

# Towards developing a model for the evaluation of hospital resilience

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## 1 Introduction

In the context of climate change and the escalating frequency and intensity of disasters, it becomes imperative for healthcare organizations to enhance their ability to deliver critical services during such challenging circumstances. As the backbone of a community's health and well-being, hospitals play a pivotal role in providing essential services like emergency care, surgery, and inpatient treatment. However, these critical institutions are not immune to the capricious whims of nature or the malicious intent of human action. Natural disasters, like raging hurricanes or devastating earthquakes, can cripple a hospital's ability to function, disrupting the delicate balance of life-saving interventions. Power outages, whether caused by freak storms or intentional sabotage, can plunge hospitals into darkness, silencing the vital hum of medical equipment and jeopardizing patient safety. When disasters occur, the resulting damages often extend to both physical components, including building structures, construction materials, and non-structural systems like medical equipment, lifelines, and architectural features. Furthermore, the impact on hospital staff, whether through their direct involvement or unpreparedness, can significantly disrupt service continuity during urgent situations prompted by the disaster [?]. In the face of these, hospital resilience emerges as a critical concept.

## 2 Hospital resilience evaluation: literature review

Over the past four decades, resilience has been a significant concern across various fields, ranging from ecological systems to economics, management, and engineering. In the health systems field, academics have proposed numerous frameworks aimed at comprehending and fortifying the resilience of health systems against a spectrum of external shocks, encompassing climate-related disasters, infectious disease outbreaks, political unrest, and financial crashes [2]. Health systems resilience has been conceptualized as a process, a capacity, an ability, an outcome, attributes, and even as a policy objective [3]. Although there are multiple definitions, the majority revolve around the same concept, defining hospital resilience as the 'capacity to maintain essential functions and to absorb, adapt, and recover in the face of disturbances in a timely and cost effective manner.

However, to effectively grasp and enhance the understanding of this concept, it is essential to initially construct a model for subsequent evaluation. A literature review was undertaken to evaluate hospital resilience, revealing a significant diversity in measurement approaches. Consequently, two distinct evaluation approaches, namely 'qualitative' and 'quantitative,' have been

identified. The methods identified have been categorized, and the outcomes of the literature review are visually presented in Figure 1.

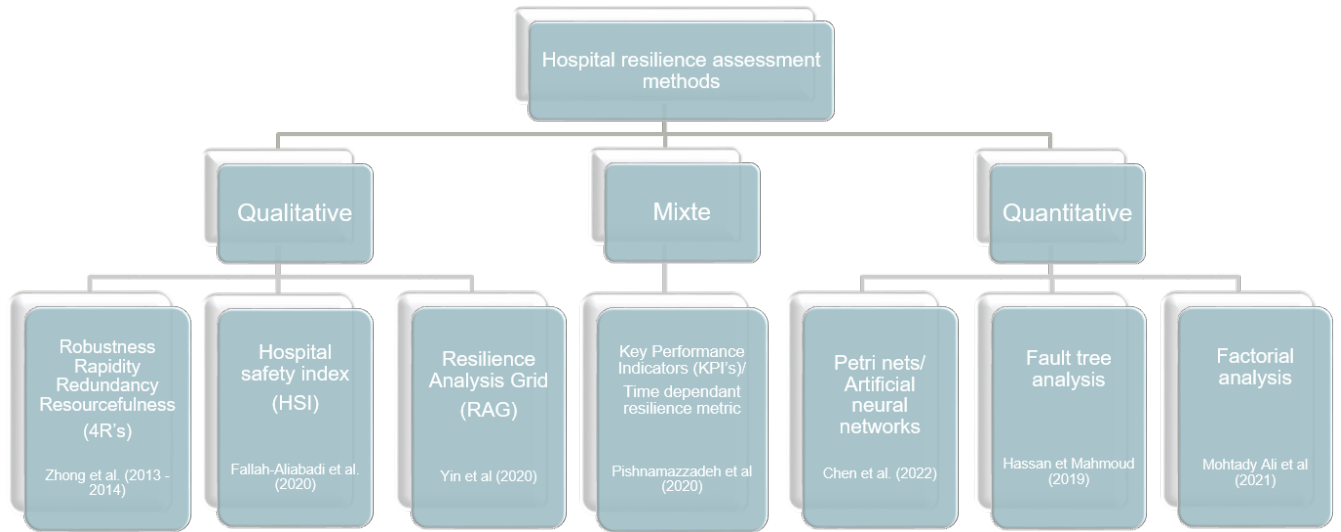


FIG. 1: "Hospital resilience evaluation approaches in the literature"

### 3 Conclusion and perspectives

In the final article, we chose the fault tree method, originally applied by Jacques et al. [4] [4] and refined by Hassan et al. [5], to develop a comprehensive analysis and performance evaluation framework for the hospital. Jacques et al in 2014 [4] employed fault-tree analysis to estimate hospital function loss during a medical surge. Their resilience metric captured the weighted sum of critical services, emphasizing the importance of specific components in assessing a hospital's ability to recover. In the same vein, we will apply this method to the emergency department, drawing inspiration from the work of Jacques et al [4] and Hassan et al [5], aiming to model and evaluate its resilience.

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