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Saving Lives with Renewable Technology!: Study of the human perception related to the electrical energy and healthcare considering community solar for rural hospitals in Puerto Rico

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Introduction There is a need in rural communities from Puerto Rico to generate a future sustainable strategy to integrate solar energy with an energy storage system, while considering microgrid functionality for consistent supply of electricity for hospitals following the events of Hurricane Maria.

- The lack of electrical energy generated a crisis in the healthcare system for communities and for individuals experiencing various physical and mental disorders [1], [2].

Research Question What is the relationship between energy and healthcare following the natural disaster in Puerto Rico?

Methodology This research is focused on the severely poverty-stricken town of Maricao, the second-least populated municipality of Puerto Rico, which is located at the western edge of the Cordillera Central.

- Analysis of qualitative instrumentations, such as open-ended interviews and oral histories; as well as data collection from questionnaires with open-ended responses.
- Data collected from stakeholders such as doctors, nurses, healthcare officials, and hospital personnel [3].

Results

Post-Hurricane Maria the Maricao rural hospital and its population determined feasible healthcare options that were supported by the community.



Figure a. Puerto Rico Map and location of Maricao [4]

Figure b. Arrival of Hurricane Maria to Puerto Rico



Figure e. Panorama of the situation of a rural community after Hurricane Maria

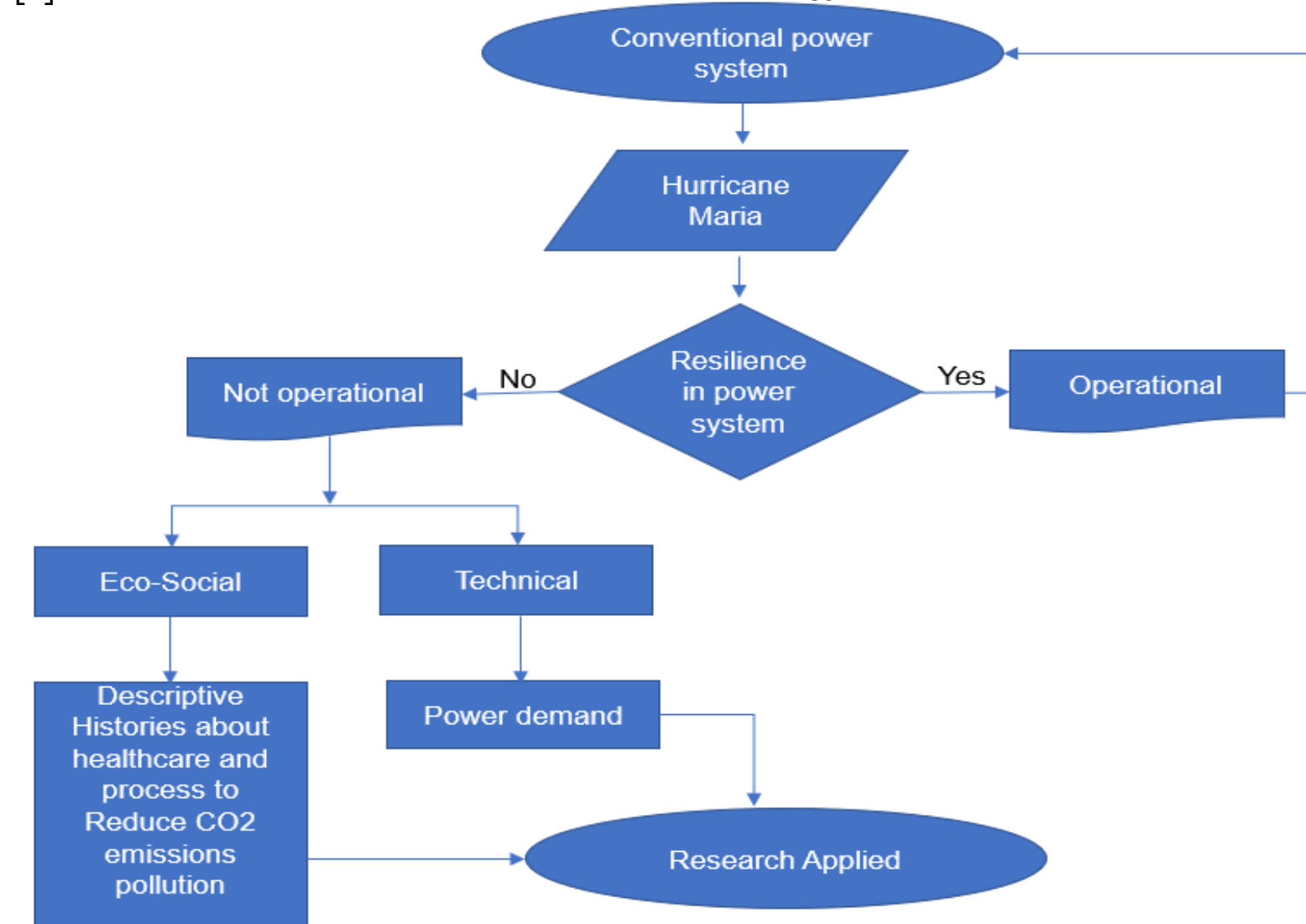


Figure c. Algorithm to reimagine future of the Electric Utility Industry/Community Solar

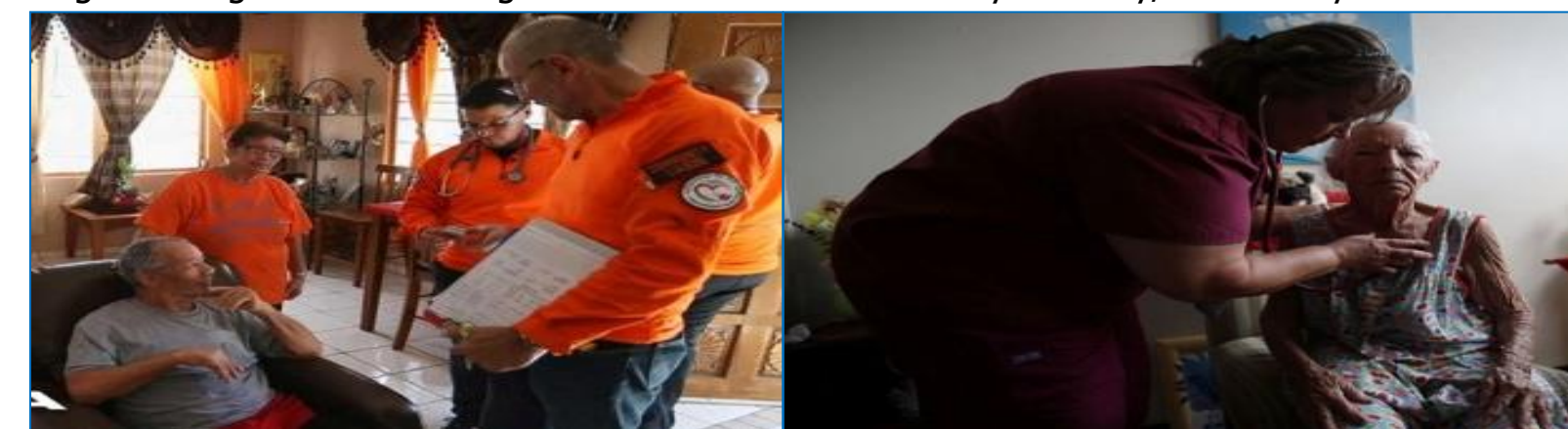


Figure d. Mental and Physical health of people was affected by the disaster

Conclusion The analysis of the technical and social aspects for rural communities in Puerto Rico allowed the reimagining of electric energy to work on the goal of eradicating poverty and energy inequality. This is the first step to meet a series of goals set by the UN's Sustainable Development Goals (SDGs).

- The analysis of the narratives from different stakeholders about the mental and physical healthcare situation before, during, and after Hurricane Maria provided an invaluable source of data on the impact of natural disasters in rural hospitals.
- This research measured and classified electrical devices used for physical and mental healthcare patients to determine the power demand in a hospital. This study provided the basis to generate proposals of sustainability in rural hospitals of Puerto Rico according to their own specific needs.
- Based-on the several diseases such as mental disorders, drug abuse, diabetes, Alzheimer's, cardiac arrest, renal failure, hypertension, pneumonia, and respiratory problems that were the most common in patients. Different studies have been developed in ECE TTU.

References

- [1] Delilah Roque, Anais, Pijawka, David, and Wutich, Amber. "The Role of Social Capital in Resiliency: Disaster Recovery in Puerto Rico." *Risk, Hazards & Crisis in Public Policy* 11.2 (2020): 204-35. Web.
- [2] A. A. Verma, J. Murray, M. M. Mamdani et al., "Mortality in Puerto Rico after Hurricane Maria," *New England Journal of Medicine*, vol. 379, no. 17, pp. 2, Oct 2018.
- [3] A. Franco, M. Shaker, D. Kalubi et al., "A review of sustainable energy access and technologies for healthcare facilities in the Global South," *Sustainable Energy Technologies and Assessments*, vol. 22, pp. 92-105, Aug 2017.
- [4] <https://rb.gy/wyylql>

Discussion The Maricao rural hospital provides access to emergency and other care for 100% of the community's population. Only this rural hospital provides obstetrical care and delivers babies. The Maricao rural hospital has less than 15 beds. Specialized hospitals were in main towns following Hurricane Maria, and road transportation had limitations.

- Without electricity in the rural hospital in Maricao, residents had to visit an urban hospital, a trip that can take between 45-120 minutes by car. This situation often puts the patient's life at risk.
- Maricao rural hospital and its personnel determined feasible healthcare options that were supported by the community.