



## Spatial Analysis of Gender-Based Violence in Morarano, Toamasina District, Madagascar

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**Abstract:** *This study presents a spatial analysis of gender-based violence in the Morarano district, located in Toamasina, Madagascar. Based on a rigorous methodology, the research conducted a field survey among 250 participants, selected by stratified random sampling to ensure representativeness in terms of age, gender, and socioeconomic status. The results indicate that the majority of victims are women. The neighborhoods of Tanambao Verrerie and Analakininina stand out for a significant prevalence of violence ; moreover, the analysis emphasizes the influence of socioeconomic factors that exacerbate family tensions and public space assaults. Intimate partners are identified as the primary aggressors, highlighting dynamics of domestic and interpersonal violence. These findings provide a solid basis for recommendations aimed at improving public policies and preventive actions.*

**Keywords:** *Gender-based violence, Spatial analysis, Morarano, Toamasina*

### I. Introduction

The study of gender-based violence occupies a central place in social geography research, particularly in urban contexts where socioeconomic disparities exacerbate tensions. From this perspective, the spatial analysis of violence in Morarano, a district of Toamasina, Madagascar, aims to shed light on the territorial dynamics associated with this complex phenomenon. The methodological approach adopted in this study falls within an interdisciplinary research tradition, combining statistical analysis with the use of a Geographic Information System (GIS) to map high-risk areas. This combination of tools makes it possible to identify not only the frequency of violent incidents, but also their spatial distribution and their correlation with socioeconomic indicators such as poverty, unemployment, and lack of education. This dual methodological approach has already been praised in recent studies (Nguyen et al., 2022 ; Martin, 2023).

The choice of Morarano as the study area is based on its representativeness in terms of demographic and socioeconomic diversity. Indeed, the neighborhoods of Tanambao Verrerie, Analakininina, and Ambolomadinika illustrate varied contexts in which gender dynamics manifest differently. Spatial analysis thus offers the possibility of examining how environmental and territorial factors interact with gender inequalities (Dupont, 2022). Moreover, the integration of geolocated data allows the identification of violence “hotspots,” a valuable tool for decision-makers in prevention and intervention (Benoit et al., 2023).

Recent literature highlights the importance of a multidimensional approach to understanding gender-based violence by integrating economic, social, and spatial dimensions (Hernandez, 2022). Furthermore, studies conducted in various geographical contexts show that the spatialization of violence is closely linked to power dynamics and social inequalities

(Lefevre, 2024). In this context, the study presents an original contribution by focusing on a specific territory in Madagascar, which is often under-represented in international research.

Additionally, the data analysis reveals that the violence experienced is not limited to a simple opposition between aggressor and victim. It reflects more complex power relations, where the intimate partner is often identified as the main initiator of the assaults (Garcia et al., 2023). This finding is corroborated by several recent studies that stress the importance of relational factors in the genesis of domestic violence (Smith, 2022). Furthermore, taking into account so-called “other” forms of violence opens the debate on less visible, yet equally devastating, forms of gender-based violence.

The objective of this introduction is also to situate the research within a relevant theoretical framework. The concepts of social space, territorial inequalities, and spatial justice provide essential analytical keys for interpreting the data collected (Durand et al., 2022). Moreover, the cartographic approach adopted allows a dynamic and contextual visualization of the incident distribution, thereby fostering a better understanding of local issues (Moreau, 2023). It underlines the need for a multidisciplinary approach, integrating both quantitative and qualitative data, in order to deploy effective intervention strategies adapted to local realities (Kouadio, 2023). In doing so, it paves the way for an in-depth discussion of the results, leading to concrete ideas for improving public policies in violence prevention.

## **II. Research Methods**

For this study on gender-based violence (GBV), a field survey was conducted in Morarano, one of the districts of Toamasina, targeting a sample of 250 people. The choice of this area is based on its representativeness in terms of socioeconomic and demographic diversity, thus allowing for a comprehensive view of the perceptions and experiences related to GBV in an urban context.

Participants were selected using a stratified random sampling method, ensuring a balanced distribution according to age, gender, and socioeconomic status. Each participant was informed about the objectives of the study and the confidential handling of their responses. Informed consent was obtained before administering the questionnaires. These questionnaires contained both closed and open-ended questions, allowing the collection of both quantitative and qualitative data on the experiences and perceptions of gender-based violence.

