation for urban residents (Mwakibete, 2025; Basaza, 2022; Mutai R. K., 2021). In Dar es Salaam, Tanzania's largest and fastest-growing city, thousands of young men rely on *boda-boda* driving as their main source of income (Mwansasu, 2025). These drivers provide essential, affordable transportation services across the city's neighborhoods and play a crucial role in sustaining the local economy, moving (Pesha, 2024). However, despite their importance, most *boda-boda* drivers work informally and lack stable income, employment contracts, and access to safety nets that could protect them in times of crisis (Wango, 2021).

One of the biggest threats to these informal workers is climate change (Dodman, 2023). Extreme weather events, such as heavy rainfall, flooding, and rising temperatures, are becoming increasingly common in Dar es Salaam, as shown in Photos 1 and 2 (Mzava, 2020). These events not only disrupt mobility but also severely damage urban infrastructure, create potholes, eroded roads, and blocked drainage systems that make daily transportation riskier and more costly for drivers. For *boda-boda* drivers, these events can lead to damaged motorcycles, increased fuel and repair costs, health risks from riding in harsh weather conditions, and reduced income when customers stay indoors (Njoroge, 2022). However, because these drivers often operate without formal protection, they must cope on their own, sometimes borrowing money, skipping meals, or taking on dangerous work to survive.

Photo 1: A boda-boda driver pushing his motorcycle through a potholed and waterlogged street in Dar es Salaam, a common challenge after heavy rains, impacting daily income and increasing vehicle wear



Photo 2: Damaged roads and stagnant water increase operational risks and repair costs for boda-boda drivers, particularly during the rainy season in Dar es Salaam



Micro-insurance has been introduced as a potential solution to help informal workers, such as boda-boda drivers, build resilience in the face of economic shocks (Wango, 2021). Micro-insurance refers to small, low-cost insurance products specifically designed for individuals with low incomes (Mhella, 2024). These products can provide compensation for accidents, illnesses, or income loss resulting from adverse weather conditions (Laddha, 2023). While the idea sounds promising, little is known about whether micro-insurance truly works for boda-boda drivers in practice. Without solid evidence, policymakers and insurance providers lack the information needed to improve these products and expand their reach. Thus, this study was guided by three main questions aimed at understanding the impact of micro-insurance on the lives of motorcycle taxi drivers (boda-boda) in Dar es Salaam: How does micro-insurance impact the climate resilience of boda-boda drivers? How does micro-insurance contribute to broader socio-economic stability among informal workers? What are the perspectives of insurance providers on the role of micro-insurance in supporting informal workers facing climate risks?

Together, these three questions help paint a comprehensive picture of the value, limitations, and opportunities that micro-insurance offers to enhance the resilience and stability of urban informal workers. Focusing on boda-boda drivers in Dar es Salaam, it examines how micro-insurance affects their ability to withstand and recover from climate-related disruptions. The study also examines whether micro-insurance contributes to broader financial stability and the well-being of the boda-boda community and their families. The research involved surveying 400 boda-boda drivers and conducting

interviews with four major Tanzanian micro-insurance providers. By combining the perspectives of drivers and insurers, the study provides a more comprehensive understanding of the opportunities and challenges associated with utilizing micro-insurance to enhance resilience in Tanzania's informal economy.

The study findings are not only useful for researchers, but also for insurance companies, government policymakers, local boda-boda associations (informal unions or cooperatives that organize motorcycle taxi drivers, represent their interests, and coordinate safety and welfare initiatives), and development partners. If micro-insurance proves effective, it can be scaled up to benefit more informal workers in Tanzania and other African cities facing similar risks. The study also highlights gaps and challenges in awareness, trust, and product design. This gives stakeholders a clear direction on how to make insurance more accessible and impactful. Ultimately, the study aims to inform the development of more effective policies and partnerships that promote inclusive economic resilience in the face of increasing climate uncertainty.

2. Literature Review

2.1 Theoretical Framework

This study is guided by Social Risk Management (SRM) Theory, a concept developed by the World Bank to improve understanding of how individuals and communities manage risks, especially when lacking formal protection, such as government safety nets or employer support (Holzmann, 2001).

According to SRM Theory, people, especially those in vulnerable or informal sectors, face numerous risks that can affect their income, health, and ability to work. These risks can arise from personal problems, such as accidents or illnesses; economic shocks, such as job loss; or natural disasters, such as floods or droughts. Without sufficient tools to manage these risks, people may fall deeper into poverty or make desperate decisions, such as selling essential belongings or taking out high-interest loans.

In the context of this study, motorcycle taxi drivers in Dar es Salaam frequently face risks associated with climate change. These risks include heavy rains and floods, which often submerge roads, cause water to enter engines, corrode electrical parts, and create deep potholes that damage motorcycle suspensions and tires, thereby limiting their ability to earn a living. Micro-insurance is one of the tools that SRM Theory considers part of a "risk management strategy." It mitigates the impact of shocks and provides people with greater security and stability. In practice, micro-insurance functions through small, low-cost premiums collected periodically, often daily, weekly, or monthly, allowing low-income

individuals to access protection against risks such as accidents, illness, or loss of income. These services are typically provided by local insurance companies, microfinance institutions, and mobile network operators partnering with insurers, making them more accessible to informal workers who lack traditional coverage. SRM Theory helps explain why access to micro-insurance might lead to better financial behavior, reduced stress, and quicker recovery after setbacks—exactly what this study set out to investigate.

2.2 Empirical Review

This section synthesizes previous research related to micro-insurance, social protection, and climate vulnerability as experienced by motorcycle taxi drivers (commonly known as boda-boda or ojek riders). To ensure coherence, the literature is organized into two thematic categories: (i) social protection and micro-insurance innovations among informal transportation workers, and (ii) climate and environmental risks affecting motorcycle taxi operations. These groupings facilitate a deeper reflection on how the current study's objectives align with existing evidence and how this research contributes new insights.

2.2.1 Social Protection, Insurance Uptake, and Informal Worker Stability

Social protection refers to policies and programs designed to reduce vulnerability and promote economic security by providing support during risks such as illness, income loss, or accidents (Holzmann, 2001; Miti, 2021). In the informal sector, this includes interventions such as microinsurance, health schemes, or savings cooperatives that help workers manage shocks. Insurance uptake, on the other hand, denotes the extent to which individuals choose to enroll in or adopt these protection mechanisms. For example, boda-boda drivers may join community-based insurance schemes or daily payment plans that cover accident or health risks.

Social protection schemes refer to public or community-based programs designed to reduce vulnerability and support individuals facing risks such as illness, income loss, or accidents. Within these, social health insurance (SHI) involves mandatory or semi-formal government- or employer-based schemes in which members make small, regular payments to access healthcare coverage. National health insurance (NHI), by contrast, is a state-led system that extends standardized health coverage to all citizens, often financed through taxes or payroll contributions. Community health insurance (CHI), meanwhile, refers to voluntary, locally organized initiatives where community members collectively pool resources to cover medical costs, often targeting informal or low-income groups.

A growing body of literature has investigated the uptake of social protection schemes, including micro-insurance and health coverage, among motorcycle taxi drivers across Africa and Asia. For example, Mutai (2021) and Mutai, Njoroge, and Mwangi (2021) examined the determinants of social health insurance uptake in Eldoret, Kenya, where social health insurance refers to government or community-based schemes that pool small, regular contributions from individuals to provide financial protection against medical expenses, finding that awareness of daily payment options significantly improved willingness to enroll. Similarly, Basaza et al. (2022) conducted a contingent valuation study in Kampala and found that knowledge, trust in institutions, and income levels all influenced the willingness to pay for community health insurance. These studies provide an important foundation for the current research by highlighting behavioral and institutional factors, such as awareness, affordability, and trust, that also shape micro-insurance participation among informal workers in Dar es Salaam. This study extends their approach by linking these determinants to climate resilience outcomes within the Tanzanian context.

Building on this, Oktora (2018) analyzed willingness to pay for national health insurance among ojek drivers in Indonesia, echoing similar challenges around affordability and value perception. Aketch (2023) furthered the understanding of youth insurance behaviors in Nairobi, emphasizing the role of financial literacy and targeted outreach. Wango et al. (2021) and Kinyondo (2021) provided a specific Tanzanian context, identifying institutional and social limitations that prevent motorcycle taxi drivers from enrolling in voluntary schemes despite their vulnerability. These limitations include weak regulatory enforcement, lack of formal representation through unions, limited awareness of available schemes, and low levels of trust in insurance institutions, all of which discourage consistent participation among informal transport workers.

More broadly, Kuncoro, Parulian, and Asher (2015) and Miti et al. (2021) have focused on extending social protection to informal workers, underscoring the policy and administrative gaps in East Asian and African systems. Alfery, Devenish, and Sesan (2023) argued that although informal worker-led schemes offer promise, they often lack technical support such as training in product design, risk assessment, actuarial analysis, and digital claim management systems and funding. Complementing these perspectives, Rezki and Anggara (2024) reviewed grassroots microinsurance models, highlighting the importance of mutual aid networks in enhancing resilience. Sinha (2025) and Tobing (2024) further explored the precarity of gig work in Southeast Asia, emphasizing the institutional inertia in extending protections to digital riders.

From a legal perspective, Muljanto, Tobing, and Widiarty (2023) and Indayatun (2025) have critiqued the weak legal safeguards for informal motorcycle drivers in Indonesia, a context that parallels the Tanzanian context. Christiyono, Tohari, and Suryandari (2024)

also emphasized the regulatory mismatches in accommodating the realities of online drivers. These studies highlight the broader struggle for recognition, fair contracts, and social protection in informal and gig-based transportation work. Lastly, Wong et al. (2021) and Sanchez et al. (2019) found a link between access to social protection and the physical and mental health of drivers. They suggest that enhanced work security and micro-insurance coverage can indirectly improve job performance and well-being.

2.2.2 Environmental Vulnerability, Road Risk, and Health Impacts Among Motorcycle Taxi Drivers

Environmental vulnerability among motorcycle taxi drivers arises from recurrent flooding, poor drainage systems, rising temperatures, and degraded road infrastructure, all of which increase accident rates, mechanical failures, and exposure-related illnesses. These risks have been widely observed in urban centers such as Dar es Salaam, Kampala, and Lagos, where informal transport workers operate in highly climate-sensitive environments.

