Corso di Dottorato di Ricerca in Scienze della Vita e dell'Ambiente - Ciclo XXXVI

Informing and harmonising preparedness and response to biological hazard: the case study of COVID-19 pandemic

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INTRODUCTION

Biological hazard or biohazard refer to bacteria, viruses, and other organisms or toxic substances that can affect human health (UNDRR, 2023). The experience with the COVID-19 pandemic underlined the need to implement knowledge and preparedness in risk reduction strategies for biological hazards (Chan et al., 2021). Countries with different level of experiences with previous pandemics, implemented different response strategies for dealing with the last global pandemic. This research compared prevention and preparedness to pandemic emergencies in Italy and New Zealand.

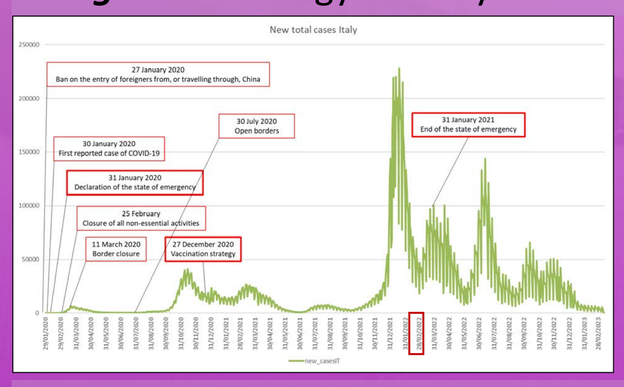
The overall objective of this research project is to gain insight into pandemic emergency planning, before and after COVID-19, highlighting strength and weaknesses to possibly develop guidelines to enhance Resilience to biological hazards of local and national Health Systems.

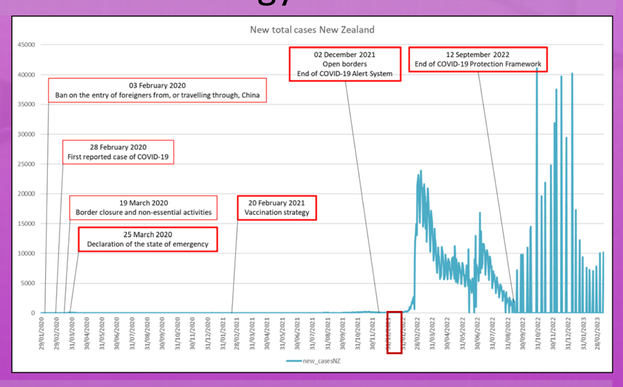
METHODOLOGY

Six main steps have been carried out for this study: (i) state-of-the-art of pandemic management; (ii) study of health system resilience components and selection of related indicators; (iii) selection of seven hospitals in the Marche Region which managed COVID-19 patients; (iv) Multi-criteria Decision Analysis (MCDA): TOPSIS and AHP methods implementation; (v) questionnaire of pandemic risk perception; (vi) PRISMA analysis that is a systematic reviews and meta-analyses on pandemic emergency management in New Zealand.

RESULTS

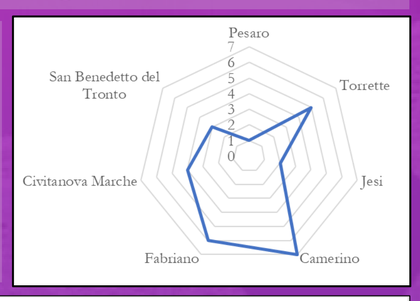
The evolution of COVID-19 pandemic's waves in Italy and New Zealand shows the different impact ensuing the different response strategies: ***Mitigation*** Strategy for Italy and ***Elimination*** Strategy for New Zealand.

