

# Evaluating Impacts of Hurricane Fiona on Puerto Rican Communities Leveraging Quasi-Qualitative Approach

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## Background

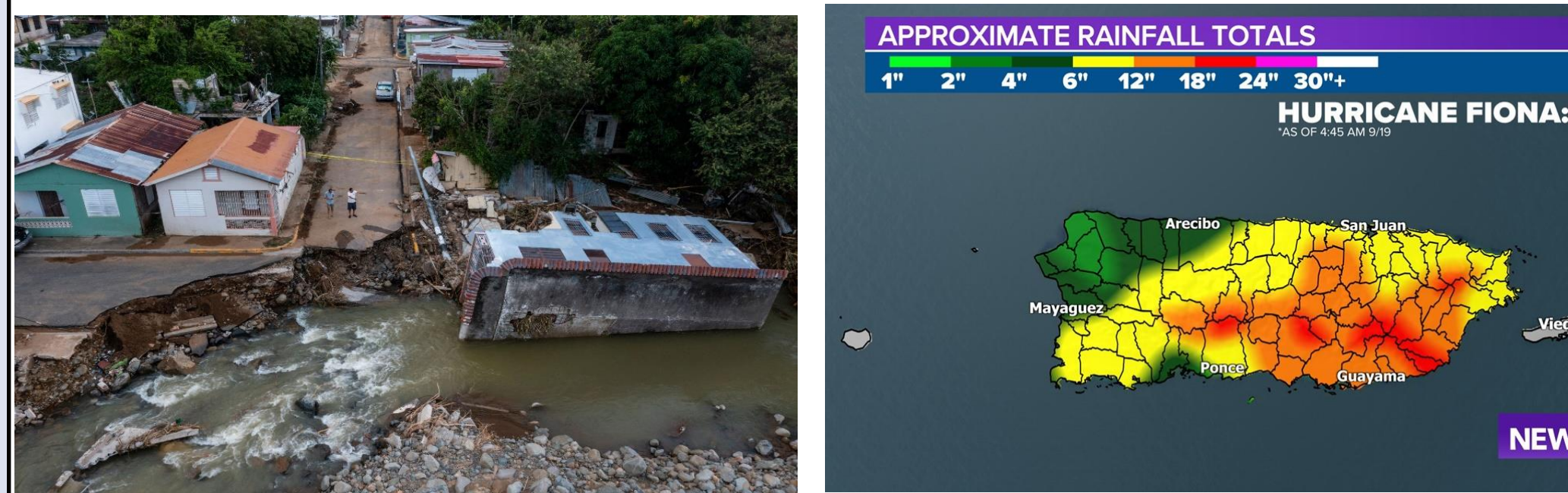


Image 1: Devastation across Puerto Rico after Fiona (Source: <https://www.cnn.com/2022/09/24/us/puerto-rico-hurricane-fiona-aftermath/index.html>)  
Image 2: Rainfall during Fiona across Puerto Rico (Source: News 19)

- Located on the Northeastern shores of the Atlantic and Southern shores of the Caribbean ocean Puerto Rican Society faces the long-standing challenge of being impacted by floods and hurricanes.
- On September 18, 2022, Category-1 Hurricane Fiona, hit the Southwestern area of Puerto Rico, provoking landslides, unleashing flooding, and obliterating the power grid.
- This study presents a qualitative framework to understand communities' and stakeholders' perceptions of disaster preparedness and recovery challenges in the aftermath of hurricanes like Fiona.