For data processing, a dual software approach was used. The quantitative data from the questionnaires were first integrated into Microsoft Excel to perform an initial sorting, calculate statistical indicators (prevalence rates, means, and standard deviations), and create pivot tables to identify significant trends and correlations. Simultaneously, the geolocated information was integrated into a Geographic Information System (GIS). This allowed for the visualization of the spatial distribution of GBV incidents and the identification of high-risk areas or areas requiring special attention. The combined use of Excel and GIS thus enabled the integration of statistical analysis with a spatial dimension, providing a more complete and contextualized view of the phenomena studied.

The entire methodology was governed by strict ethical protocols, ensuring the confidentiality of participants and the scientific rigor of the study. The results obtained form a solid basis for formulating recommendations aimed at preventing GBV and improving public policies in this area.

### III. Results and Discussion

#### 3.1 Results

The study reveals that women are the majority of victims (58.56%), followed by men (41.18%) and a very small percentage of transgender individuals (0.27%). Tanambao Verrerie is the most affected neighborhood with 27.54% of reported cases, where women are particularly vulnerable (16.58%), although men are also affected (10.70%). Analakininina follows closely with 25.40%, showing a relatively balanced distribution between violence against women (13.90%) and men (11.50%), which could indicate a prevalence of domestic violence and assaults in public spaces. Ambolomadinika (22.73%) shows a clear majority of violence against women (16.84%), while men are less affected (5.88%), perhaps reflecting structural and familial violence primarily targeting women. In contrast, Mangarivotra (7.75%) is the neighborhood with the lowest rate, likely due to factors such as better access to protection services or different social dynamics.

**Table 1.** Distribution of Genders by Neighborhood in the Morarano District

Neighborhood	Genders			
	Female	Male	Transgender	TOTAL
Ambolomadinika	16,84	5,88	0,00	22,73
Analakininina	13,90	11,50	0,00	25,40
Mangarivotra	3,74	4,01	0,00	7,75
Morarano	7,49	9,09	0,00	16,58
Tanambao verrerie	16,58	10,70	0,27	27,54
TOTAL	58,56	41,18	0,27	100,00

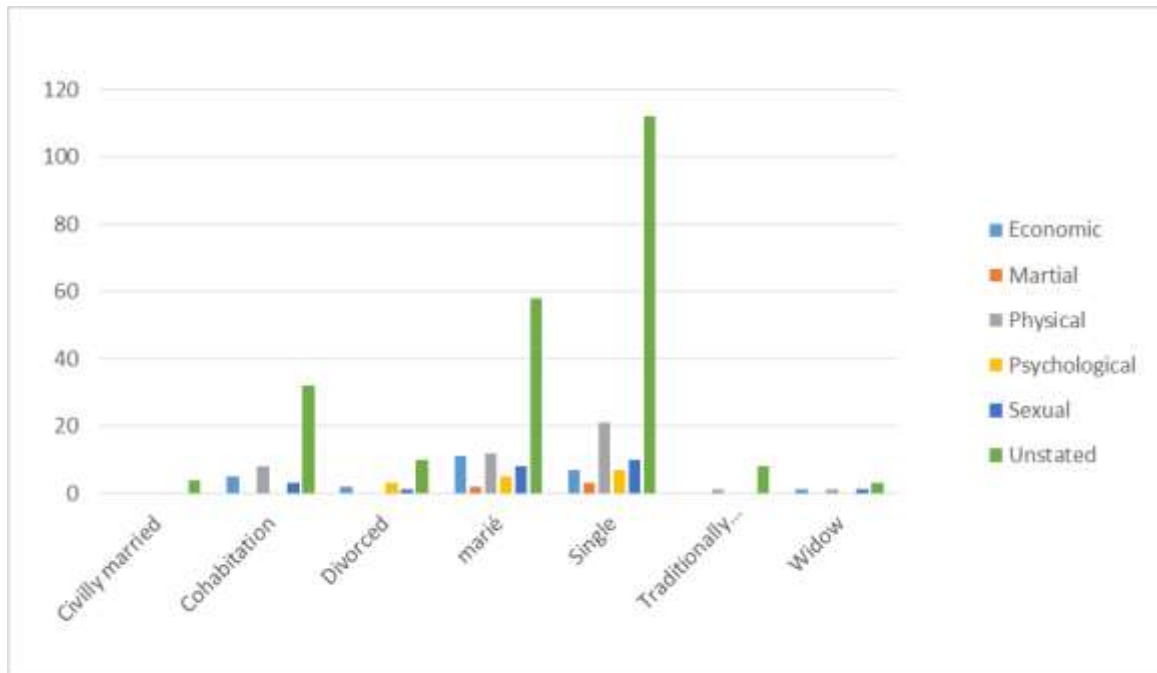
In Ambolomadinika, the most frequently reported violence is classified as “other” (13.10%), followed by “physical” violence (4.55%) and “sexual” violence (2.14%). The absence of domestic violence (0%) and economic violence (1.87%) suggests that, in this neighborhood, physical and sexual violence could be more linked to external or social causes rather than domestic conflicts or economic problems.

