

Gezani as an Indicator of Economic Housing Inequalities among Urban Households in Toamasina

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ABSTRACT: This study analyzes the impact of Cyclone Gezani on economic housing inequalities among urban households in Toamasina, Madagascar. It is based on a quantitative survey of 383 households in the Tsarakofafa neighborhood. The objective is to assess the role of economic capacity in residential resilience following a climate-related disaster. The data were analyzed using descriptive statistics, the chi-square test, and a multinomial logistic regression model. The results show that 39.35% of households take more than two months to regain access to their homes, while 23.37% still have not regained access to their homes four months after the hurricane. Informal employment affects 72.06% of households, and 95.04% have no social protection. Econometric estimates indicate that job loss significantly increases the probability of delayed recovery ($p < 0.001$), while access to credit significantly improves reconstruction ($p < 0.001$). Cyclone Gezani thus reveals structural inequalities in residential resilience. These results suggest the need to strengthen social protection mechanisms, expand access to credit tailored to vulnerable households, and integrate informal workers into post-disaster reconstruction policies in order to reduce inequalities in urban resilience.

Keywords: Cyclone Gezani; housing inequalities; social protection; Toamasina; urban resilience

I. INTRODUCTION

Economic inequalities in housing are a major challenge for urban development. Difficulties in accessing housing reinforce socio-spatial disparities and exacerbate forms of urban segregation, particularly in large cities [1], [2]. These authors emphasize that the concentration of resources and the unequal distribution of housing opportunities contribute to the social exclusion of disadvantaged households.

Recent literature on African urbanization indicates that rapid urbanization is accompanied by a sharp expansion of informal settlements, where often more than 50% of the urban population lives [3], [4], [5]. These studies highlight that urban growth far exceeds the capacity of governments to provide accessible formal housing, leading to a massive informalization of urban housing. They also show that poor households are predominantly concentrated in these precarious areas characterized by poor infrastructure quality and limited access to basic services [6], [7]. Furthermore, several empirical studies demonstrate a strong correlation between income inequality and housing inequality, with low-income households being excluded from formal land markets and forced to reside in precarious urban areas [8]. This dynamic contributes to reinforcing socio-spatial segregation and the reproduction of inequalities in African cities.

In Toamasina, the main port city on Madagascar's east coast, scientific studies show that recurring exposure to cyclones and floods poses a major threat to urban infrastructure and household living conditions, due to high vulnerability to hydro-climatic hazards and the concentration of populations in high-risk areas [9]. This vulnerability is exacerbated by the characteristics of the urban fabric, particularly the inadequacy of drainage systems and the location of housing in flood-prone areas, which increases the impact of cyclonic events

on the most exposed households. Furthermore, empirical research conducted in Toamasina shows that socioeconomic inequalities strongly influence housing quality and household resilience, with the poorest households concentrated in precarious housing that is more vulnerable to natural disasters [10]. Thus, cyclones act as indicators and amplifiers of pre-existing socioeconomic inequalities in the city, exacerbating disparities in resilience among households based on their income levels and housing conditions.

This study investigates the socio-economic impacts of Tropical Cyclone Gezani, which struck Toamasina on February 10, 2026. The cyclone constituted an exogenous shock whose economic and social effects had a severe impact on urban households. Due to its coastal location, Toamasina remains particularly exposed to cyclone risks and the disruptions they cause to economic activities and people's living conditions. However, households' capacity for adaptation and resilience remains unevenly distributed depending on income level, housing conditions, access to resources, and the degree of socioeconomic vulnerability. The cyclone thus acts as a revealing and amplifying factor of pre-existing structural vulnerabilities and socioeconomic inequalities. From this perspective, this research aims to determine whether the economic resilience of households in the post-cyclone period depends on their economic capacity. Consequently, this study tests two hypotheses: job loss significantly increases the time required for housing recovery. The second posits that access to economic resources, particularly credit, significantly increases the time required to recover housing.

To address the research question and test the hypotheses formulated, the analysis is structured around several complementary dimensions, ranging from theoretical contextualization to the presentation of methodological choices. The empirical results are then presented and discussed in light of the existing literature.