## INTRODUCTION

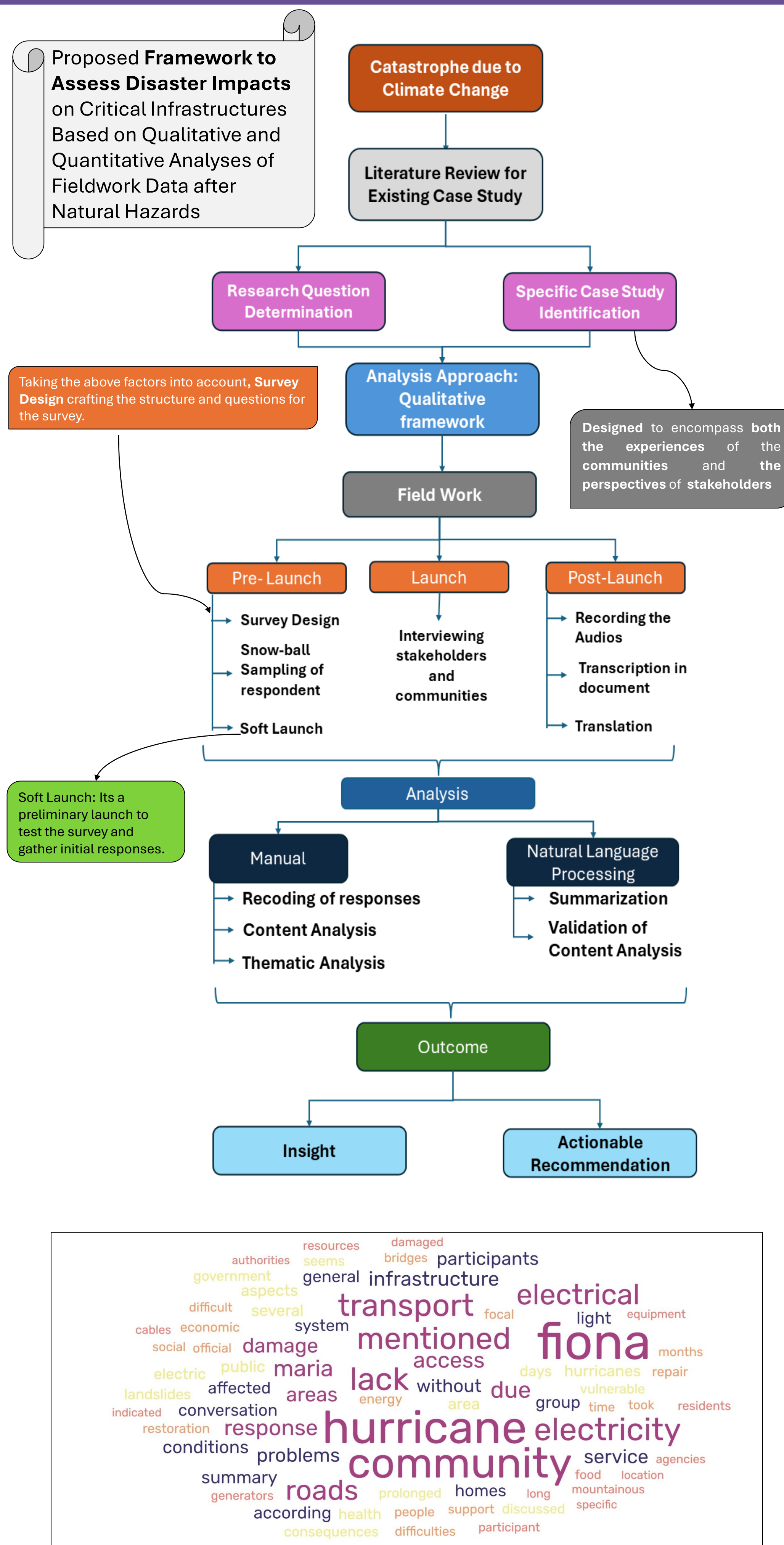
- This study presents a qualitative framework [1] to understand communities' and stakeholders' perceptions of disaster preparedness and recovery challenges in the aftermath of hurricanes like Fiona.
- For identifying the challenges across Puerto Rico vulnerable communities are identified across the diverse topographies like central mountain regions, interior valley, regions susceptible to mudslides etc., of Puerto Rico



While performing the analysis we have considered social vulnerability and diverse topography to understand the impact across Puerto Rico. **Social vulnerability** describes a community's limited ability to prepare for, respond to, recover from disasters due to socio-economic factors