The second thematic strand examines how climate change, environmental stress, and inadequate infrastructure affect motorcycle taxi drivers. Mwakalila (2025), focusing on Dar es Salaam, found that the COVID-19 pandemic amplified both health and financial vulnerability among boda-boda drivers, as multiple overlapping risks, such as reduced passenger demand due to mobility restrictions, increased exposure to infection, rising maintenance and fuel costs, and lack of social safety nets, converged to erode their income stability and well-being, revealing how compounding risks can destabilize informal livelihoods. Similarly, Truong, Tay, and Nguyen (2021) and Teixeira et al. (2019, 2020) investigated the health and psychosocial risks faced by drivers in Vietnam and Brazil, finding a correlation between high stress and poor working conditions, as well as an increased risk of injury and financial strain. Chen et al. (2017) and Guo et al. (2022) utilized spatial data to demonstrate how rainfall patterns influence taxi passenger distribution, resulting in reduced income for drivers during extreme weather conditions. Liu, Jiang, and Chen (2021) and Wong et al. (2021) further demonstrated that adverse weather directly affects ride-hailing usage, which may lead to sudden drops in earnings.

The link between road safety and environmental conditions was also addressed by Zhai et al. (2019) and Zare Sakhvidi et al. (2022), who revealed that weather, especially heat and rain, exacerbates crash severity and frequency. In addition to environmental hazards, the absence of proper road signage and limited enforcement of mandatory motorcycle training and licensing further compound safety risks, as many drivers lack formal road-use knowledge and hazard awareness. Hammad et al. (2019) and Das (2021) focused on accident patterns in suburban Pakistan and Southeast Asia, indicating that motorcycles are

especially vulnerable in flooded or pothole-ridden areas, conditions also reflected in this study's photographic documentation and driver testimonies.

Tuan & Huong (2019) and Rakhmatulloh, Dewi, and Winarendri (2019) found that mode choice behavior changes significantly in bad weather, as both passengers and drivers tend to reduce trips, switch to safer or sheltered transport modes, or avoid travel altogether. For motorcycle taxi drivers, this not only decreases ride demand but also forces them to navigate slippery roads and low visibility, thereby heightening accident risks and income instability. These findings support Olvera et al. (2016), who noted that although motorcycle taxis provide essential mobility in Sub-Saharan Africa, they expose drivers to disproportionate social and environmental costs, including long working hours, exposure to air and noise pollution, heightened accident risks, and limited access to occupational health protections, all of which reduce their overall well-being. Lastly, Agheyisi (2021) added a spatial dimension by studying access and economic livelihood impacts of informal transport workers in Nigerian cities, reinforcing the need for inclusive planning that acknowledges informal transport as both economically vital and climate sensitive.

2.2.3 Synthesis and Relevance to Current Study

The reviewed literature collectively highlights three critical insights. First, micro-insurance and social protection are underutilized by motorcycle taxi drivers, often due to barriers related to affordability, trust, and policy design, including low participation in health insurance schemes that could otherwise protect drivers from medical and income shocks resulting from accidents or illness. Second, environmental and climate stressors, particularly flooding, poor drainage, and extreme heat, exacerbate the operational and health risks that boda-boda drivers face. Third, there is a growing international consensus that informal transport workers require tailored insurance products and systemic inclusion in resilience planning, through coordinated programs led by national governments, municipal authorities, and development partners, including NGOs and private insurers, that integrate social protection, occupational health, and climate adaptation measures into urban transport policies. This study contributes to the body of knowledge by examining climate vulnerability and insurance behavior within a localized Tanzanian context, using a mixed-methods approach. The study evaluates individual resilience and explores how micro-insurance can generate socio-economic spillovers within informal transport communities. The focus on individual resilience is crucial because it captures the personal capacity of drivers to absorb, adapt to, and recover from shocks, an essential foundation for building broader community and system-level resilience. By understanding how individual behaviors and coping strategies evolve under risk, this study links micro-level adaptation to collective stability in the informal transport economy.

While prior research has examined social protection, insurance uptake, and environmental risks among informal transport workers, there is a critical gap in our understanding of how micro-insurance directly influences climate resilience and broader socio-economic stability within this group, particularly in urban African contexts such as Dar es Salaam. Most prior research has focused on willingness to pay or barriers to enrollment, often treating insurance as a standalone financial product rather than a tool for climate adaptation. Additionally, few studies integrate both quantitative and qualitative insights to assess how insurance coverage affects coping strategies, recovery ability, and long-term well-being in the face of weather-related shocks. This study addresses that gap by combining driver-level survey data with provider perspectives to evaluate not only the effectiveness of micro-insurance in building individual resilience but also its potential to amplify the resilience of informal economic systems under climate stress.

3. Methodology

3.1 Research Design

This study employed a mixed-methods research design that combines both quantitative data (numbers) and qualitative data (personal experiences) to provide a comprehensive picture. First, a survey was administered to 400 motorcycle taxi drivers (commonly known as boda-boda) in Dar es Salaam. This was a structured, face-to-face survey, developed based on prior studies on micro-insurance and informal-sector resilience (e.g., Mutai, 2021; Basaza et al., 2022), and refined through pilot testing with 20 drivers to ensure clarity and contextual relevance. The questionnaire included both closed- and open-ended questions covering demographics, insurance participation, income stability, and exposure to climate-related shocks. It was administered in paper form by trained enumerators familiar with the local context, ensuring accurate translation and comprehension during interviews. A copy of the survey instrument has been included as an addendum to facilitate replication in other geographic settings. The survey aimed to understand how access to microinsurance affects these drivers' ability to cope with climate shocks, such as floods and heavy rain, as well as their overall financial stability. The instrument included both closed-ended quantitative questions and open-ended items to capture detailed experiences and coping strategies. It was first developed in English and then translated into Kiswahili to ensure clarity for all respondents. The survey design and implementation required trained enumerators, printing materials, and field logistics, all coordinated by the research team with support from two research assistants experienced in survey administration and local engagement. This helped capture general patterns and trends. Additionally, in-depth interviews were conducted with four insurance providers to understand how micro-insurance products are designed, how they are offered to informal

workers, and to identify existing challenges and opportunities. Using both types of data allowed the study to compare the drivers' experiences with the insurance providers' claims, offering well-rounded insights into how micro-insurance works in real life.

3.2 Selection of the Study Area and Justification

This study was conducted in Dar es Salaam, which is Tanzania's largest and most rapidly growing urban center. As a coastal city, Dar es Salaam is highly vulnerable to weather-related events intensified by climate change, such as storms, heavy rainfall, and heatwaves, which are further aggravated by weak infrastructure, poor urban planning, and inadequate drainage systems. These challenges frequently disrupt daily transportation and livelihoods. The city also has one of the highest concentrations of informal workers, including thousands of motorcycle taxi (*boda-boda*) drivers who depend on daily earnings and operate with limited financial safety nets. These drivers often face risks such as vehicle damage, road accidents, and income loss due to extreme weather conditions. Due to its combination of climate vulnerability and informal sector activity, where over 80 percent of the city's workforce is employed informally, according to the National Bureau of Statistics (2022), Dar es Salaam was an ideal study area to explore how micro-insurance could strengthen the resilience and financial security of informal transportation workers (*boda-boda* drivers).

3.3 Target Population

The study focused on motorcycle taxi (*boda-boda*) drivers in Dar es Salaam, Tanzania, a rapidly growing group of informal workers who depend on their daily earnings. *Boda-boda* drivers are especially vulnerable to financial shocks from extreme weather, which can damage their motorcycles and reduce demand. Many lack access to formal insurance. The study aimed to assess how micro-insurance could offer protection and stability to this underserved segment of the urban workforce.

3.4 Sample Size and Sampling Technique

A total of 400 motorcycle taxi (*boda-boda*) drivers were surveyed in Dar es Salaam for this study. This sample size was chosen to provide a strong and reliable representation of the broader *boda-boda* community in the city. To ensure fairness and diversity, the researchers used stratified random sampling at major *boda-boda* gathering points across different districts. Each district was treated as a stratum, and within each stratum, riders were randomly chosen from active *boda-boda* stands to ensure balanced representation across locations and operating conditions. Drivers were selected by chance rather than by personal preference, which helped to reduce bias and provide every rider with an equal opportunity to participate. Specifically, enumerators approached drivers at *boda-boda* stands using a simple random selection procedure, for example, by inviting every third

available driver in rotation to participate after explaining the study purpose. If a driver declined, the next one in sequence was selected. This process ensured impartiality and maintained the randomness of participant selection across all sampled locations. The goal was to capture a wide range of experiences and perspectives related to weather-related challenges and the use of micro-insurance services.

3.5 Data Collection

To understand the experiences of motorcycle taxi (boda-boda) drivers with micro-insurance and climate challenges, the research team collected data using a carefully designed survey. The survey included questions about the drivers' income losses due to extreme weather, coping strategies, insurance status, and the extent to which insurance has helped them (if applicable). The survey also captured information about their financial habits, such as saving and borrowing. Trained data collectors administered the questionnaire through face-to-face interviews conducted by trained data collectors who visited boda-boda stands across various areas of Dar es Salaam, as shown in Photos 3 and 4. This method ensured that the drivers fully understood the questions and could explain their answers clearly.

Photo 4: Enumerator administering a structured survey to a boda-boda driver at a local stand in Dar es Salaam. One-on-one interviews allowed respondents to share personal experiences on climate shocks and financial coping strategies



Photo 3: Enumerator collecting survey responses from a boda-boda driver at a roadside stop in Dar es Salaam, illustrating on-the-ground engagement with informal sector workers



In addition to the survey, the team conducted in-depth interviews with representatives from four major micro-insurance providers operating in Tanzania. A total of four interviews were held, one with each company, engaging insurance officers, a market officer, and company representatives responsible for sales/distribution, client outreach,

and service delivery. This selection ensured that the perspectives captured reflected both frontline engagement with riders and organizational approaches to product promotion and access. These in-depth interviews provided valuable insights into how insurers design, price, and promote insurance products for informal workers, such as boda-boda drivers. The interviews also helped uncover challenges in product delivery, uptake, and claim processing, particularly about weather-related risks. Combining the perspectives of drivers who use these services and the providers who offer them, the data collection process gave a well-rounded view of how micro-insurance works in practice and how it can be improved to support vulnerable workers facing climate uncertainty.