In Analakininina, “other” violence is also the most common (19.79%), followed by physical violence (1.60%) and economic violence (1.60%). This pattern is similar to that of Ambolomadinika, where unspecified violence dominates, though with a slight presence of economic and physical violence. Domestic violence remains relatively low (0.27%). Psychological (0.53%) and sexual violence (1.60%), though low, show that gender-based violence takes multiple forms in this neighborhood.

**Table 2.** Type of Violence by Neighborhood in the Morarano District (%)

Quartier	Type of violence						TOTAL
	Others	Martial	Economic	Physical	Psychological	Sexual	
Ambolomadinika	13,10	0,00	1,87	4,55	1,07	2,14	22,73
Analakininina	19,79	0,27	1,60	1,60	0,53	1,60	25,40
Mangarivotra	5,35	0,00	0,27	1,87	0,00	0,27	7,75
Morarano	10,70	0,27	1,87	1,34	1,60	0,80	16,58
Tanambao verrerie	19,52	0,80	1,60	2,67	1,07	1,87	27,54
TOTAL	68,45	1,34	7,22	12,03	4,28	6,68	100,00

Intimate partners are the perpetrators in the majority of cases, accounting for 56.79% of the total reported incidents. In Ambolomadinika, a high percentage (27.16%) of violence is committed by partners. Family members and other individuals also play a role, but to a much lesser extent, representing only 1.23% each. In Analakininina, the aggressors are again mainly intimate partners (8.64%), followed by “others” (8.64%) and family members (1.23%). In Mangarivotra, violence is less widespread overall, with 6.17% of the violence committed by partners and no violence reported by family members or others.



**Figure 1.** Illustrates the types of violence.

Morarano shows a pattern similar to Analakininina, with 17.28% of the violence coming from others and 6.17% from partners. In Tanambao Verrerie, 13.58% of the violence is perpetrated by partners, followed by 8.64% of cases where the aggressors are classified as “others.”

Poverty (9.63%) and unemployment (3.21%) are major factors contributing to insecurity and violence. These factors are particularly notable in Analakininina (3.74%) and Tanambao Verrerie (2.41%), where difficult living conditions may exacerbate family and marital conflicts.

The lack of education (4.81%) and lack of awareness (2.14%) are significant obstacles to preventing violence. Analakininina (1.87%) and Tanambao Verrerie (1.34%) are the neighborhoods most affected by this educational deficit.

In Ambolomadinika, only 2.22% of respondents reported experiencing gender-based violence, although such violence is infrequent and without marked recurrence. In contrast,

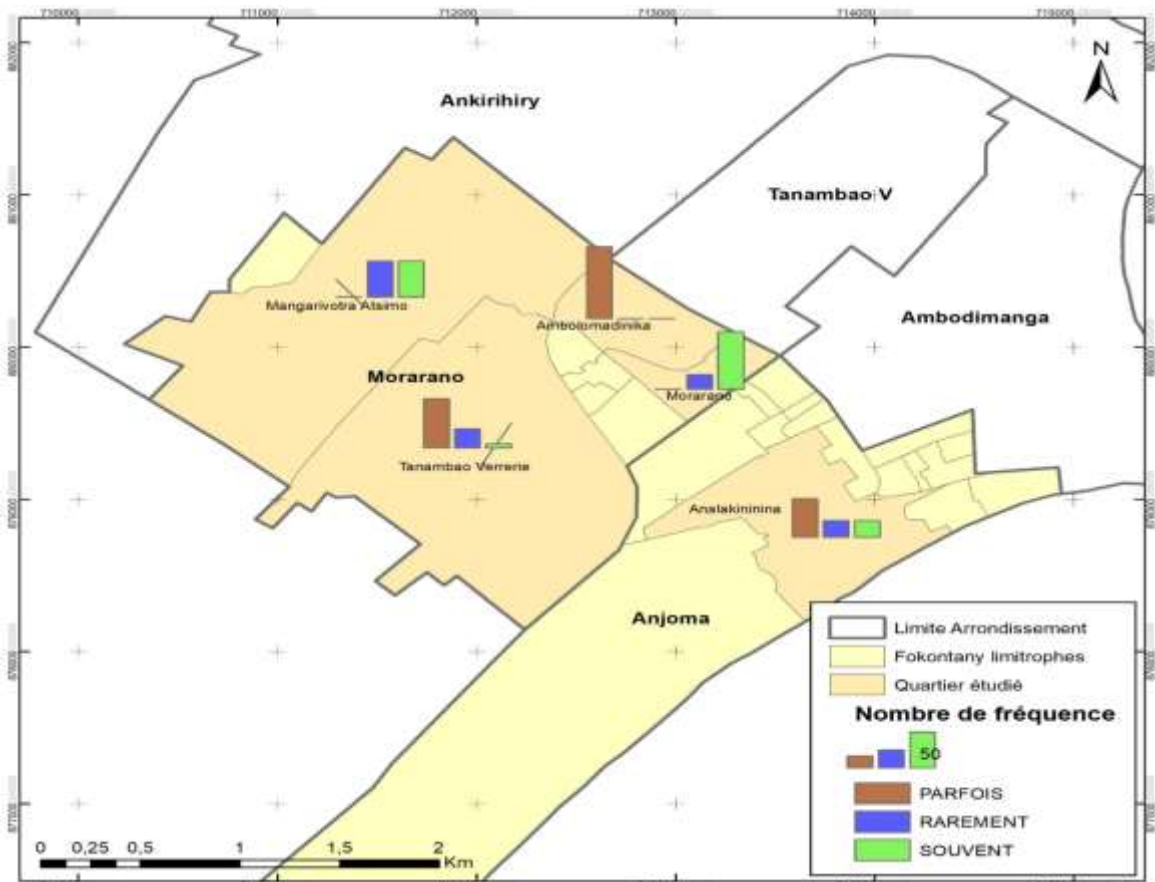
Analakininina shows higher figures, with 15.56% of respondents reporting that they experience gender-based violence “sometimes,” 6.67% “rarely,” and 6.67% “often,” totaling 28.89%. In Mangarivotra, the frequency of violence is relatively low, with 0% of respondents saying they experience it “sometimes,” but a small portion (2.22%) reporting it as “rare” or “often.”

### 3.2 Discussion

First, the predominance of violence against women, who account for 58.56% of cases, reinforces the hypothesis of a structural and systemic dimension in power relations. The results also show that intimate partners are the main aggressors in most neighborhoods, a trend observed on a global scale (Lemoine, 2022). These findings call for a revision of existing

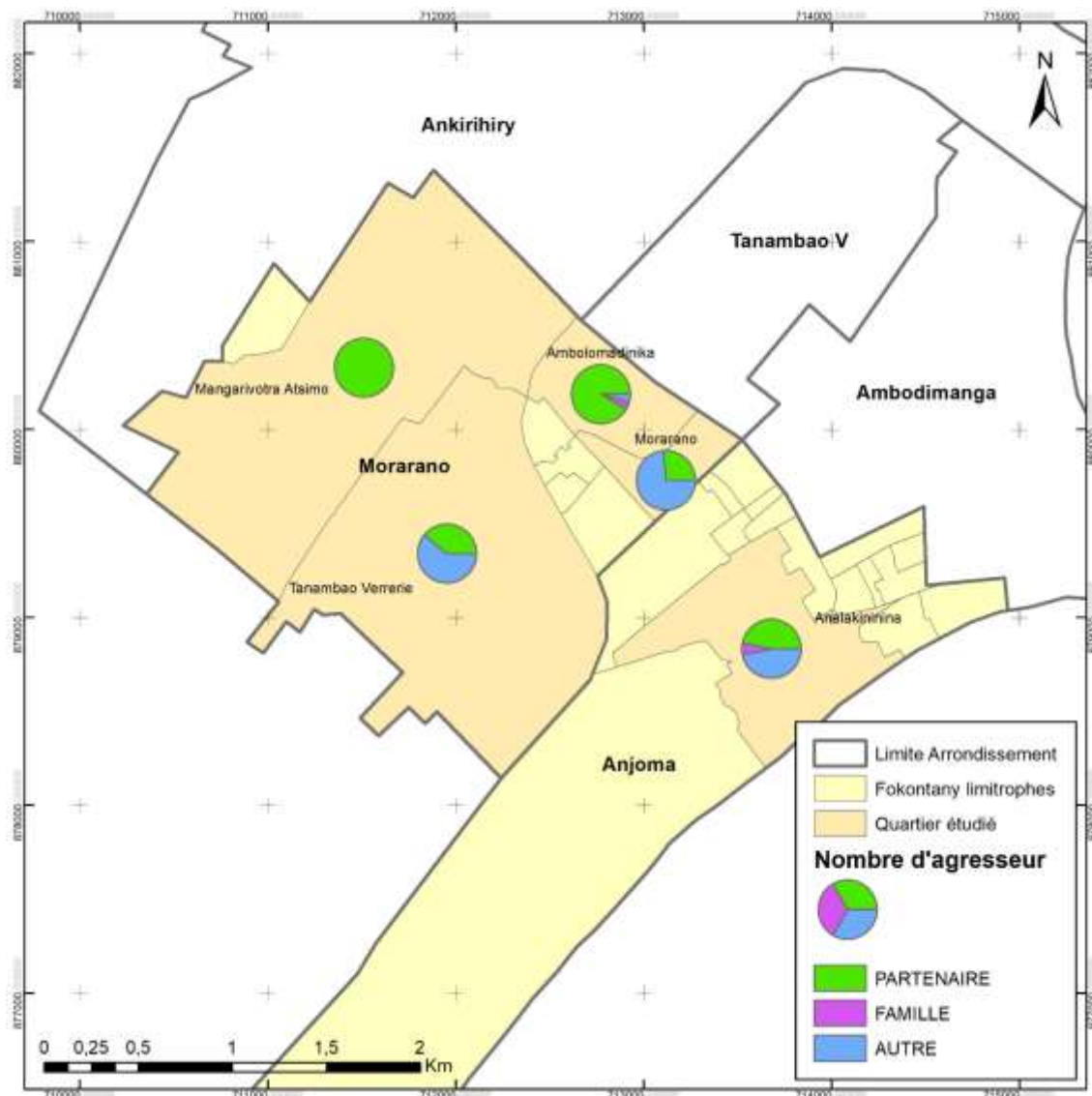
prevention mechanisms, taking into account the relational dynamics specific to the urban contexts of Madagascar (Bernard & Lefevre, 2023).

The spatial analysis conducted using GIS reveals that certain neighborhoods, such as Tanambao Verrerie and Analakininina, are high-risk zones. The concentration of incidents in these sectors could be linked to a conjunction of unfavorable socioeconomic factors, such as poverty, unemployment, and low levels of education. These factors contribute to an increased vulnerability of the population, as demonstrated by several recent studies (Dupont et al., 2022). In addition, the physical configuration of these neighborhoods, marked by insufficient infrastructure and rapid urbanization, appears to exacerbate tensions and facilitate the manifestation of violence (Martinez, 2023).



**Figure 2.** The frequency of GBV in the Arrondissement of Anjoma and Morarano.

Mapping the violence also makes it possible to identify “hotspots” where incidents are concentrated. This spatial distribution underlines the importance of considering the territory as an active factor in the dynamics of violence. The correlation between insecure zones and socioeconomic indicators is particularly strong, suggesting that improving living conditions could have a preventive effect (Oumar, 2024). Thus, public policies should be oriented towards targeted interventions in these critical areas, integrating actions for socioeconomic development and community capacity building (Garcia, 2023).



**Figure 3.** Identity of aggressors GVB Morarano

The analysis of the types of violence indicates a dominance of so-called “other” and physical forms. This predominance can be explained by the fact that these forms of violence, often less codified, benefit from increased visibility in the studied context. However, the notable presence of sexual violence, although less frequent, should not be underestimated as it entails significant psychological and social consequences (Petit, 2022). It is therefore crucial to diversify intervention approaches by integrating specific measures to combat each form of violence.

Moreover, the impact of socioeconomic factors such as poverty, unemployment, and lack of education on the prevalence of violence cannot be ignored. The link between precarious living conditions and domestic aggression has been widely documented in the literature (Moreau, 2023). In the context of Morarano, these factors combine to create an environment conducive to interpersonal tensions, necessitating a multisectoral response. Economic development strategies and vocational training could help reduce these inequalities and, consequently, the vulnerability to violence (Durand et al., 2022).

Furthermore, the geographical dimension of the analysis offers innovative perspectives for prevention. The spatialization of data allows actions to be directed toward specific areas, thus facilitating the implementation of monitoring systems and rapid intervention measures. Local

authorities could, for example, use these maps to optimize resource allocation and improve the responsiveness of protection services (Nguyen, 2023). At the same time, raising awareness among local communities about gender-based violence issues is paramount to establishing an atmosphere of trust and dialogue (Simon, 2024).

It also appears that gender-based violence is not an isolated phenomenon but interacts with other social dynamics. The presence of aggressors outside the familial circle, particularly in densely populated urban neighborhoods, suggests a complexity in social relationships (Kouadio, 2023). This reality calls for a multidisciplinary approach that integrates psychological, economic, and spatial dimensions in the fight against violence (Ribeiro, 2022). Another avenue of reflection concerns how public policies can be rethought to account for the territorial dimension of violence. The implementation of local initiatives, in partnership with community actors and non-governmental organizations, could promote a prevention strategy more adapted to local realities. Recent examples of successful urban interventions show that a participatory approach not only helps identify high-risk areas but also mobilizes residents around a common safety project (Fischer, 2023).

Finally, the limitations of the study must be acknowledged. Although the mixed-method approach provides a rich and nuanced view of the phenomenon, the complexity of the factors involved calls for additional analyses, particularly in the long term. Future research would benefit from incorporating temporal dimensions to track the evolution of violence and measure the impact of interventions (Schneider, 2024). Similarly, deepening the qualitative analysis would allow for a better understanding of the aggressors' motivations and the resilience mechanisms of the victims.

Compared to other studies conducted in various urban contexts, the approach adopted in this study stands out for its integration of geospatial tools to analyze the distribution of violence.

Dupont (2022) demonstrated the significant impact of socioeconomic inequalities on the distribution of violence in urban areas, echoing our findings on the correlation between poverty and violent incidents. Similarly, Lemoine (2022) underlined the importance of precise mapping to target high-risk areas, justifying our use of GIS to identify hotspots in the Morarano district. Garcia et al. (2023) highlighted the complex relational dynamics in domestic violence, which resonates with our observations on the prevalence of partner violence.

Furthermore, Simon (2024) explored effective community intervention strategies in preventing violence, reinforcing the relevance of a participatory approach in our methodology.

Finally, Moreau (2023) demonstrated how integrating geospatial analysis into public policies can better guide preventive actions. In sum, these external studies corroborate our interdisciplinary approach and confirm the value of using contextual methods to better understand and prevent gender-based violence.

#### **IV. Conclusion**

In conclusion, the discussion of the results highlights the importance of a spatial and multidimensional approach to understanding gender-based violence in Morarano. The data collected call for a revision of public policies, with an emphasis on targeted interventions in areas identified as critical. Future perspectives rely on close collaboration between researchers, decision-makers, and local actors to implement effective prevention and sustainable development strategies. The richness of the spatial data thus opens the way to new approaches for combating gender inequalities and promoting social justice in a rapidly changing urban context.

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