II. SOCIOECONOMIC DETERMINANTS OF HOUSING RESILIENCE: A REVIEW OF THE EMPIRICAL LITERATURE

The literature on disaster economics shows that housing recovery depends heavily on household income. Household panel data and regression models were used to analyze climate shocks in Indonesia, revealing that wealthier households restore their assets 30 to 50 percent faster after a shock. The effect is statistically significant at the 1% level for consumption and assets. Low-income households experience a sustained decline of 15 to 25% in housing capital over several years [11]. International disaster data and fixed-effects panel models were used to estimate that disasters reduce household capital by 5 to 15% on average, with effects persisting for up to 10 years after the shock [12]. A study conducted in Ethiopia and Honduras shows that up to 60% of poor households embark on disinvestment trajectories following a shock, creating poverty traps linked to the accumulation of housing capital [13].

Employment, credit, and social protection also play a decisive role in household resilience. Longitudinal rural data from Ethiopia analyzed using dynamic panel models reveal a 20–40% decline in agricultural income following a climate shock, as well as an average 10–20% decrease in productive and residential investments [14].

Furthermore, randomized credit experiments show that access to credit increases post-shock consumption by 10 to 20% [9]. Similarly, randomized controlled trials on microinsurance in Malawi indicate a 25% increase in the probability of investment following a shock among insured households [15]. Furthermore, rural panel data analyzed using consumption models reveal a reduction of approximately 30% in asset sales due to social safety nets [16]. Finally, impact evaluations of post-flood cash transfers in Bangladesh show a 15–25% improvement in asset recovery [17].

In Madagascar, fixed-effects regression studies indicate that rural households experience a lasting 10–30% reduction in assets following repeated climate shocks [18]. GFDRR reports (2017, 2021) use descriptive analyses and climate risk models. They estimate that cyclones destroy up to 50–80% of housing in certain exposed areas [19], [20]. They also show a recovery that is highly uneven across income levels. Poor households remain in precarious housing for 2 to 3 times longer. Financial and social mechanisms remain insufficient to compensate for losses. A major gap persists in integrated causal analyses. No study combines income, employment, credit, and social protection within a single empirical framework. This limits a nuanced understanding of housing reconstruction.

III. METHODOLOGY

3.1 Research Setting

This study was conducted in the city of Toamasina, located on the east coast of Madagascar. The study area specifically covers the Fokontany of Tsarakofafa, a neighborhood characterized by severe socioeconomic vulnerability and high exposure to flood risks. This area is among the urban areas most vulnerable to the effects of climate hazards, particularly due to weak infrastructure, substandard housing, and inadequate drainage systems.

This area was selected due to its high exposure to cyclonic events that have affected the region in recent years, notably Tropical Cyclone Gezani. The recurrent flooding observed in this neighborhood results in significant material losses and exacerbates the social vulnerabilities of households.

The survey targeted households residing in the Fokontany of Tsarakofafa. Several eligibility criteria were established for selecting participants. Households had to have resided in the study area during the twelve months preceding the survey. They also had to have experienced Cyclone Gezani and been directly exposed to the effects of flooding or related disruptions. Inclusion criteria required respondents to be at least 18 years old and capable of accurately reporting household living conditions.

The following formula is used to determine the sample size:

$$n = \frac{Z^2 p(1 - p)}{E^2}$$

Where:

- n = sample size
- Z = standard normal table value (e.g., 1.96 for a 95% confidence level)
- p = prevalence rate of affected households. Since the prevalence rate is unknown for the neighborhood under study, we use a value of p = 0.5, in accordance with statistical recommendations. This choice maximizes the variance and thus yields a conservative and adequate sample size.
- E: Margin Of Error, 5% (0.05)

Using this formula, the sample size was set at 383 households. Data were collected in May 2026, four months after the cyclone, using a structured questionnaire. The questionnaire was administered via telephone and tablet using the KoboCollect app. Interviewers received prior training to standardize data collection procedures and minimize survey bias. A pre-test with 30 households was conducted to verify the clarity of the questions, the consistency of the responses, and the administration time before launching the main survey. Data quality was enhanced by using a digital questionnaire with automatic data entry checks and by recording GPS coordinates, which helped reduce errors, geolocate the surveyed households, and ensure better traceability of the collected information.

3.2 Data and statistical analysis methods

The dependent variable is the housing recovery time (hereafter 'Recovery'). It provides a concrete and observable measure of households' ability to restore their living conditions following a hurricane. It reflects both the extent of the damage sustained and differences in access to the resources needed for reconstruction. Housing recovery consists of either repair or reconstruction. This choice is also justified by the fact that it captures inequalities in economic and social resilience among households, particularly based on income, type of housing, and access to formal or informal support. Within the theoretical framework of Amartya Sen's capabilities, this variable reflects individuals' actual freedom to transform their resources into essential functions in this case, the ability to secure decent housing within a variable timeframe thus revealing unequally distributed capabilities for resilience.

This dependent variable is ordinal because the time required to restore housing is measured using ordered categories that reflect an increasing intensity of vulnerability and difficulty in recovering after the hurricane. The categories selected (Less than 1 month, 1 to 2 months, > 2 months, Never) reflect a clear gradient in household resilience, ranging from rapid recovery to a complete lack of recovery, which justifies the use of an ordinal model rather than a continuous variable. The "recovery in less than one month" category is selected as the reference category because, according to the literature on resilience to natural disasters, a shorter recovery time indicates a higher level of resilience [21], [22]. Furthermore, methodological works on categorical data analysis recommend choosing the most favorable category as the reference to facilitate the interpretation of effects in terms of degradation or vulnerability [23], [24].

This recovery period is influenced by economic factors, which are presented in Table 1 below.

Table 1: Table of Study Variables

Variable	Type	Description	Modalities / Coding
Income	Ordinal	Measures the level of household income diversification as an indicator of economic resilience	1 = No diversification (single income source); 2 = Low diversification (2 income sources); 3 = High diversification (≥ 3 income sources)
Job_loss	Binary	Captures whether the household experienced job loss following Cyclone Gezani	1 = Yes; 0 = No
Job	Ordinal	Reflects the stability and vulnerability of the household's main employment type	1 = Informal activities (highly vulnerable); 2 = Agriculture/fishing (climate-dependent); 3 = Salaried employment (more stable)

Housing	Binary	Indicates whether the household owns or does not own its dwelling	1 = Owner; 0 = Non-owner
Social_security	Binary	Indicates whether the household is affiliated with any formal social protection scheme	1 = Yes; 0 = No
Credit	Binary	Indicates whether the household obtained financial credit or support after the shock	1 = Yes; 0 = No

The statistical analysis was conducted in several stages. First, descriptive statistics were used to characterize the households surveyed and describe the distribution of the study's main variables. Second, chi-square tests of independence were performed to examine whether there was a statistically significant association between the time taken to find new housing and the explanatory variables under consideration. Finally, the variables that showed a significant association were incorporated into a multinomial logistic regression model to identify the factors that most influence housing recovery time and to estimate their specific effect, all other things being equal.

To analyze the influence of economic variables on housing recovery time following a hurricane, this study employs a multinomial logistic regression model, as the dependent variable "Recovery" is qualitative and comprises several non-metric categories representing distinct recovery durations. The use of this model is justified by the fact that it allows for the estimation of the relative probabilities of belonging to each recovery time category relative to a reference category, without assuming a strict linear or ordered relationship between the categories, making it suitable for the analysis of multinomial qualitative variables.

Let y_i be the recovery time for household i , with j ordered modalities. For each modality $J \neq 0$ (4 = reference category), we have :

$$\ln\left(\frac{P(Y_i = j)}{P(Y = 4)}\right) = \beta_{j,0} + \beta_{j,i} \sum_{i=1}^{383} X_i + \varepsilon_i$$

With X_i as the vector of explanatory variables for household housing recovery time Y_j such as:

$$X_i = \begin{bmatrix} \text{Income} \\ \text{Job_loss} \\ \text{Job} \\ \text{Housing} \\ \text{Socia security} \\ \text{Credit} \end{bmatrix}$$

Each coefficient β_j measures the effect of an economic variable on the log-probability of a longer recovery time compared to a rapid recovery (< 1 month)

IV. RESULTS

4.1 Descriptive statistics for the variables

Figure 1 shows that the majority of households are renters (62.67%), reflecting a heavy reliance on the rental market and lower residential stability. Homeowners account for only 26.63%, while 10.70% of households live rent-free, revealing significant precariousness in housing tenure.

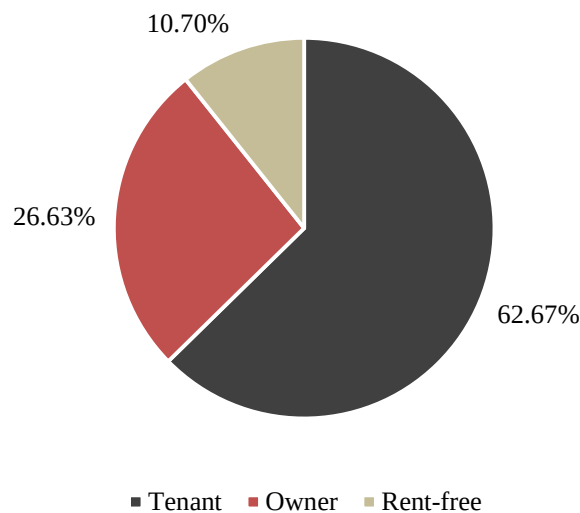


Figure 1: Distribution of households by housing tenure status

Table 2 shows a clear predominance of informal activities, which account for 72.06% of households, reflecting significant economic insecurity and high exposure to climate shocks. Wage employment accounts for only 21.67%, while agriculture and fishing remain marginal (6.27%), confirming the fragile and highly vulnerable economic structure of the urban households studied.

Table 2: Distribution of households by job type

Job Type	Frequency	Percentage
Informal activities (more vulnerable to shocks)	276	72.06%
Salaried employment (more stable)	83	21.67%
Agriculture/fishing (climate-dependent)	24	6.27%
Total	383	100.00%

The distribution shows that the majority of households (39.35%) take more than two months to return to their homes after a cyclone, indicating high vulnerability and limited reconstruction capacity (Figure 2). Furthermore, nearly a quarter of households (23.37%) never manage to regain access to their homes, while only 14.50% achieve a rapid recovery in less than a month, revealing significant inequalities in resilience.

Figure 2 illustrates that the vast majority of households (95.04%) are not enrolled in any social security system, while only 4.96% are enrolled.

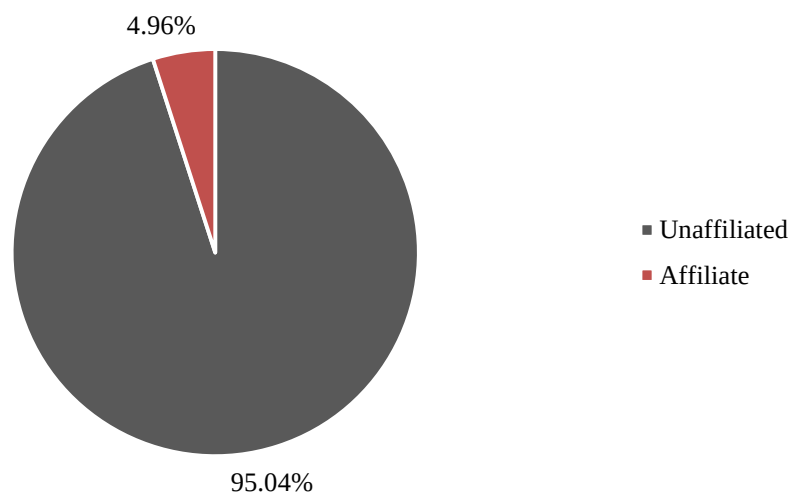


Figure 2: Household enrollment in a social security system (%)

This situation reflects the low level of social security coverage among the households studied and suggests that most of them remain vulnerable to risks associated with illness, accidents, or loss of income without any formal social protection mechanism. The very limited coverage observed may reflect economic constraints, a predominance of informal employment, or restricted access to social security programs.

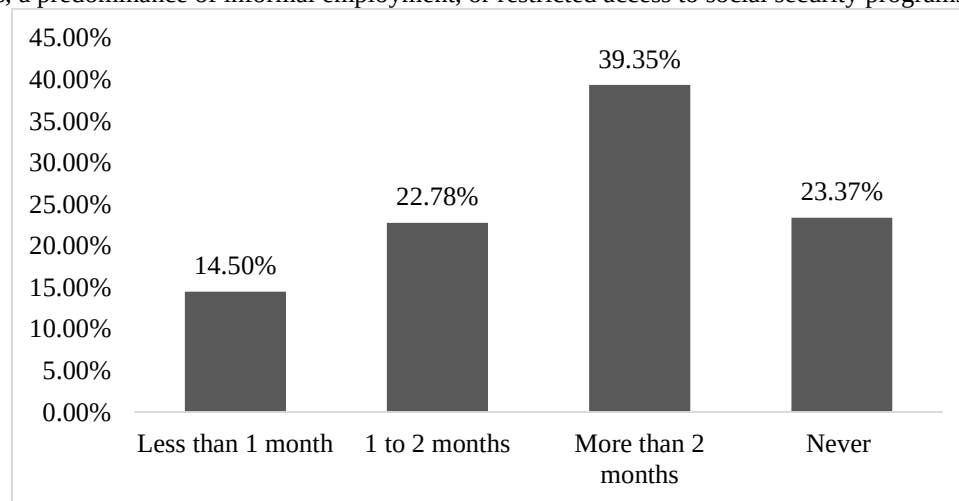


Figure 3: Distribution of households by time to find new housing

4.2 Statistical test

The results of the chi-square test presented in the table 3 below indicate that all explanatory variables are significantly associated with housing recovery time (Recovery).

Table 3: Chi-square test results between housing recovery time and explanatory variables

Explanatory variables	χ^2	df	p-value	Significance
Income	8.68	3	0.034	**
Job	19.20	3	< 0.001	***
Job_loss	90.20	3	< 0.001	***
Housing	41.70	3	< 0.001	***
Social security	8.16	3	0.043	**
Credit	74.70	3	< 0.001	***

The variables Income ($p = 0.034$) and Social security ($p = 0.043$) show a significant association at the 5% level, while Job ($p < 0.001$), Job_loss ($p < 0.001$), Credit ($p < 0.001$), and Housing ($p < 0.001$) show highly significant associations. These results suggest that household economic characteristics influence the housing recovery process and thus justify the use of a multinomial logistic regression to analyze the specific effect of each factor on the different categories of recovery time following the hurricane. The variables Income ($p = 0.034$) and Social_security ($p = 0.043$) show a significant association at the 5% level, while Job ($p < 0.001$), Job_loss ($p < 0.001$), Credit ($p < 0.001$), and Housing ($p < 0.001$) show highly significant associations. These results suggest that household economic characteristics influence the housing recovery process and thus justify the use of a multinomial logistic regression to analyze the specific effect of each factor on the different categories of recovery time following the hurricane.

4.3 Econometric estimation of the determinants of housing recovery

The overall model is statistically significant ($\chi^2 = 134$; $df = 18$; $p < 0.001$), indicating that the selected economic variables significantly explain the recovery time of households following Cyclone Gezani in Toamasina (Table 4). The model has moderate explanatory power, with a McFadden pseudo R^2 of 0.133, which is acceptable for logistic models applied to socioeconomic data.

Table 4: Model fit statistics

Model	Deviance	AIC (Akaike Information Criterion)	Model fit statistics			
			R^2_{McF}	χ^2	df (Degrees of freedom)	p
1	876	918	0.133	134	18	<.001

Note. Models estimated using sample size of N=383

These results suggest that the economic variables included in the analysis contribute substantially to explaining inequalities in housing recovery, though they do not capture all determining factors. The AIC of 918 confirms the model's validity while suggesting that improvements could be made by adding additional variables. Thus, the model highlights a statistically robust link between households' economic characteristics and their residential resilience in the face of Cyclone Gezani.

The results of the multinomial logistic regression model presented in Table 4 below highlight significant differences in the residential recovery trajectories of urban households in Toamasina following Cyclone Gezani.

Table 5: Estimation of the logistic regression model

Recovery	Predictor	Estimation	Standard Error	Z	p
1 to 2 months - Less than 1 month	Constant	-10.060	0.0780	-129.029	<.001
	Income	0.577	0.8181	0.705	0.481
	Job_loss	4.957	0.1559	31.785	<.001
	Job	0.893	0.5231	1.708	0.088
	Housing	-0.158	0.4182	-0.377	0.706
	Social_security	15.975	0.3875	41.227	<.001
	Credit	2.381	0.7737	3.077	0.002
> 2 months - Less than 1 month	Constant	-11.250	0.0711	-158.144	<.001
	Income	-0.471	0.8129	-0.579	0.562
	Job_loss	5.871	0.1423	41.265	<.001
	Job	0.311	0.5183	0.600	0.548
	Housing	-0.352	0.3925	-0.897	0.370
	Social_security	15.108	0.4195	36.013	<.001
	Credit	3.385	0.7525	4.498	<.001
Never - Less than 1 month	Constant	28.111	0.0773	363.695	<.001
	Income	-1.806	0.8752	-2.064	0.039
	Job_loss	-14.071	0.1546	-91.025	<.001
	Job	1.227	0.5044	2.432	0.015
	Housing	0.269	0.4141	0.649	0.516
	Social_security	15.536	0.3928	39.554	<.001
	Credit	2.725	0.7642	3.566	<.001

Source: authors, using Jamovi software

In the equation comparing households that regained their housing between one and two months to those that regained it in less than a month, job loss emerges as a factor strongly associated with a longer time to regain housing ($\beta = 4.957$; $p < 0.001$). Similarly, access to credit has a positive and significant effect ($\beta = 2.381$; $p = 0.002$), reflecting the use of external financing as a post-disaster coping mechanism. The variable related to employment type also exhibits a weakly significant positive effect ($\beta = 0.893$; $p = 0.088$), suggesting that certain occupational categories remain vulnerable despite relative economic stability. In contrast, income diversification ($\beta = 0.577$; $p = 0.481$) and housing status related to home ownership ($\beta = -0.158$; $p = 0.706$) do not have a statistically significant effect in this initial recovery trajectory.

Comparing households with recovery times exceeding two months to those recovering in under one month confirms the central role of economic vulnerabilities in the dynamics of residential resilience. Job loss remains the most decisive factor ($\beta = 5.871$; $p < 0.001$), indicating that the destabilization of the labor market following Gezani severely compromises the reconstruction capabilities of urban households. Access to credit also retains a positive and significant effect ($\beta = 3.385$; $p < 0.001$), suggesting that the most affected households are precisely those forced to mobilize external financial resources to restore their homes. Furthermore, the social

protection variable exhibits a particularly high and statistically significant coefficient ($\beta = 15.108$; $p < 0.001$), revealing the limitations of institutional post-disaster support mechanisms in the urban context of Toamasina. Conversely, neither income diversification ($\beta = -0.471$; $p = 0.562$), nor the type of employment ($\beta = 0.311$; $p = 0.548$), nor homeownership status ($\beta = -0.352$; $p = 0.370$) have a significant effect on this category of prolonged recovery.

Finally, the equation for households that never regained their housing highlights more structural forms of socioeconomic inequality. Income diversification significantly reduces the probability of failing to regain housing ($\beta = -1.806$; $p = 0.039$), confirming that having multiple sources of income is a major factor in economic resilience. Conversely, the type of employment significantly increases the probability of falling into the “Never” category ($\beta = 1.227$; $p = 0.015$), reflecting the persistent vulnerability of precarious or weather-dependent occupations. Social protection retains a strongly positive and significant effect ($\beta = 15.536$; $p < 0.001$), as does access to credit ($\beta = 2.725$; $p < 0.001$), highlighting the inadequacies of institutional and financial mechanisms in ensuring the effective reconstruction of the most vulnerable housing. The unexpectedly large negative coefficient ($\beta = -14.071$; $p < 0.001$) for job loss is likely due to quasi-complete separation in the data for this specific subsample.

Overall, these findings show that Cyclone Gezani serves as a powerful indicator of economic inequalities in housing in Toamasina, where the ability to recover housing remains closely tied to economic resources, job stability, and access to institutional support mechanisms.

V. DISCUSSIONS

5.1 Economic Capacity and Differentiation in Residential Recovery Trajectories

The results show that inequalities in residential recovery following Cyclone Gezani in Toamasina stem primarily from structural inequalities in economic capacity. The high significance of the “job loss” variable in the prolonged recovery categories (“1 to 2 months”: $\beta = 4.957$; $p < 0.001$; “> 2 months”: $\beta = 5.871$; $p < 0.001$) indicates that the vulnerability of the urban labor market is a central mechanism in the production of post-disaster housing inequalities. Economically, these results imply that the destruction or interruption of labor income immediately reduces households’ ability to finance repairs, procure materials, or access the labor needed for reconstruction. This finding aligns with the work of Boubacar et al. (2017) on urban households exposed to flooding in Niamey, which show that urban disasters severely erode the economic resilience of poor households and force them into debt to survive. The authors demonstrate in particular that households with unstable or precarious incomes experience much longer recovery trajectories following climate shocks [25].

Similarly, Seeliger and Turok (2014), in their study of South African informal settlements, emphasize that urban residential vulnerabilities are closely linked to structural economic weaknesses and the dynamics of urban poverty [26]. The findings from Toamasina thus extend this African literature by showing that Gezani did not merely cause physical destruction but also revealed the limits of urban households’ economic capacity to cope with climate shocks. This interpretation is reinforced by the negative coefficient associated with income diversification in the “Never” category ($\beta = -1.806$; $p = 0.039$), indicating that a plurality of income sources acts as a protective factor against failure to recover housing. This result aligns with the study by Poku-Boansi et al. (2021) in Ghana, which shows that households with diversified economic capital develop greater post-disaster resilience in informal urban neighborhoods [27].

5.2 Social Protection, Access to Credit, and the Reproduction of Housing Vulnerability

The findings related to social protection and credit, however, reveal a significant contradiction in the institutional mechanisms of urban resilience in Madagascar. The extremely high and positive coefficients of the “social_security” variable in the three equations (“1 to 2 months”: $\beta = 15.975$; $p < 0.001$; “> 2 months”: $\beta = 15.108$; $p < 0.001$; “Never”: $\beta = 15.536$; $p < 0.001$) show that enrollment in formal social protection schemes does not guarantee rapid housing recovery. From an economic perspective, this suggests that existing institutional mechanisms remain insufficient to absorb the high costs of post-disaster urban reconstruction. This finding partially diverges from the conclusions of Otchere and Handa (2022) in Malawi, who demonstrate that regular social transfers significantly improve the resilience of poor households in the face of economic and climate shocks. However, this divergence can be explained by institutional differences between Malawi’s social transfer programs and Madagascar’s social protection systems, which are often characterized by low coverage, limited resources, and delayed response following natural disasters [28].

However, this discrepancy can be explained by institutional differences between Malawi’s social transfer programs and Madagascar’s social protection systems, which are often characterized by low coverage, limited resources, and delayed response following natural disasters. The results are more consistent with Devereux and Cuesta (2021), who show that social protection systems in African cities remain inadequately adapted to urban vulnerabilities and informal workers, who nevertheless constitute the majority in African economies [29]. Similarly, the positive effect of credit on categories of prolonged recovery (“1 to 2 months”: $\beta = 2.381$; $p = 0.002$; “> 2 months”: $\beta = 3.385$; $p < 0.001$; “Never”: $\beta = 2.725$; $p < 0.001$) indicates that the use of

external financing serves primarily as an economic survival mechanism for already vulnerable households. This result aligns with the analyses by Boubacar et al. (2017), according to which poor urban households frequently resort to debt after disasters, which can prolong their housing vulnerability rather than promote rapid reconstruction [25]. Thus, in the case of Toamasina, credit appears to reflect an inability to finance oneself rather than a true capacity for economic resilience.

VI. CONCLUSION

This study analyzes the role of Cyclone Gezani in exposing economic inequalities in housing in Toamasina. The results show that residential resilience depends heavily on households' economic capacity. The cyclone exacerbated pre-existing social and economic vulnerabilities. The most vulnerable households are recovering their housing more slowly in the aftermath of the disaster. Some households never even manage to restore their homes. Thus, Gezani serves as a major indicator of urban inequalities in residential resilience.

The results support the two research hypotheses. The first hypothesis is confirmed: job loss significantly increases housing recovery time by diminishing the reconstruction capacity of urban households. The second hypothesis is partially validated. Access to credit significantly influences housing recovery after the cyclone. However, credit appears more as a strategy for economic survival. Income diversification strongly reduces the risk of failing to recover housing. Economic capacity therefore remains central to post-disaster resilience trajectories.

This research contributes to the literature on the economics of disasters and urban inequality in Madagascar. It proposes an integrated approach that combines employment, income, credit, and social protection. Few studies have examined these dimensions within a single empirical framework for urban Madagascar. The results show that disasters exacerbate pre-existing socioeconomic inequalities. This study also provides guidance for social housing policies. Social protection systems must be strengthened in the aftermath of climate-related disasters. Public policies must better integrate workers in the informal sector. Financing mechanisms tailored to vulnerable households also remain necessary. Finally, reconstruction policies must sustainably reduce inequalities in residential vulnerability.

ACKNOWLEDGEMENTS

This research did not receive any grants or funding.

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