3.6 Data Analysis Techniques

After collecting the data, the research team conducted two types of analysis: quantitative analysis for the survey data and qualitative analysis for the interviews with micro-insurance providers. For the survey, the team analyzed responses from 400 boda-boda drivers using Stata 15. They calculated percentages and averages and compared those who had micro-insurance with those who did not. For instance, the study measured how well insured drivers were able to recover after extreme weather events compared to uninsured drivers. The team utilized a specialized tool, the Climate Resilience Index, constructed from five behavioral indicators that capture how effectively boda-boda drivers recover from climate-related income loss, manage financial stress, and use coping strategies such as savings or insurance. Each driver received a score from 0 (low resilience) to 1 (high resilience) based on these indicators to assess and compare the effectiveness of drivers in coping with climate shocks, based on their access to insurance and other forms of support.

The Climate Resilience Index (CRI) was computed by combining five key indicators that reflect how well boda-boda drivers cope with and recover from climate-related income loss. Each driver received a score of 1 for showing a positive resilience behavior, such as recovering from weather-related income loss, receiving support from micro-insurance, using personal savings instead of borrowing, avoiding high-stress coping strategies, or experiencing reduced financial stress from insurance, and 0 if they did not. These scores were then summed and divided by the total number of indicators, yielding a final CRI score ranging from 0 (low resilience) to 1 (high resilience) for each driver.

For the interviews, the research team used thematic analysis. They carefully reviewed and grouped responses from insurance company representatives into common themes, such as the risks faced by boda-boda drivers, challenges in delivering insurance, and ways to improve awareness and access to insurance. These themes helped explain not only what is happening on the ground but also why certain problems exist and how they might be addressed. By combining both numbers (from surveys) and detailed explanations (from

interviews), the analysis provided a comprehensive view of the impact of micro-insurance on the lives and resilience of boda-boda drivers in Dar es Salaam.

To enhance transparency and replicability, the study clearly documented all data management and analytical processes. Survey data were coded and cleaned in Microsoft Excel and analyzed with STATA 15, while qualitative interview transcripts were organized and coded thematically using NVivo 14. The survey instrument was pre-tested with 20 boda-boda drivers to assess clarity, reliability, and question sequencing prior to full rollout. Data collectors administered paper-based questionnaires, as this format was more familiar to the enumerators and respondents and ensured better engagement and comprehension during interviews. These additional details ensure that the research can be replicated and verified by other scholars interested in informal-sector resilience and micro-insurance.

3.7 Ethical Considerations

To ensure that the study was conducted responsibly and respectfully, the research team strictly adhered to ethical guidelines. Before collecting any information, the participants were informed of the study's purpose and their rights, including the right to refuse or withdraw from the study at any time without any consequences. All respondents, including both boda-boda drivers and insurance representatives, were asked to provide their informed consent, meaning they agreed to participate voluntarily after understanding the details of the study. The team also guaranteed confidentiality, meaning that no personal names or identifying information would be shared in the report or with anyone outside the research team. This information was used solely for research purposes to protect the privacy and dignity of all participants.

4. Quantitative Results

4.1 Introduction to the Results Section

This section presents the quantitative findings from a survey of 400 motorcycle taxi (boda-boda) drivers in Dar es Salaam. The results are organized according to the study's three core objectives: assessing the impact of micro-insurance on individual climate resilience, evaluating broader socio-economic outcomes among informal workers, and identifying factors that enable or limit the effectiveness of micro-insurance.

4.2 Socio-Demographic Profile of Respondents

The socio-demographic profile of the motorcycle taxi (boda-boda) drivers surveyed in Dar es Salaam reveals that most are young, relatively educated men, as shown in Table 1 and

Figures 1-4. Over 54% are between the ages of 25 and 34, indicating that boda-boda riding is predominantly a youth-driven occupation. Most respondents are married (56.5%), though a significant proportion are also single (42.5%). Regarding education, over 90% of the drivers have at least a primary education. Specifically, 50.3% completed only primary school, and 40.7% reached ordinary level secondary education (Form Four). Very few have a higher education. Experience in the sector varies, but approximately 57% have worked in the sector for more than three years, suggesting a relatively seasoned workforce. Finally, 89.3% of the respondents report that boda-boda riding is their primary source of income, underscoring the sector's economic significance for urban Tanzania livelihoods. Although the survey captured key socio-demographic and economic variables, it did not include information on the number of children or dependents supported by each driver. This remains an important area for future research to better understand household-level financial pressures and the broader social responsibilities of boda-boda drivers.

Table 1: Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Age	18-24	65	16.25%
	25-34	219	54.75%
	35-44	87	21.75%
	45-54	17	4.25%
	55 and above	12	3.00%
Total		400	100.00%
Marital Status	Single	170	42.50%
	Married	226	56.50%
	Divorced	4	1.00%
Total		400	100.00%
Education Level	No formal education	14	3.50%
	Primary education	201	50.25%
	Secondary (O-Level)	163	40.75%
	Secondary (A-Level)	14	3.50%
	College/University	8	2.00%
Total		400	100.00%

Years of Experience	<1 year	30	7.50%
	1-3 years	141	35.25%
	4-6 years	109	27.25%
	>6 years	120	30.00%
Total		400	100.00%
Main Income Source?	Yes	357	89.25%
	No	43	10.75%
Total		400	100.00%

Figure 1: Bar chart for visualizing age

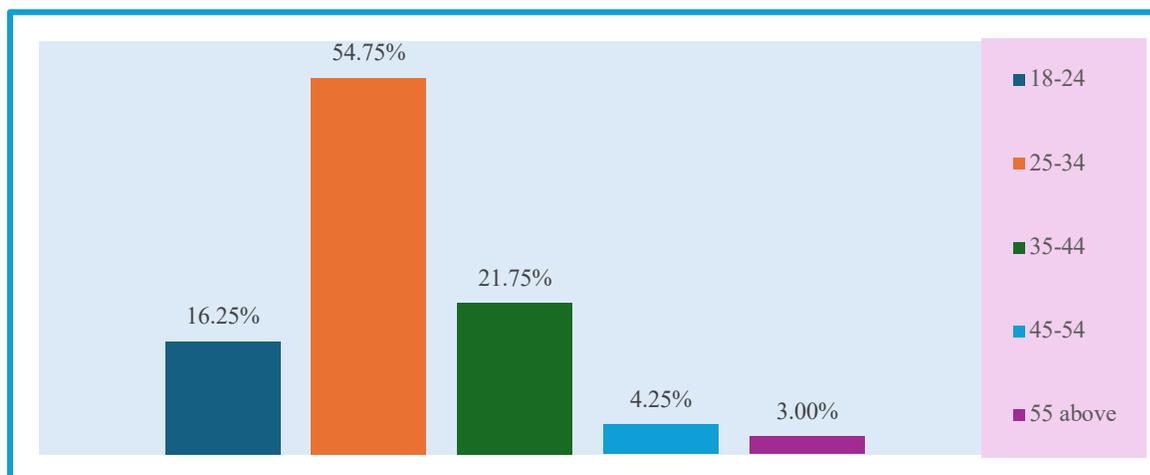


Figure 2: Bar chart for visualizing marriage status

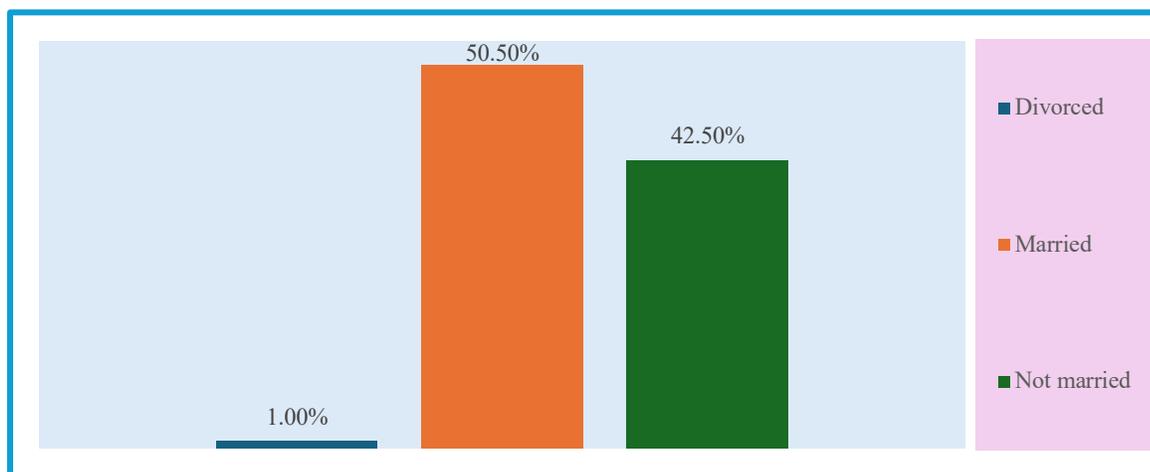


Figure 3: Bar chart for visualizing education level

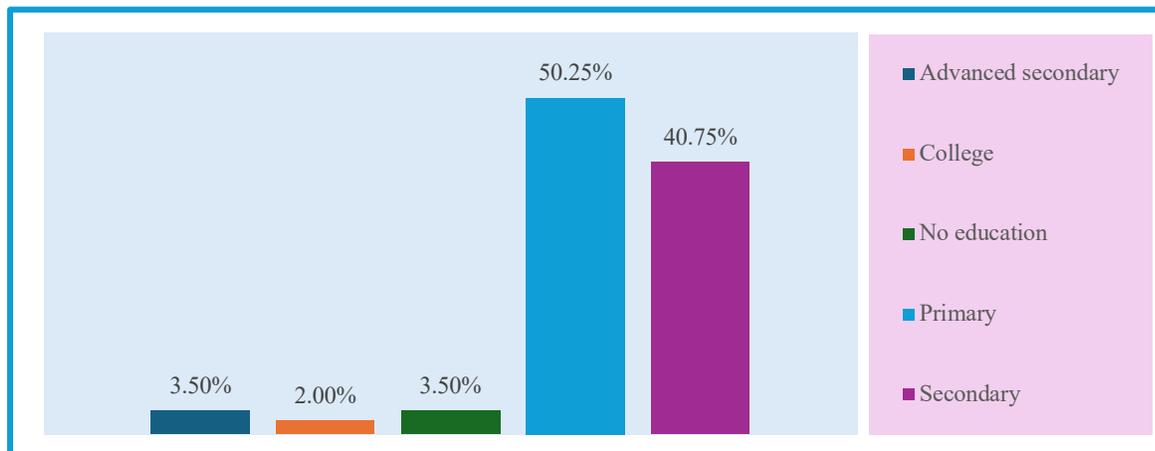
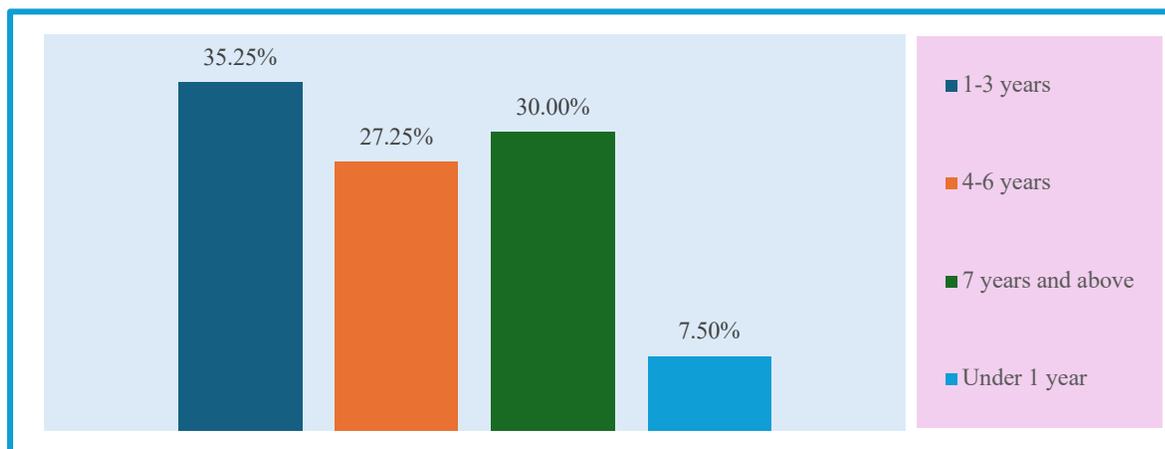


Figure 4: Bar chart for visualizing experience



4.3 Work and Financial Security Status

The financial profile of boda-boda drivers in Dar es Salaam reveals that most earn a modest daily income. Specifically, 36.3% earn between TZS 20,000 and 29,999 Tanzanian shillings (TZS)¹, and 27.5% earn between TZS 30,000 and 39,999 TZS. In comparison, only 7% earn above TZS 40,000, as shown in Table 2. Despite these earnings, a large majority (66%) reports saving **over TZS 10,000 per week**, indicating a relatively strong savings culture. This tendency reflects both necessity and experience; many drivers operate in highly uncertain environments with irregular income and limited access to credit, prompting them to save small amounts regularly as a self-insurance mechanism against income loss or emergencies. However, **only 28.5% have ever taken out a loan**, suggesting limited engagement with formal or informal credit. Among the 110 drivers who took out loans, Savings and Credit Cooperative Societies (SACCOs) were the most common source (28%), followed by family

¹ The exchange rate is 1 USD = 2,493 Tanzanian Shilling

and friends (20.1%), and mobile money loans (15.8%). Notably, some drivers combined multiple sources to access credit. Overall, the data suggests that, although many drivers are financially active and save regularly, their access to and use of credit remains relatively low, possibly due to preference, risk aversion, or limited access to formal financial services, an interpretation inferred from observed survey patterns rather than explicit responses. Future qualitative interviews with boda-boda drivers could help validate these underlying behavioral preferences.

Table 2: Work and Financial Security Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Daily Income (TZS)	Less than 10,000	21	5.25%
	10,000–19,999	96	24.00%
	20,000–29,999	145	36.25%
	30,000–39,999	110	27.50%
	40,000 or more	28	7.00%
Total		400	100.00%
Weekly Savings (TZS)	I don't save	66	16.50%
	Less than 5,000	18	4.50%
	5,000–9,999	52	13.00%
	10,000 or more	264	66.00%
Total		400	100.00%
Ever Taken a Loan?	Yes	114	28.50%
	No	286	71.50%
Total		400	100.00%
Loan Source (n=110) (Multiple response)	Bank	11	9.65%
	Mobile money loan	18	15.79%
	SACCOs	32	28.07%
	Family/Friends	23	20.18%
	Other	24	21.05%
	Banks & SACCOs	2	1.75%
	Mobile money loan & Family/Friends	1	0.88%
	Mobile money loan & Other	1	0.88%
	SACCOs & Family/Friends	1	0.88%
	Mobile money loan, SACCOs & Family/Friends	1	0.88%
Total		114	100.00%

4.4 Micro-Insurance and Individual Climate Resilience

The results align with the study's first two research questions, which focus on the experiences and resilience of boda-boda drivers in relation to micro-insurance. Overall, the findings reveal that while many drivers demonstrate adaptive coping mechanisms and a strong informal savings culture, access to microinsurance remains limited, suggesting a substantial opportunity to expand coverage and strengthen financial resilience within this

vulnerable workforce. The third research question will be addressed in a subsequent qualitative analysis section based on interviews with micro-insurance providers.

4.4.1 Exposure to Climate Shocks

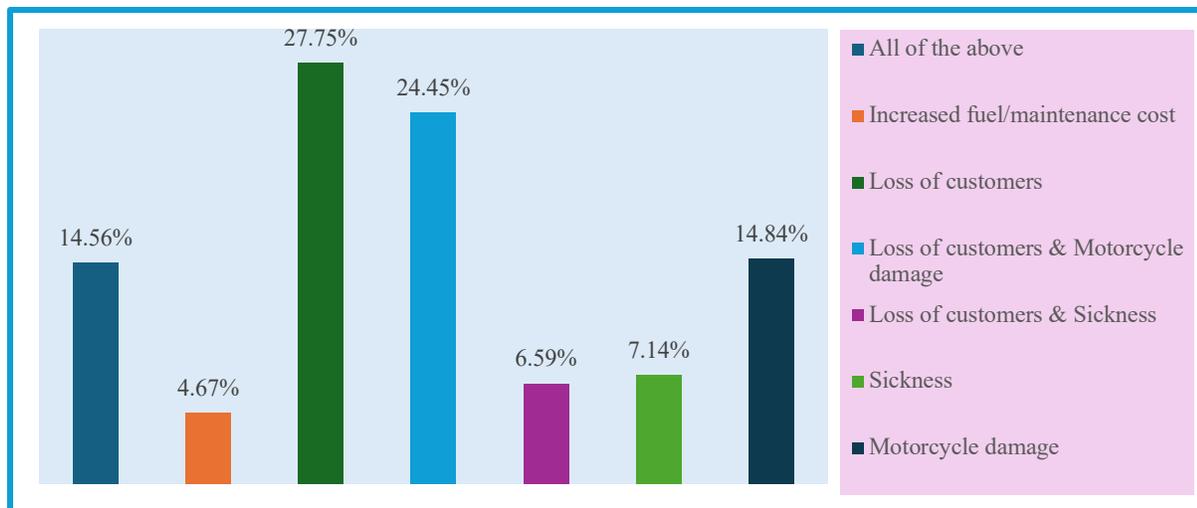
Most of the motorcycle taxi (boda-boda) drivers in Dar es Salaam have experienced financial disruptions due to extreme weather. Out of 400 respondents, 339 drivers (84.75%) reported losing income due to weather-related events, such as heavy rain, flooding, and harsh working conditions. Only 15.25% reported not facing such disruptions (see Table 3). This small group was largely composed of more experienced riders who reported adapting their work schedules, choosing alternative routes, or taking preventive maintenance measures to reduce exposure to weather-related shocks. These results highlight the vulnerability of boda-boda drivers to climate shocks, especially given the outdoor and mobile nature of their work.

Further analysis of how extreme weather affects their operations explicitly reveals a wide range of challenges (Figure 5). The most common issue was loss of customers (27.75%), as people often avoid motorcycle transportation during rainy or dangerous conditions. This was followed by a combination of customer loss and motorcycle damage (24.45%), and a smaller share (14.84%) reported experiencing only motorcycle damage alone due to poor road conditions or flooding. Some drivers (14.56%) selected “All of the above,” indicating that they faced multiple challenges simultaneously, such as income loss, equipment damage, illness, and increased costs. A few respondents (7.14%) reported getting sick from riding in bad weather, while others mentioned loss of customers and experiencing health issues (6.59%). Very few (4.67%) highlighted increased fuel or maintenance costs alone.

Table 3: Experience of Income Loss Due to Extreme Weather

Response	Frequency (n)	Percentage (%)
Yes	339	84.75%
No	61	15.25%
Total	400	100%

Figure 5: Reported Effects of Extreme Weather on Boda-Boda Operations



These results clearly demonstrate the severe impact of extreme weather on the livelihoods of boda-boda drivers, primarily through the **loss of customers, motorcycle damage, and health-related issues**, as shown in Photos 5 to 8. Over 84% of respondents reported experiencing income loss due to climate shocks, indicating that this is a systemic risk within the informal transport sector, rather than an isolated problem. The wide range of adverse effects, which often co-occur, underscores the need for **financial protection mechanisms** such as micro-insurance, which can help drivers absorb such shocks and recover more effectively.



Photo 5: Boda-boda drivers navigating a flooded and broken road segment in Dar es Salaam. Such conditions frequently occur after heavy rainfall, leading to income loss, vehicle damage, and heightened physical risk



Photo 6: A boda-boda driver attempts to fix his motorcycle near a flooded road in Dar es Salaam. Such climate-related disruptions are a frequent cause of income loss and vehicle damage, as reported by over 84% of surveyed drivers.