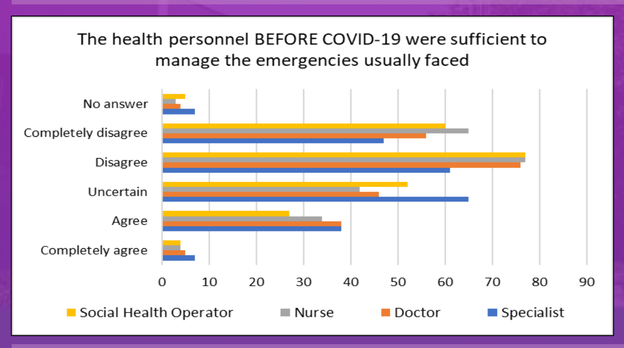


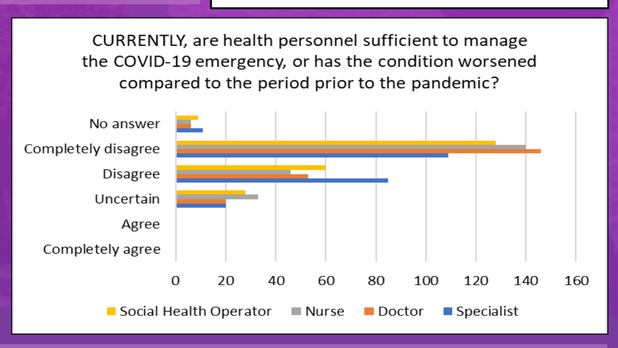


Investigating the state-of-the-art of pandemic management through the literature review five macro areas have been chosen to represent the principal faces of resilience in pandemic emergency conditions: Health & safety; Political & economic; Socio-psychological; Demographic, Pandemic.

The results of the TOPSIS analysis for the **Italian case study** visualise the different level of resilience of the selected hospitals. The rank (from 1 to 7) measure the closeness coefficient to the ideal level of resilience.

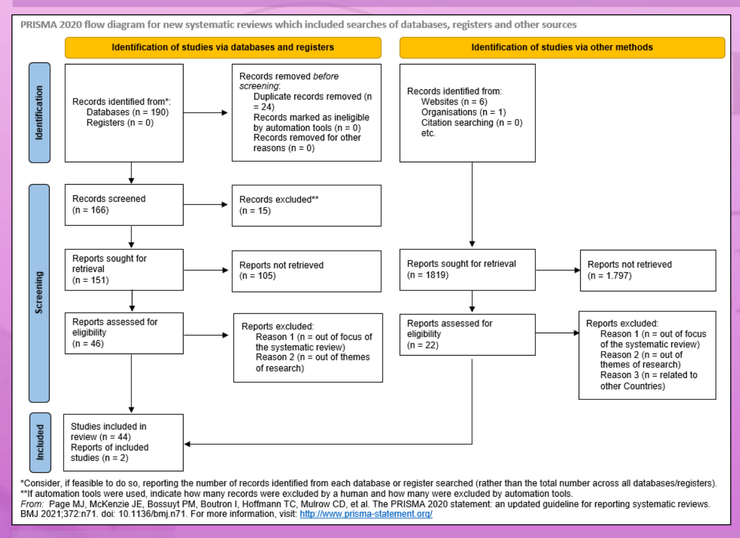






Among the findings of the risk perception questionnaires, administered to the Italian healthcare workers, the lack of human and technical resources specifically devoted to pandemic emergency scored high.

The PRISMA analysis for the **New Zealand case study** highlighted that the strong strategies limiting the contagion and saving lives prevailed over the concerns about long-term economic impacts.



A multidisciplinary approach; the memory of previous experiences; the coordination among scientific, political, and health systems; and the clear, sincere and engaging communication of the Prime Minister seem to be the most important instruments to deal with the COVID-19 pandemic emergency in New Zealand.

Overall, the comparative analysis highlighted the need for both in Italy and New Zealand to enhance healthcare workers preparedness on pandemics.

ITALY	
POSITIVE ASPECTS	**NEGATIVE ASPECTS**
Any	Need of updated plans
Collaboration among colleagues	Need of training for pandemic emergency management
Acquisition of new skills	Enhancing emergency communication
	Adaptation of structures and personnel
	Involvement of experts into the implementation of guidelines
	Management of relationship with family
	Management of burnout
	Overtime working hours
	Implement public health consciousness in the population

NEW ZEALAND	
POSITIVE ASPECTS	**NEGATIVE ASPECTS**
Geography	Long time of restriction
Demography	Economic impact of border closures
Culture	Respect all minorities in the implementation of normative
Public Health Institutes	Freedom restriction
High number of healthcare workers	Accessibility of online services
MIQ (Managed Isolation and Quarantine) facilities	Many healthcare workers come back to their Countries of origin
	"Go extra miles"
	Management of relationship with family
	Management of burnout

The unpreparedness of the Italian Government caused a fragmented response in the whole Country, while the strong centralised actions implemented in New Zealand had not always been respectful of ethnic minorities. Situation, demographic and knowledge change continuously, therefore emergency plans should be updated accordingly. Indeed, cultural, ethical and psychological characteristics appear to have significantly influenced the response.

FUTURE PERSPECTIVES

The European Module Exercises (EU MODEX) held in Arcevia at the beginning of June 2023 was an opportunity to test the discussed findings in the field. Simulation and training about pandemic emergencies should become routine in the preparation phases, and more research should be developed to enhance coordination among all the stakeholders involved in the emergency. The role of volunteer organizations should also be investigated better to define their reach. Further studies should be caried out on public health education to prepare the population and make it a primary responder to future pandemic emergencies. Replicating this study in other Italian regions should highlight different needs.

References

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