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Tech-Powered Community Engagement in Health Crisis Management

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Health crises pose significant challenges worldwide, demanding proactive strategies to enhance preparedness, response, and recovery. This research, presented at the prestigious Entrepreneurship for Sustainability and Impact (ESI) conference, explored the role of digital technologies in facilitating community engagement for effective health crisis management. Through leveraging social media analytics, crowdsourcing, crowdsensing, and other technologies, the study presented a conceptual model illustrating how technology can empower communities and inform policymaking across various stages of health crisis management.

Leveraging Technology to Harness Community Engagement

Community engagement is crucial in health crisis management, as local populations are both the first responders and the most affected. Governments and institutions can harness digital technologies to collect real-time data, enhance situational awareness, and facilitate swift decision-making. This research identified three critical phases where technology can have a significant impact:

1. Preparedness Stage: Proactive Measures for Crisis Mitigation

Predicting potential outbreaks and enhancing healthcare system readiness are crucial in minimizing crisis impact. This study separated the preparedness stage into:

- **Deliberate Preparedness:** refers to a group of organized actions taken well ahead of time, before the instigation of a crisis, to eliminate response and recovery inhibitors. The method we use to consolidate this stage is through implementing highly reliable organizational approaches, which include resilience cultivation and mindful leadership. Resilience cultivation aims to upgrade people's adaptability to unpredictable events by elevating their skills through training sessions, simulations, learning by doing, and the usage of personal protective equipment, scenario planning, and backup systems. On the other hand, mindful leadership refers to opening the communication environment and reducing the perceived distance between divergent actors, including citizens and decision-makers.
- **Immediate Preparedness:** refers to proactive actions taken to prevent minor issues from escalating. This phase operates in the aftermath

of a crisis to manage discrete outbreaks or halt the continuity of pandemic waves. In this phase, a new confirmed case is considered a minor issue that must be detected and addressed to prevent the progression of the pandemic.

2. Response Stage: Real-Time Crisis Management

The response phase requires swift action, and technology-driven community engagement that play a crucial role by providing vital support through:

- **Social Media Sentiment & Spatio-Temporal Analysis:** within the umbrella of "citizens' centered data analysis," both sentiment and spatio-temporal analysis can be used to study and identify outbreak patterns by analyzing citizens' tweets—leveraging time, location, and sentiment analysis of the text of the tweets to enhance early detection and inform targeted containment measures. An example consolidating this idea includes a novel real-time flu and cancer surveillance system that uses spatial, temporal, and text mining on X's (Twitter previously) data.
- **Crowdsourcing Platforms:** Aggregating citizen-reported symptoms and epidemiological data for informed decision-making. This can be done via several open crowdsourcing technologies.
- **Crowdsensing Technologies:** engage the community in a subtler way, which, through various physiological factors, can detect disorders. These technologies provide decision makers with information that is objective and reliable, thereby guiding the process of smart decision-making that is backed by evidence. These technologies can be demonstrated through mobile and wearable devices to detect physiological indicators of infection, enabling real-time monitoring and intervention.

3. Recovery Stage: Enhancing Community Resilience

Post-crisis recovery involves addressing social and economic disruptions while rebuilding trust. Technology supports this phase by:

- **Vaccine Sentiment Analysis:** Assessing public perceptions and hesitations to tailor awareness campaigns.
- **Digital Social Support Networks:** Facilitating mutual aid and psychological resilience through online platforms.

- **Policy Refinement through Big Data:** Analyzing engagement trends to develop long-term health strategies.

The Impact of this Research

This research filled a gap in the existing body of knowledge as it examined the role of technology-mediated community engagement in health crisis management along its three separate stages: preparedness, response, and recovery. This was achieved by integrating distinct theoretical frameworks from the literature into a single conceptual model, as shown in **Figure 1**, showcasing the individual strategies that could be adopted at each stage.

Additionally, the research demonstrated the potential employability of digital technologies in

harnessing big data driven by citizens in tackling health crises. For instance, citizen-centered data analysis could be utilized in exploring the geographical distribution of diseases as well as performing citizens' sentiment analysis amid the crisis. In sum, implementing such a conceptual model transforms health systems by fostering proactive management of health crises.