Photo 7: Pothole-ridden roads like this one are common in Dar es Salaam and severely impact boda-boda drivers' income, safety, and ability to operate during or after rainfall



Photo 8: A boda-boda undergoing repair after mechanical failure. Frequent breakdowns, sometimes due to poor roads and harsh weather conditions, place a heavy financial burden on drivers without insurance

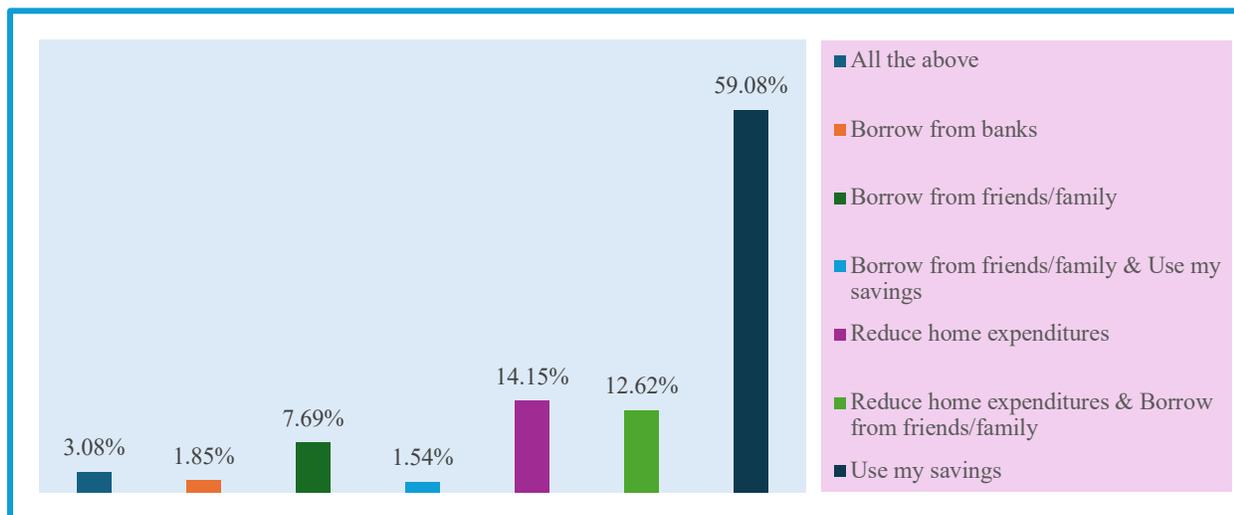
4.4.2 Coping Mechanisms Used

When extreme weather events (as shown in Photos 9 and 10) lead to income loss, boda-boda drivers in Dar es Salaam primarily rely on personal financial strategies to cope with the situation. As shown in Figure 6, the vast majority (59.08%) reported using their personal savings to manage the immediate impact of reduced earnings. This heavy reliance on savings suggests that, although many drivers try to prepare for financial shocks, their limited resources may be depleted quickly, especially if disruptions are frequent. Other commonly reported coping strategies include reducing household expenditures (14.15%) and a combination of reducing expenses while using savings (12.62%). While the survey did not capture specific categories of household expenditures reduced, respondents often mentioned cutting back on non-essential spending, such as leisure activities, phone data, and certain food preferences, during informal discussions. The broader implications of such adjustments, particularly their impact on household or family resilience, remain an important area for future investigation. These actions reflect the drivers' efforts to adjust their lifestyles and spending habits to compensate for lost income, which could put pressure on household wellbeing.

A smaller portion (7.69%) reported borrowing from friends or family, and a mere 1.85% indicated borrowing from banks. This suggests that formal credit options are not widely used or accessible. Additionally, 3.08% of drivers reported using all available coping

strategies, including borrowing, reducing expenses, and dipping into savings. This indicates a higher level of financial distress. The least used strategy was a combination of borrowing from family or friends while using savings (1.54%).

Figure 6: Coping Mechanisms Used by Boda-Boda Drivers After Weather-Induced Income Loss



These findings indicate that most boda-boda drivers do not utilize formal financial services, such as bank loans, to manage climate-related income shocks, only a small proportion of respondents reported using formal credit channels, suggesting that access may vary depending on individual characteristics such as motorcycle ownership or asset possession, variables not captured in the present study but worth exploring in future research to better understand financial inclusion dynamics among riders. Instead, they use their savings, cut household costs, and utilize informal social networks. While these strategies may be effective in the short term, they are not sustainable in the long term, particularly given the increasing frequency and intensity of weather events. The low use of bank loans, combined with stress-based tactics, suggests that drivers lack structured safety nets. This reinforces the urgent need for accessible micro-insurance products that can offer drivers more stable and dignified protection. Although this study did not investigate the specific barriers or hesitancy behind the limited use of bank loans, this remains an important area for future research to understand financial exclusion and behavioral constraints among informal transport workers.



Photo 9: Boda-boda drivers in Dar es Salaam often operate under harsh environmental conditions without formal protection. This photo captures the improvised strategies drivers use to shield themselves from weather hazards.



Photo 10: Boda-boda driver navigating a muddy urban road in Dar es Salaam during rainfall, using a plastic raincoat for protection. This highlights the coping mechanism against rain.

4.4.3 Micro-Insurance and Recovery Capacity

Despite being highly exposed to weather-related shocks such as heavy rainfall and flooding, only 112 of the 400 boda-boda drivers surveyed (28%) reported having any form of micro-insurance coverage (see Table 4). In this study, the term “climate shocks” is used in an operational sense to describe recurrent weather extremes that disrupt livelihoods, rather than implying formal attribution to long-term climate change trends. The remaining 72% of respondents had no insurance protection at all, indicating that a large portion of the informal transport sector is unprotected from the financial consequences of extreme weather. Among the insured drivers, only 41.1% (46 out of 112) reported receiving support from their insurance provider for income loss or weather-related damage (see Table 5). This suggests that, while some insured drivers benefit from their coverage, the majority (58.9%) have not received support, possibly due to limited policy coverage, exclusions, or inadequate claims processing.

Figure 7 shows that the most common form of support received was help with repairing a damaged motorcycle, reported by 66.7% of those who benefited. A smaller proportion mentioned stress reduction (22.2%), reflecting the psychological relief that comes with having some financial backing. Only 11.1% said they were compensated for weather-related income loss, suggesting that income protection remains rare in current micro-insurance offerings.

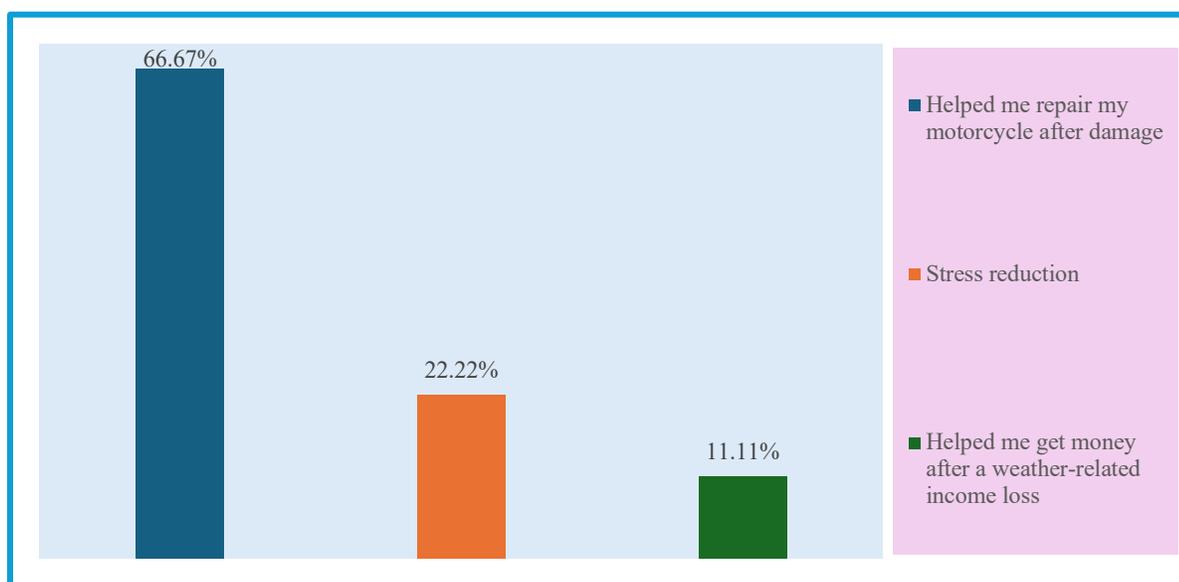
Table 4: Micro-Insurance Coverage Among Respondents

Response	Frequency (n)	Percentage (%)
Yes	112	28.00%
No	288	72.00%
Total	400	100%

Table 5: Insured Respondents Who Received Recovery Support

Response	Frequency (n)	Percentage (%)
Yes	46	41.07%
No	66	58.93%
Total	112	100%

Figure 7: Types of Support Received Through Micro-Insurance (n = 46, multiple responses)



To understand the relationship between micro-insurance and coping strategies, we compared responses from insured and uninsured drivers regarding climate-related income loss. As shown in Table 6, uninsured drivers were significantly more likely to employ informal or vulnerable coping strategies, such as utilizing personal savings (42.2%) or borrowing from friends or family (6.2%). In contrast, insured drivers used these strategies less frequently: only 16.9% relied on their savings, and fewer than 2% borrowed from friends or family. Additionally, 2.5% of uninsured drivers reported using complex, high-stress strategies such as "all of the above," compared to just 0.6% of insured drivers. Survey responses revealed that the most common reasons for not having micro-insurance

included lack of awareness of where to obtain it, perceived high cost, and low trust in insurance companies.

Table 6: Coping Strategies by Micro-Insurance Status (n = 400)

Resilience Indicator	Uninsured	Insured
Borrow from banks	1.54%	0.31%
Borrow from friends/family	6.15%	1.54%
Borrow from friends/family & use my savings	1.54%	0.00%
Reduce home expenditures	10.46%	4.00%
Reduce home expenditures & borrow from friends/family	7.69%	4.61%
Use my savings	42.16%	16.92%
All the above	2.46%	0.62%
Grand Total	72%	28%

The data shows that insured drivers are significantly less likely to use vulnerable coping strategies, such as borrowing money or depleting personal savings, in times of need. While not all insured respondents received support, those who did primarily benefited from motorcycle repairs and reduced financial stress. In contrast, uninsured drivers were much more likely to face hardship alone, relying heavily on informal networks and personal resources. These patterns suggest that, despite its current limitations, microinsurance can help drivers recover more quickly and maintain financial stability in the face of climate-related shocks. However, the disparity between insurance ownership and the support actually received highlights the need for better-designed, more inclusive products that align with the realities of informal sector workers. In this context, inclusive products refer to micro-insurance schemes that are affordable, flexible in payment schedules, easy to access without complex documentation, and responsive to the irregular income patterns of informal workers such as boda-boda drivers.

4.4.4 Mean Climate Resilience Index (CRI) by Micro-Insurance Status

As shown in Table 7, the Climate Resilience Index (CRI) scores show a **clear and statistically significant difference** between boda-boda drivers who have micro-insurance and those who do not. On average, **insured drivers scored 0.507**, indicating higher levels of resilience to climate-related income shocks. In contrast, uninsured drivers scored only 0.274, indicating significantly **lower resilience**. The **difference in CRI scores is 0.233**, which is **highly significant (p < 0.001)** according to a t-test. Drivers with micro-insurance are not only more likely to recover from weather-related disruptions but are also less likely

to rely on vulnerable coping strategies, such as borrowing money or cutting basic household expenses. These results strongly suggest that **micro-insurance plays a meaningful role in improving climate resilience** among informal workers in the transportation sector.

Table 7: Mean Climate Resilience Index (CRI) by Micro-Insurance Status

Group	Observations (n)	Mean CRI	Std. Error	Std. Dev.	95% Confidence Interval
Insured	112	0.507	0.014	0.152	[0.478, 0.535]
Uninsured	288	0.274	0.009	0.151	[0.256, 0.291]
Combined Sample	400	0.339	0.009	0.184	[0.321, 0.357]
Difference (Yes - No)	-	0.233	0.017	-	[0.200, 0.266]
t-statistic	-	-	-	-	13.80
p-value	-	-	-	-	< 0.001

Note: The Climate Resilience Index (CRI), described in the methodology section, measures the extent to which drivers can recover from climate-related income loss based on five behavioral indicators of coping and financial adaptation.

4.5 Socio-Economic Spillovers and Stability

4.5.1 Stress Reduction and Psychological Relief

Beyond direct financial compensation, one of the broader benefits of micro-insurance is its potential to provide informal sector workers with psychological relief and a sense of security. In this study, respondents with micro-insurance were asked if their coverage reduced stress and financial worries related to income loss from extreme weather events.

Of the 112 insured boda-boda drivers, only 22 (19.64%) reported that micro-insurance helped them feel less stressed or anxious about their finances during or after a climate-related disruption. This relatively low percentage suggests that, although some drivers experienced emotional relief from having insurance, most did not view their coverage as a significant source of psychological stability. In this study, psychological stability refers to a sustained sense of mental assurance and reduced anxiety about future livelihood risks. In contrast, emotional relief represents an immediate but short-lived sense of comfort following coverage or claim support. This may be due to several reasons, including uncertainty about how or when payouts will be made, limited coverage (e.g., only for accidents, not weather-related events), and a lack of clear communication or claims support from insurers. Nevertheless, for those who reported reduced stress, micro-

insurance likely provided a safety net, reassuring them that they had some financial cushion rather than complete protection against potential losses during extreme weather or other environmental disruptions.

4.5.2 Willingness to Recommend Micro-Insurance

One way to assess the value and trustworthiness of micro-insurance is to ask current users if they would recommend it to others. In this study, 75 out of 112 insured boda-boda drivers (66.96%) said they would recommend micro-insurance to their fellow drivers, while 37 drivers (33.04%) said they would not (see Figure 8). Thus, two out of every three insured drivers believe that micro-insurance is worth sharing with others, suggesting a generally positive perception of the product. However, the fact that one in three drivers would not recommend it indicates that some users may have concerns about the product, possibly related to claim delays, limited coverage, or lack of trust in providers. Overall, the high recommendation rate indicates that many drivers perceive micro-insurance as helpful; however, improvements in communication, coverage clarity, and claims support could help increase trust and satisfaction among the remaining third.

Figure 8: Willingness to Recommend Micro-Insurance to Other Drivers

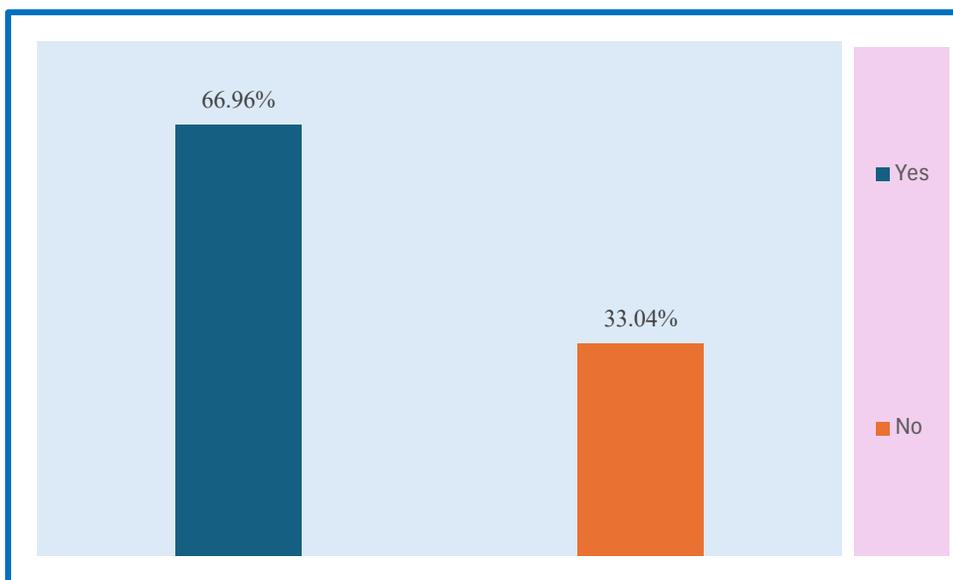


Photo 11 below shows a boda-boda stand for drivers on a street in Dar es Salaam. A boda-boda stand is more than just a waiting area; it is also a bustling hub of community life and economic activity. When you observe a group of boda-boda drivers at their stand, you are witnessing an informal ecosystem in action. This environment is vital for peer learning. Typically, new drivers learn the best routes and how to interact with different customers from their more experienced counterparts. These stands are also important for exchanging

information. Boda-boda drivers share everything from traffic updates to news about new regulations. This swift, word-of-mouth network helps them adapt quickly to the city's ever-changing landscape. Beyond sharing information on daily logistics, boda-boda stands are crucial for disseminating financial tools, especially micro-insurance. Social bonds and informal trust among boda-boda drivers usually enhance willingness to share and adopt new ideas, particularly those that offer a safety net. For instance, a boda-boda driver who has successfully used micro-insurance can easily convince his colleagues to sign up. Thus, this peer-to-peer endorsement enhances trust among boda-boda drivers, making them more stable in case of emergencies or severe weather that limits their daily work performance. Future studies could build on this finding by conducting focus group discussions or participatory interviews at boda-boda stands, which serve as natural hubs for collective learning, trust-building, and financial decision-making.



Photo 11: A group of boda-boda drivers at a stand in Dar es Salaam. Such informal gatherings are key points for peer learning, information exchange, and the spread of financial tools like micro-insurance

5. Qualitative Results

5.1 Introduction

This section complements the quantitative findings by presenting insights from four micro-insurance providers, BUMACO, NIC, MO Assurance, and Jubilee Insurance, regarding their experiences, challenges, and opportunities in insuring informal sector workers, especially

motorcycle taxi drivers (boda-boda) in Dar es Salaam. A thematic analysis organized the responses into key themes that address the third research question.

5.1.1 Perceived Risks and the Role of Micro-Insurance

The results indicate that the four leading micro-insurance providers in Dar es Salaam City, BUMACO, NIC, MO Assurance, and Jubilee Insurance, identified theft, accidents, and income disruption from extreme climate events as the most pressing risks for boda-boda drivers. While the survey did not record which specific provider each insured driver used, qualitative interviews revealed that product coverage and design varied slightly across firms. For example, Jubilee Insurance emphasized accident and condolence benefits, NIC focused on personal accident policies with optional add-ons, and MO Assurance offered bundled savings-linked micro-covers. Future studies could collect provider-level uptake data to better understand which products are most trusted and widely used among drivers. These risks are not merely momentary inconveniences; they affect drivers' income and threaten the sustainability of their livelihoods. According to insurance officers from NIC and Bumaco, the risky nature of this work means that any disruption due to these negative events may have a cascading effect on the income of boda-boda drivers. In response, boda-boda drivers view micro-insurance as a crucial tool for financial recovery when facing such circumstances. Jubilee Insurance provided convincing real-world examples of how insurance coverage helps boda-boda drivers repair their motorcycles, allowing them to resume work after damage caused by poor roads due to heavy rains. This demonstrates how insurance products play a significant role in helping informal workers, including boda-boda drivers, respond to shocks and continue their economic activities.

5.1.2 Climate Vulnerability and Limited Product Alignment

The majority of insurance providers in Dar es Salaam recognize that extreme weather events, such as heavy rains and floods, pose a significant threat to the income and assets of boda-boda drivers. However, they admitted that their current micro-insurance products do not cover weather-specific shocks. In practice, this means that losses resulting from flooding, storm damage, or income interruption due to heavy rainfall are excluded, as most insurers classify such events as “acts of God” under standard policy terms. This gap highlights the absence of climate-responsive coverage tailored to informal workers' risks, emphasizing the need for products that integrate weather-indexed or parametric features to better align with drivers' lived realities. This highlights a critical gap in the insurance market. Key informant interviews with insurance officers at BUMACO and Jubilee Insurance revealed an ongoing effort to incorporate weather-specific shocks into their insurance packages. Both insurers are trying to tailor their products and initiate marketing

campaigns that align with the rainy seasons. Unfortunately, these initiatives are often isolated. The findings reveal that the National Insurance Corporation (NIC) has integrated weather-specific shocks into its Corporate Social Responsibility (CSR) strategies, rather than its insurance packages. There is an emerging recognition that current products may be insufficient for achieving full climate resilience, indicating a need for innovation in climate-responsive insurance design. There is an urgent need to design insurance products that are specifically responsive to climate change, effectively protecting informal workers, such as boda-boda drivers, from increased financial risks.

5.1.3 Affordability and Payment Flexibility

Cost remains a crucial factor in uptake. Products are priced between 5,000 TZS per month and 76,000 TZS per year, which providers consider affordable (Photo 12). However, riders often prioritize daily needs and report having little disposable income. To overcome this barrier, innovative payment methods were suggested and partially implemented, including installment plans through boda associations and mobile payment platforms.

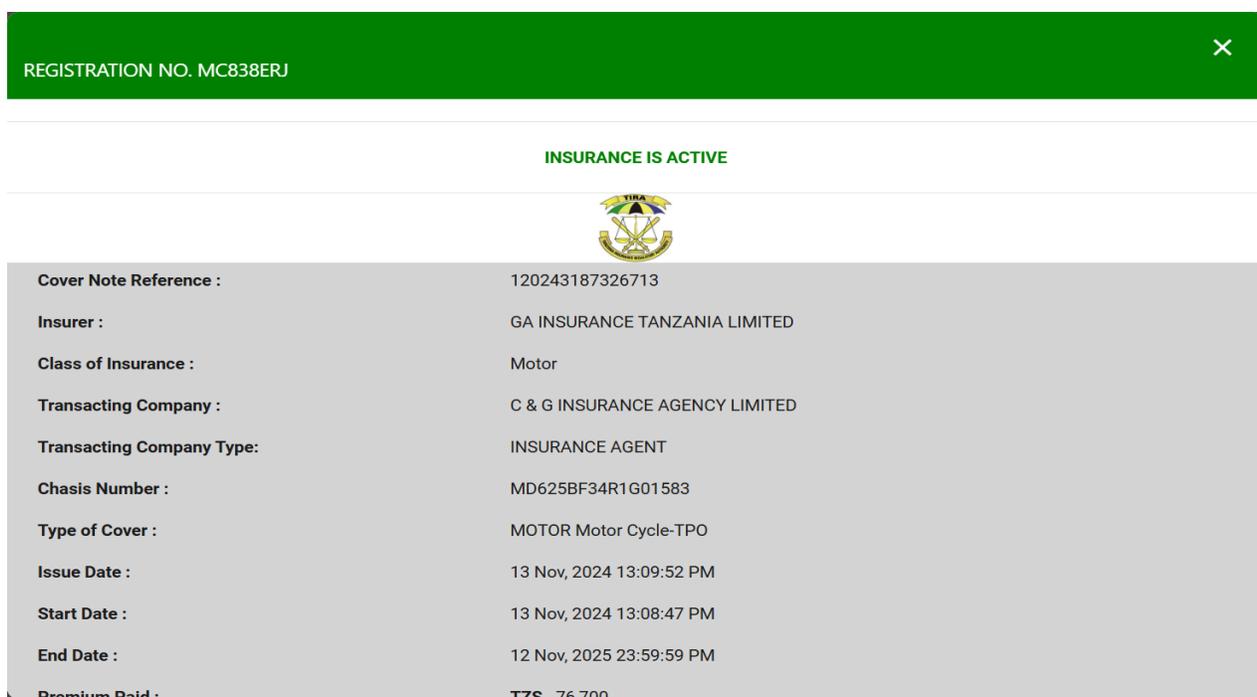


Photo 12: An example of an active TPO insurance policy purchased by a boda-boda driver. While such insurance is common, it typically covers only third-party liability and does not protect against climate-related disruptions or loss of income

5.1.4 Awareness, Misconceptions, and Low Uptake

The findings revealed that the primary challenge for micro-insurance providers is the knowledge gap and widespread misconceptions about micro-insurance among boda-boda drivers in Dar es Salaam City and throughout the country. Insurance providers consistently reported that a major barrier to scaling up their services is the misconceptions that boda-boda drivers have about the services. According to an insurance officer at BUMACO, boda-boda drivers do not trust insurance companies to pay beneficiaries on time. One driver expressed his sentiments...*"I do not trust insurance companies to pay the insurance on time in case I get in an accident or my motorcycle gets damaged."* This misconception is fueled by mob psychology or a collective mindset that perpetuates the perception that insurance companies will not pay. This skepticism, alongside limited knowledge of financial products, leads to other false assumptions....*"This is not my motorcycle, so I do not need insurance....."* is a common misconception among boda-boda drivers who rent their vehicles. This misconception reflects how ownership status influences perceptions of insurance responsibility, drivers who rent motorcycles often assume that the owner bears full liability for risks or damages. While ownership status was not captured quantitatively in this study, qualitative interviews indicated that non-ownership strongly contributes to low insurance uptake and perceived irrelevance of coverage among renters. According to providers like MO Assurance and Jubilee Insurance, limited knowledge is a significant obstacle to the adoption of insurance services among boda-boda drivers. Most drivers realize the value of insurance only after they have been in a costly accident. Addressing these misconceptions and ingrained beliefs is a significant step toward the uptake of micro-insurance among boda-boda drivers.

5.1.5 Distribution and Outreach Channels

The findings showed that all four micro-insurance providers use various distribution and outreach channels to disseminate information about their services. According to insurance officers from BUMACO, NIC, MO Assurance, and Jubilee Insurance, they primarily employ a multi-pronged approach, which includes forming partnerships with boda-boda associations, leveraging sales agents, and utilizing digital platforms such as mobile money and WhatsApp for communication and transactions. Beyond these direct channels, service providers like NIC and Jubilee focus more on creating awareness through broader educational campaigns. Most of these initiatives use traditional media such as radio and television, as well as public events, which are often co-organized with local police and boda-boda associations. Despite these initiatives, a significant challenge remains: the high mobility and unpredictable schedules of boda-boda drivers make it difficult to access them and raise their awareness. Consequently, establishing long-term relationships and effective follow-ups is challenging, which complicates efforts to increase access to and utilization of the service.

5.1.6 Policy and Institutional Collaboration Needs

The results demonstrated that all four micro-insurance providers recommended government involvement to promote the uptake of micro-insurance services for informal workers. Although this study did not directly include government offices, incorporating perspectives from institutions such as the Tanzania Insurance Regulatory Authority (TIRA) and the Ministry of Finance in future research would provide a more comprehensive understanding of the policy coordination and regulatory mechanisms required to strengthen micro-insurance adoption. They proposed various suggestions to create a more conducive ecosystem, including government-led public awareness campaigns to address the widespread distrust and misconceptions in the insurance sector. The MO Assurance representative proposed that insurance companies establish zonal offices, which would improve access to services. The NIC's market officer further suggested that insurance companies leverage existing systems, such as licensing or tax frameworks, to embed insurance premiums and increase uptake seamlessly. Lastly, the Jubilee Insurance representative emphasized the importance of simplifying legal claim procedures, a barrier mentioned by the majority of drivers. These findings support the idea that a clear consensus involving government agencies, financial institutions, and mobile networks is the most significant way to overcome existing challenges and scale up micro-insurance to serve the broader informal sector population.

5.2 Summary of Provider Perspectives

The results indicate that micro-insurance providers acknowledge the significant role their products play in enhancing the resilience of boda-boda drivers in responding to various shocks. It was reported that micro-insurance provides a safety net for accidents and helps boda-boda drivers stabilize their income. The most significant challenge facing micro-insurance providers is the limited adoption of their products. According to insurance providers, a major gap in existing offerings is the lack of weather-specific protection, which leaves boda-boda drivers vulnerable to asset damage from frequent events such as floods and heavy rain, as well as income loss. Micro-insurance companies also struggle with affordability issues and a lack of awareness, which is attributed to widespread misconceptions and distrust about how insurance works. This knowledge deficit is a significant institutional limitation that hinders the scaling up of such services for informal workers.

6. Discussion

This study set out to understand how micro-insurance affects both the climate resilience and broader socio-economic stability of motorcycle taxi (boda-boda) drivers in Dar es

Salaam, one of Tanzania's most climate-exposed and economically vulnerable informal worker groups. Drawing on a mixed-methods approach, the discussion integrates insights from two key sources: quantitative survey data from boda-boda drivers and qualitative interviews with micro-insurance providers. Together, these findings provide a comprehensive understanding of how insurance operates in practice, its benefits, challenges, and limitations, while offering practical implications for enhancing both resilience and stability within this high-risk sector.

6.1 Micro-Insurance and Climate Resilience

The findings clearly show that boda-boda drivers are highly exposed to climate shocks, with over 84% reporting income loss due to extreme weather such as heavy rain and flooding. These events impact their daily operations in multiple ways, including loss of customers, damaged motorcycles, increased fuel costs, and even illness due to harsh conditions. This confirms that climate variability directly threatens both the income and physical safety of informal transport workers. Similar associations between weather shocks and transport worker vulnerability are observed in studies such as Chen (2017), Guo (2022), Liu (2021), and Wong (2021), which document the disruptive effects of rainfall and extreme weather on taxi and ride-hailing operations.

However, the study also found that drivers with micro-insurance were significantly more resilient to these shocks. It is important to note that while micro-insurance products did not directly cover climate or weather-related damage, insured drivers demonstrated greater indirect resilience through financial stability, quicker recovery after weather disruptions, and reduced reliance on high-stress coping mechanisms. Using a Climate Resilience Index (CRI), insured drivers scored an average of 0.51, while uninsured drivers scored only 0.27, a statistically significant difference. Insured drivers were more likely to recover quickly after a weather-related loss and less likely to rely on high-stress coping strategies, such as borrowing money, reducing household expenses, or combining multiple risky approaches. This suggests that micro-insurance plays a crucial role in helping informal workers recover more effectively after climate-related disruptions. This corresponds with evidence from Basaza (2022) and Oktora (2018), who find that insurance significantly improves the willingness and ability of motorcycle taxi operators to manage shocks.

Importantly, insured drivers were also more likely to receive concrete recovery support such as motorcycle repairs and financial relief, and to report reduced financial stress. These benefits are not just economic; they also help protect drivers' mental well-being and facilitate their daily decision-making in uncertain situations. However, it is worth noting that only 41% of insured drivers had received support, which suggests that while micro-insurance is helpful, coverage limitations and gaps in claim processing remain. This finding

is consistent with insights from Alferts (2023) and Rezki (2024), who highlight both the promise and the constraints of informal worker-led and microinsurance schemes in addressing climate and livelihood risks.

6.2 Micro-Insurance and Broader Socio-Economic Stability

Beyond short-term recovery, the study explored whether micro-insurance contributes to longer-term financial stability and community well-being. In this context, community well-being refers primarily to the boda-boda driver community and their households, encompassing both economic stability and social cohesion. Improved insurance access not only helps individual drivers recover financially but also reduces financial stress within families and strengthens mutual support networks among riders. The results show encouraging patterns. For instance, insured drivers were more likely to save regularly and less likely to take out loans during emergencies. This suggests that insurance may reduce financial stress and help informal workers plan, rather than live reactively from one crisis to the next. Similar results are reported by Mutai (2021) in Eldoret, Kenya, and Mhella (2024) in Tanzania, both of whom highlight the role of microinsurance in improving financial inclusion and reducing reliance on informal borrowing.

Additionally, micro-insurance was found to have positive social value. Approximately 67% of insured drivers reported that they would recommend the product to others, indicating a moderate to strong level of trust in it. A smaller group, approximately 20%, reported that insurance had helped alleviate their financial stress during difficult times. While this may seem low, it still represents a meaningful shift for a group that typically has no formal safety net or employer support. This aligns with Wango (2021) and Kinyondo (2021), who emphasize that even limited social protection mechanisms can foster greater trust, solidarity, and collective resilience among informal transport workers.

Overall, these results suggest a dual benefit of micro-insurance: it helps individuals cope with and recover from climate shocks, and it also contributes to day-to-day financial behavior that enhances long-term resilience and well-being. However, barriers remain, including limited awareness, trust issues, and unclear policy terms, which will be explored further in the qualitative findings section of this study. The persistence of these challenges has also been observed in Aketch (2023), who documents similar barriers to youth insurance uptake in Nairobi, and Dodman (2023), who advocates for climate-resilient social protection systems to address the needs of informal workers better.

6.3 Perspectives from Micro-Insurance Providers

Insights from insurance providers further illuminate the enabling and limiting factors shaping micro-insurance outcomes. Providers consistently acknowledged that boda-boda drivers face severe risks, including accidents, income loss due to heavy rains, and theft.

Micro-insurance was described as a practical tool for cushioning these shocks, although most products do not yet explicitly cover climate-specific losses. For example, some insurers offer personal accident or savings-linked policies, but few have weather-triggered payouts or disaster recovery features. These observations correspond with Holzmann (2001) and Kuncoro (2015), who stress the need for adaptive and inclusive risk management frameworks for informal workers.

A recurring challenge was the low level of awareness and uptake among riders. Providers cited misinformation, affordability concerns, and distrust as key barriers. Most riders only engage with insurance after a crisis. Furthermore, the design of products often fails to align with riders' daily realities, especially for those without legal ownership of the motorcycles they operate. This resonates with findings from Indayatun (2025), Muljanto (2023), and Tobing (2024), who highlight how legal gaps and mismatched contractual arrangements constrain adequate protection for motorcycle taxi drivers.

On the positive side, providers described ongoing innovations such as group policies through associations, mobile payments, and targeted marketing during rainy seasons. Partnerships with boda associations, banks, and police were seen as effective for outreach. However, many providers emphasized the need for policy support, including simplified claim procedures, regulatory incentives for weather-related insurance, and national campaigns to promote insurance literacy among informal workers. In sum, while providers recognize the potential of micro-insurance to support both resilience and stability, they stressed that product design, delivery models, and enabling policy frameworks must evolve for this potential to be fully realized. These insights are consistent with Miti (2021) and Kawou (2016), who both argue that sustainable social protection for informal transport workers requires stronger institutional and policy frameworks.

6.4 Study Limitations

This analysis is based on a single cross-sectional survey, so the relationships we document between micro-insurance and outcomes are associative rather than strictly causal. The patterns are nonetheless consistent across multiple indicators and triangulated with insurer interviews. We recommend further studies that track the same riders across rainy and dry seasons (panel or pre/post designs) to verify persistence and strengthen causal inference, and, where feasible, embed simple quasi-experimental variation. The sample is also urban (Dar es Salaam), so generalizability to other settings may be limited. We therefore recommend further studies that extend to secondary cities and peri-urban routes, and link survey responses to administrative claims or mobile-money transaction data, to enhance measurement accuracy and external validity without altering the core conclusion that micro-insurance aligns with materially better coping and recovery.

6.5 Conclusion of the Discussion

In summary, the combined quantitative and qualitative findings strongly suggest that micro-insurance can make a real difference in the lives of informal workers, such as boda-boda drivers, by increasing their resilience to climate change-related extreme weather events, supporting faster recovery after loss, encouraging savings and reducing debt dependency, and building moderate levels of community trust in insurance mechanisms. The perspectives of insurance providers further affirm these benefits, while also highlighting operational realities, such as low awareness, limited financial literacy, distrust in insurance systems, and barriers to claim accessibility. Providers emphasized the importance of community-based education, simplified insurance products, and stronger partnerships with boda-boda associations to improve uptake and impact.

However, for micro-insurance to reach its full potential, more must be done to expand access, improve product design, and build user confidence through transparent and timely support. These findings provide valuable evidence for policymakers, insurers, and development partners seeking to strengthen climate resilience among vulnerable urban populations in Tanzania and similar settings.

7. Conclusion

This study aimed to investigate the role of micro-insurance in enhancing climate resilience and promoting socio-economic stability among motorcycle taxi (boda-boda) drivers in Dar es Salaam. The results show that while this group is highly vulnerable to climate shocks such as flooding and heavy rain, access to micro-insurance significantly improves their ability to cope and recover. Insured drivers were more likely to recover from income loss, rely less on high-risk coping strategies, and report lower financial stress. The Climate Resilience Index confirmed that insured drivers consistently scored higher in resilience than their uninsured peers, offering strong evidence that micro-insurance provides meaningful protection against weather-related risks. These quantitative insights were reinforced by interviews with insurance providers, who consistently acknowledged the climate-related financial hardships faced by boda-boda drivers, notably reduced earnings and mechanical damage from floods. Providers emphasized that micro-insurance, especially accident and condolence cover, offers a pathway to partial recovery when properly understood and utilized.

Beyond recovery, the study also found that micro-insurance has positive ripple effects on financial behavior and peer trust. Insured drivers were more likely to save regularly, less likely to take loans during emergencies, and more inclined to recommend insurance to others, highlighting its broader contribution to financial confidence and social endorsement. However, the findings also reveal that many insured drivers have not

received the support they need, highlighting gaps in product design, claims communication, or trust in insurers. Interviews with insurers further revealed challenges, including low public awareness, mob psychology, misinformation, and operational delays that hinder uptake and confidence in insurance. Providers emphasized the need for mass education campaigns, collaboration with boda-boda associations, and the development of simplified products tailored to the informal sector. These insights underscore the importance of scaling up micro-insurance in a manner that is inclusive, affordable, and responsive to the realities of informal workers, particularly in the face of increasing climate uncertainty.

8. Policy Recommendations

To strengthen climate resilience among informal transport workers, policymakers and stakeholders should prioritize expanding access to affordable and well-designed micro-insurance products. This includes developing insurance schemes that explicitly cover income loss and vehicle damage resulting from climate change-related extreme weather events, risks that directly affect the livelihoods of boda-boda drivers. Government institutions, in partnership with private insurers and digital platforms, can promote bundled products that include weather protection, medical support, and income recovery. Special attention should be given to simplifying claim processes and ensuring prompt payouts, which would foster trust and enhance the perceived value of insurance among low-income users. Interviews with insurance providers revealed that while most insurers acknowledge the importance of climate risks, only a few products directly cover extreme weather events. Moreover, delays in claims processing and legal procedures were highlighted as barriers to timely support, especially for death and accident claims. Stakeholders should streamline legal and administrative requirements to ensure boda-boda drivers are not discouraged from enrolling or filing claims.

Additionally, awareness and education campaigns are crucial for enhancing understanding and adoption. Many drivers remain uninsured due to a lack of knowledge or mistrust of insurance providers. Local governments, boda-boda associations, and mobile money agents can play a crucial role in educating drivers about the benefits of micro-insurance and how to utilize it effectively. Insurance officers consistently emphasized that education is the most powerful tool for improving enrollment. Several firms reported efforts, including radio broadcasts, sales field teams, and partnerships with boda-boda unions, to overcome misinformation and low literacy. These community-based and culturally tailored approaches should be scaled up nationwide. Finally, integrating micro-insurance into broader urban resilience and social protection programs, such as municipal transport planning or financial inclusion strategies, can ensure that vulnerable workers are not left

behind as climate risks intensify. With the right policy support, micro-insurance can become a powerful tool for promoting inclusive, climate-resilient urban economies.

Beyond Tanzania, these findings contribute to a wider conversation on how micro-insurance can be embedded within social protection frameworks across Sub-Saharan Africa and other climate-vulnerable regions. By linking informal worker protection to urban resilience planning, this study underscores the global relevance of context-specific, affordable insurance solutions that can strengthen the adaptive capacity of informal transport workers in diverse geographic settings.

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Note: Some responses reported in the findings were based on enumerators' follow-up prompts or clarifications made during face-to-face interviews. These were used to capture richer explanations and ensure participants' full understanding of each question.

Survey Questionnaire

Section A: General Information

Age (years):

18-24

25-34

35-44

45-54

55 and above

Gender:

Male

Female

Prefer not to say

Marital Status:

Single

Married

Divorced

Widowed

Level of Education:

No formal education

Primary education

Secondary education (O-Level)

Secondary education (A-Level)

College/University

How long have you been working as a boda-boda driver?

Less than 1 year

1-3 years

4-6 years

7 years or more

Is this your main source of income?

Yes

No (If no, what is your main source of income?) _____

Section B: Work and Financial Security

On average, how much do you earn per day as a boda-boda driver?

Less than TZS 10,000

TZS 10,000-19,999

TZS 20,000-29,999

TZS 30,000-39,999

TZS 40,000 or more

How much do you usually save per week?

I don't save

Less than TZS 5,000

TZS 5,000-9,999

TZS 10,000 or more

Have you ever taken a loan for your business or personal use?

Yes

No

If yes, where did you get the loan? (Select all that apply)

Bank

Mobile money loan (e.g., M-Pesa, Tigo Pesa)

SACCOs (Savings and Credit Cooperative Society)

Family/Friends

Other (Specify) _____

Section C: Climate Change and Business Impact

Have you ever experienced loss of income due to extreme weather (e.g., heavy rains, floods, strong winds)?

Yes

No

How do extreme weather events affect your business? (Select all that apply)

I lose customers because people avoid boda-boda during bad weather

My motorcycle gets damaged due to flooding or bad roads

I get sick from working in harsh weather conditions

Fuel and maintenance costs increase

Other (Specify) _____

How do you usually cope when bad weather reduces your earnings? (Select all that apply)

Borrow money from family/friends

Take a loan from a financial institution

Use my savings

Reduce household expenses

Other (Specify) _____

Section D: Awareness and Access to Micro-Insurance

Have you ever heard of micro-insurance for boda-boda drivers?

Yes

No

Do you currently have any micro-insurance policy?

Yes

No

If no, what are the reasons for not having micro-insurance? (Select all that apply)

I don't know where to get it

It is too expensive

I don't trust insurance companies

I don't think I need it

Other (Specify) _____

If yes, which risks does your micro-insurance cover? (Select all that apply)

Accident

Motorcycle damage

Theft

Medical bills

Weather-related losses (e.g., floods, heavy rain)

Other (Specify) _____

Where did you purchase your micro-insurance?

Insurance company

Mobile money platform (e.g., M-Pesa, Tigo Pesa)

Boda-boda association

Other (Specify) _____

How much do you pay for micro-insurance per month?

Less than TZS 5,000

TZS 5,000-9,999

TZS 10,000 or more

Section E: Impact of Micro-Insurance on Climate Resilience

Has micro-insurance helped you recover from income loss due to bad weather?

Yes

No

How has micro-insurance helped you? (Select all that apply)

Helped me repair my motorcycle after damage

Helped me get money after a weather-related income loss

Reduced my stress and financial worries

Helped me get medical care

Other (Specify) _____

Would you recommend micro-insurance to other boda-boda drivers?

Yes

No

In your opinion, what can be done to improve micro-insurance for boda-boda drivers?