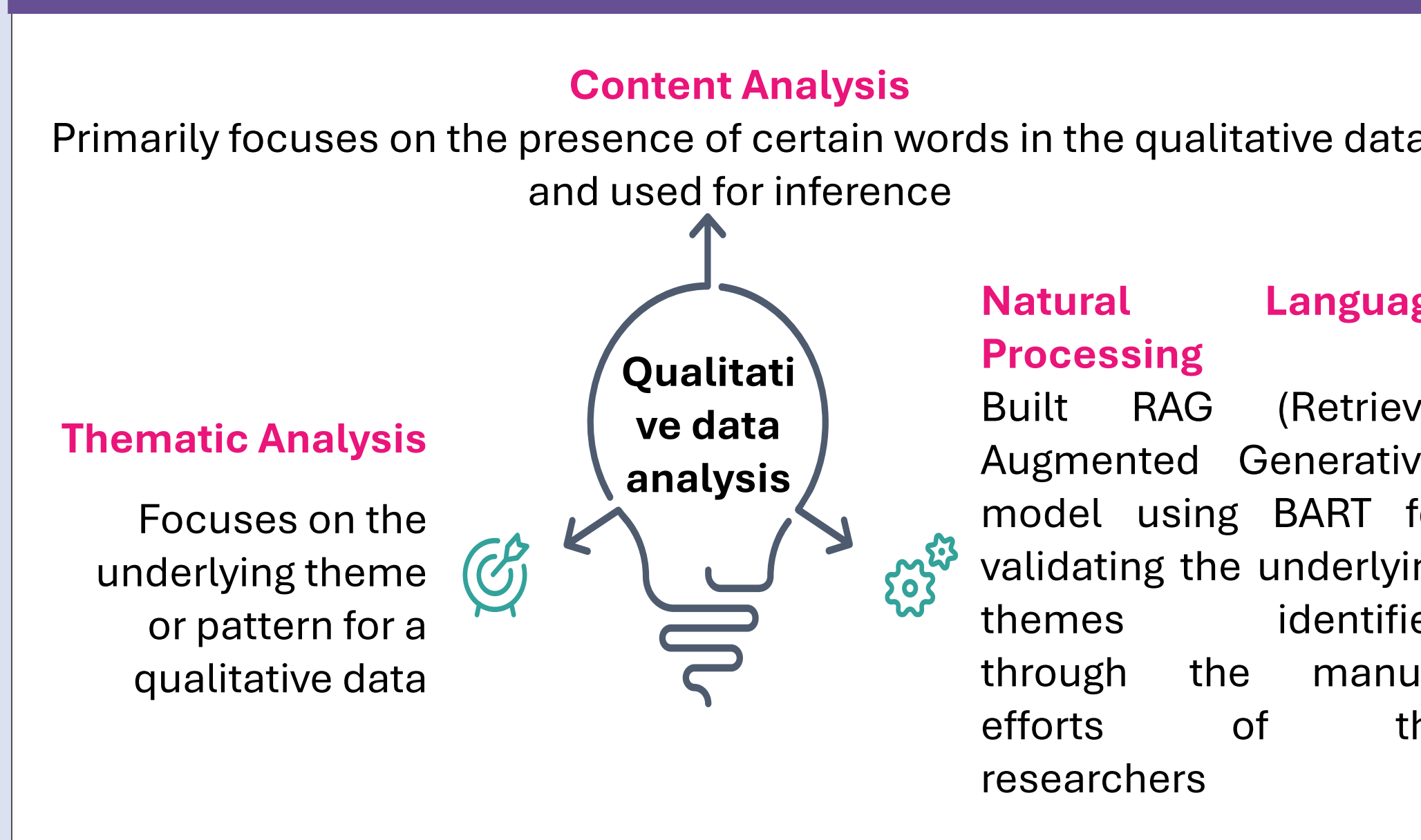
Community Interview			
Place	Latitude	Longitude	Topography
Utua	18°15'56"N	66°42'02"W	This is central mountainous region and susceptible to mud slide
Adjuntas	18°09'46"N	66°43'20"W	This is a small mountainside town and municipality located central midwestern portion
Mayaguez	18°12'04"N	67°08'23"W	located in the center of the western coast
Salinas	17.977°N	66.298°W	Located in the southern coast of the island and it is located below the sea level
Caguas	18°13'53"N	66°2'22"W	Caguas, town, east-central Puerto Rico. Caguas lies in the fertile Caguas valley
Jayuya	18°13'07"N	66°35'30"W	Jayuya located in the center, in a valley in the middle of the Cordillera Central. Due to this location, its terrain is mostly rough and steep

## Methodology

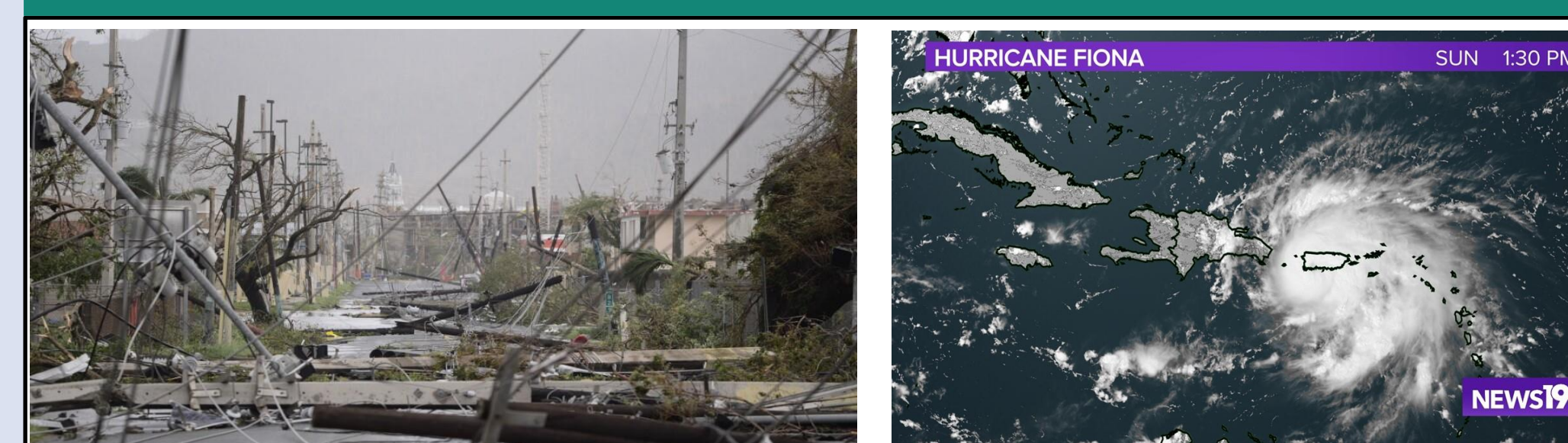


- After the fieldwork, responses were processed through a data preprocessing pipeline, involving audio transcription, translation, cleaning, and consolidation. These were then analyzed thematically and through content analysis
- summarized and validated the content using AI techniques like Natural Language Processing (i.e. BERT Model) throughout our analysis
- The **outcome** of our analysis identified the gaps in the disaster recovery process informing the development of practical steps to boost community resilience [2].

## Methodology



## Result



### 1. Insights:

- 1.1 Impact of **MARIA** persisted before **FIONA** hit:
- Transportation** : Qualitative assessment of the interviews with the communities revealed that the roads and bridges were not repaired properly after Hurricane Maria which aggravated the consequences of Fiona. For example, in cities like Mayaguez, damaged roads aggravated the transportation failure during Fiona
  - Electrical Infrastructure**: The communities of Adjuntas, Utua faced consistent prolonged power outages after Hurricane Maria which led to drastic failure when Hurricane Fiona hit the island
  - Residential Structure**: The interviews revealed that before Hurricane Fiona, many houses were already vulnerable due to damage from Hurricane Maria.
- 1.2 Outdated transportation & defunct grid infrastructure, lack of preparedness for disaster management worsened the impact of FIONA:
- Transportation**: According to the **focus group** discussion, in Puerto Rico, public transport is in a miserable condition as there are lack of public buses, and mismanagement in accessing car-dependent societies, makes these societies completely inaccessible during disaster.
  - Electrical Infrastructure**: Lack of nano grid, centralized grid structure, and lack of adaptability for renewable sources of energy like solar power leads to complete power.
  - Stakeholders and communities have depicted in their interviews that the lack of preparedness and coordination among the stakeholders for disaster management led to delays in the restoration process which induced the consequences.

## Conclusion

- Actionable Recommendation**
- Overall Infrastructure improvement**
    - Organizing traffic volume by encouraging public transport in rural and urban interfaces and repairing, and maintaining the traffic infrastructures like bridges, and roads will alleviate the burden of disaster management.
    - Introducing nano-grids and adaptability towards renewable energy, maintenance of the grid will prevent complete grid failure after disasters or ease the restoration of the grid.
  - Preparedness for Disaster Management**
    - Emergency Response Coordination: Improve coordination among local authorities, municipalities, and stakeholders to ensure efficient and effective disaster response.
    - Resource allocated to the marginal society and efficient distribution of the resources will reduce the load in disaster management.
    - Community Engagement and Training: Engage communities in disaster preparedness training and simulations to build local capacity for responding to emergencies.

## Reference

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## Acknowledgements

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