Conclusion

As digital technologies continue to evolve, their role in enhancing community engagement and crisis response becomes more pronounced. By integrating real-time data analytics, participatory governance, and technological innovations, a more proactive and resilient approach to health crisis management can be established.

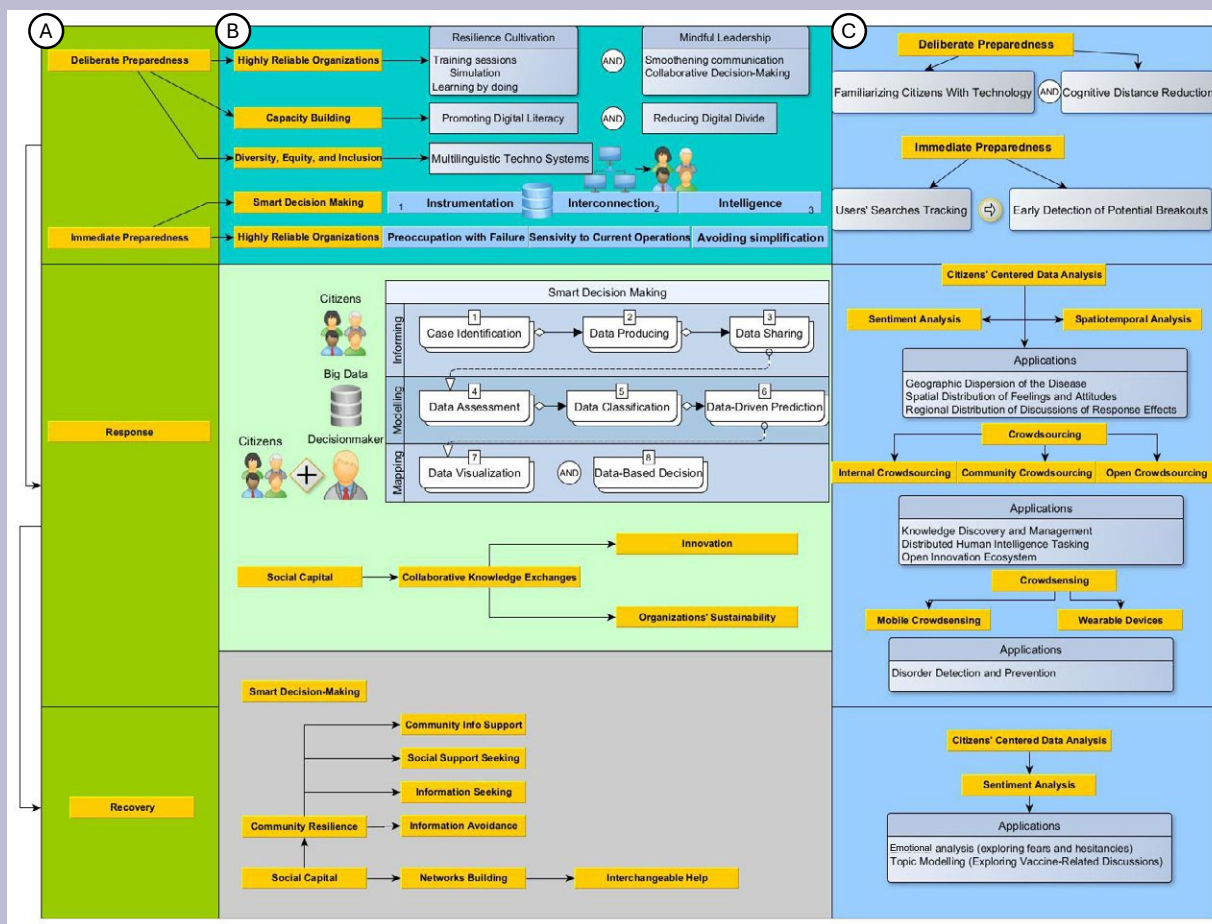


Figure 1: The first column represents the crisis lifecycle stage. The second column represents the approaches applied to the stage. The third column represents the technologies and their applications.

To view the research, please scan the QR code:

