



UNIVERSIDADE D
COIMBRA

Catarina José Figueiredo Salvador

**THE ROLE OF CIVIL PROTECTION IN THE
RESPONSE TO THE COVID-19 PANDEMIC**

LESSONS LEARNT TOWARDS AN INCLUSIVE
BIOLOGICAL RISK MANAGEMENT IN PORTUGAL

Dissertação no âmbito do Mestrado em Dinâmicas Sociais, Riscos Naturais e Tecnológicos orientada pela Doutora Neide Luisa Portela Areia e Comandante sub-regional de Emergência e Proteção Civil David Alexandre Amaral Lobato e apresentada à Faculdade de Economia da Universidade de Coimbra.

junho de 2023

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in memoriam...Gracinda and Pureza...

Abstract

The COVID-19 pandemic was neither unpredictable nor unforeseen. Although the scientific community's efforts to warn humanity for the heightened risk for such biological disaster, a sense of complacency about public health risks has prevailed among the society, and worryingly among governments and public institutions or organizations with a crucial role in managing biological risks. Portugal was not an exception to the challenges posed by COVID-19, as the country's vulnerabilities to efficiently respond to the pandemic were exposed. In Portugal, the Civil Protection is responsible for planning, coordinating and executing civil protection policy, namely in the fields of prevention and response to major disasters, as it was the COVID-19. Considering the central role of Civil Protection in managing and responding to major disasters, this study aimed to comprehensively ascertain how it occurred the COVID-19 emergency management in Portugal, in the perspective of civil protection elements. Moreover, this study aimed to determine the lessons learnt by Civil Protection through the COVID-19 pandemic, towards an improved framework of biological risk management. To meet these goals an exploratory sequential mix-methods study was conducted, in which civil protection elements were interviewed in a first phase ($N = 15$), and enrolled in a survey questionnaire in a second phase ($N = 262$). The gathered qualitative data from the interviews was in-depth content analysed. Quantitative data analyses encompassed paired-sample t -tests, independent sample Student's t -tests and structural equation modelling. Results from this study demonstrate that, in general, civil protection elements consider that the COVID-19 emergency management was uncoordinated, reporting particular difficulties in articulating with other public institutions also involved in the emergency response. Moreover, participants from this study demonstrated a general sense of Civil Protection's unpreparedness for future health emergencies, particularly related to institutional distrust. Finally, emotional states and risk perception demonstrated to be strong predictors of preparedness for future health emergencies at both individual and organizational level. In conclusion, this study highlights the need for a paradigm shift in biological risk management. Inclusive and deliberative decision-making processes should be prioritized to ensure that diverse perspectives are considered and to mitigate civil protection agents' distrust in other public institutions, whilst leading to more robust and comprehensive risk management strategies. The sense of unpreparedness reported by civil protection agents requires urgent action to improve resources, training, and coordination for future biological risk events. By addressing these key areas, Civil Protection can enhance its resilience and response capabilities and be better prepared to navigate the challenges of future biological hazards.

Keywords: Civil Protection, COVID-19 emergency management, biological risk, preparedness, inclusive decision-making

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1. Introduction

The COVID-19 pandemic has caused major damage and disruption at several societal layers (e.g., policy, economic, health, social). Worldwide and in Portugal, the health emergency has posed unprecedented challenges to public health, policy/decision-makers and first responders (e.g., Civil Protection), who have been responsible for designing and implementing herculean measures, under ongoing uncertainty and based merely in the knowledge that the cost of failure could be translated in a huge number of fatalities. Ideally, the COVID-19 emergency management would strongly benefit from an inclusive decision-making in an institutionalized manner rather than from the *ad hoc* efforts. Instead, several *tragic* decisions were taken in the midst of the pandemic, revealing the obvious uncoordinated strategies that world organizations, national governments and institutions, were implementing to respond to such a disaster.

In Portugal, the Civil Protection is responsible for planning, coordinating and executing civil protection policy, namely in the fields of prevention and response to major disasters. With regard to the COVID-19 disaster, the Civil Protection had a central role. However, little is known about the Civil Protection exact role in the management of the COVID-19 health emergency; and whether Civil Protection and the other involved public institutions in the response to the pandemic are better prepared to manage future biological hazardous processes, based on the lessons learnt from the COVID-19 health emergency.

Therefore, this study aims to comprehensively ascertain how it was the COVID-19 emergency management in Portugal, with a special focus on decision-making processes, in the perspective of civil protection elements. Furthermore, this study has the ambition to provide insights on the lessons learnt by Civil Protection through the COVID-19 pandemic, towards an inclusive biological disaster risk management and greater preparedness for future epidemic or pandemic outbreaks.

2. State-of-the-art

2.1. COVID-19 Risk Management and Emergency Response

Since late 2019, a novel pathogen, known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been disseminating globally, resulting in the manifestation of coronavirus disease (COVID-19). The initial outbreak of COVID-19 originated in Wuhan city, located in Hubei Province, and swiftly propagated throughout China and subsequently across the entire world (Shereen et al., 2020; Zhu et al., 2020). On January 30, 2020, the World Health Organization [WHO] proclaimed the COVID-19 outbreak as a public health emergency of international concern (Zhu et al., 2020). Subsequently, on March 11, 2020, WHO officially classified the COVID-19 outbreak as a pandemic (WHO, 2020). By that time, the virus had already disseminated to over a hundred countries, with a confirmed tally of 126,214 cases and 4,292 fatalities.

Prevalent symptoms of COVID-19 are fever, cough, shortness of breath, and myalgia or fatigue (Song et al., 2020). In addition, severe complications of COVID-19, encompass respiratory distress syndrome, septic shock, metabolic acidosis, coagulation dysfunction, multiple organ failure, and ultimately, mortality (Guo et al., 2020).

The initial two confirmed cases of COVID-19 in Portugal were documented on March 2nd, 2020, and the first fatality was recorded at Santa Maria Hospital in Lisbon two weeks later, on March 16th (Nogueira et al., 2022).

On March 13rd, 2020, the Dispatch was issued by former ministers Eduardo Cabrita (Internal Administration) and Marta Temido (Health), establishing the Declaration of Alert Situation and activating the National Plans of Emergency and Civil Protection. Subsequently, on March 18th, the President of the Republic declared a State of Emergency, leading to the partial suspension of certain rights. These rights included the Right to freedom of movement and residence within the national territory (e.g., mandatory home confinement, prohibition of non-essential travel, restrictions on public gatherings without justified reasons), Property rights and private economic initiative (e.g., competent public authorities may request the provision of services and use of property), Rights of workers (e.g., competent public authorities may assign employees from public or private entities to work in different locations, entities, and under different conditions and working hours, particularly in sectors such as health, civil protection, security, and defense), International movement (e.g., restriction or prevention of entry into the national territory, imposition of

conditions to prevent the spread of the epidemic or overwhelming of resources), Right to assemble and demonstrate (e.g., limitations or prohibitions on holding meetings or demonstrations), Freedom of worship, and Right to resist any act of active or passive resistance against orders issued by competent public authorities (Resolução n.º 15-A/2020. Autorização da declaração do estado de emergência. Diário da República, Série I. N.º55/2020, 2020-03-18, p. 13-15). As of May 5th, 2023, the number of confirmed COVID-19 cases in Portugal had surpassed 5 million, as depicted in Figure 1. Simultaneously, the nation experienced a significant toll of over 25,000 lives lost to COVID-19 by the same date, as depicted in Figure 2 (Mathieu et al., 2023).

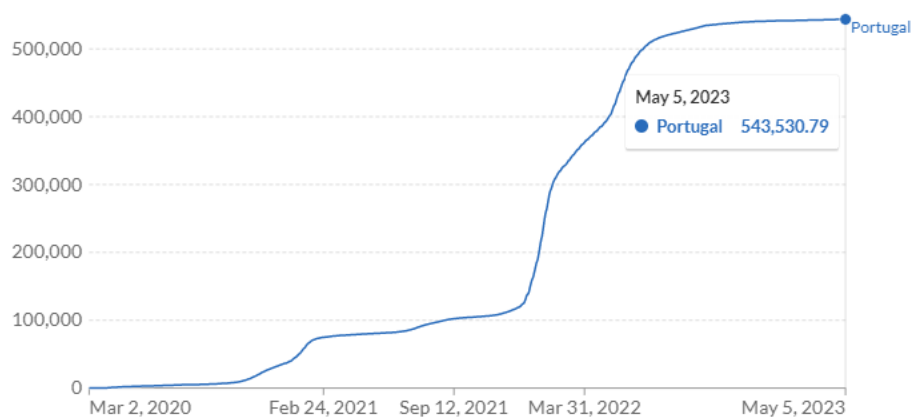


Figure 1. Cumulative confirmed COVID-19 cases in Portugal (May 5th, 2023).

Source: Mathieu et al., 2023, Our World in Data.



Figure 2. Cumulative confirmed COVID-19 fatalities in Portugal (May 5, 2023).

Source: Mathieu et al., 2023, Our World in Data.

On May 5th, 2023, the World Health Organization (WHO) officially announced the global cessation of the health emergency for COVID-19. This decision was made based on the recommendation of the emergency committee and was communicated by WHO Director-General, Tedros Adhanom Ghebreyesus, in a statement:

“At 1221 days ago, WHO learned of a cluster of cases of pneumonia of unknown cause in Wuhan, China. On the 30th January of 2020, on the advice of an [COVID-19] Emergency Committee convened under the International Health Regulations, I declared a Public Health Emergency of International Concern over the global outbreak of COVID-19, the highest level of alarm under international law. In three years since then, COVID-19 has turned our world upside down. Almost 7 million deaths have been reported to WHO, but we know the toll is several times higher- at least 20 million. Health systems have been severely disrupted. With millions of people missing out on essential health services, including lifesaving vaccinations for children. It has caused severe economic upheaval, erasing trillions from Gross Domestic Product. Disrupting travel and trade. Shuttering businesses and plunging millions into poverty. It has caused severe social upheaval. With borders closed, movement restricted, schools shut, and millions of people experiencing loneliness, isolation, anxiety and depression. COVID-19 has exposed and exacerbated political fault lines within and between nations. It has eroded trust between people, governments and institutions, fueled by a torrent of mis- and disinformation. And it has laid bare the searing inequalities of our world with the poorest and most vulnerable communities, the hardest hit and the last to receive access to vaccines and other tools. This is a moment for reflection. As a global community the suffering we have endured, the painful lessons we have learned, investments we have made and the capacities we have built must not go to waste. We owe it to those we have lost to leverage those investments, to build on those capacities, to learn those lessons, and to transform that suffering into meaningful and lasting change (...) This virus is here to stay, it is still killing, and it is still changing. The risk remains of new variants emerging that cause new surges in cases and deaths. The worst thing any country could do now is to use this news as a reason to let down its guard, to dismantle the systems it has built, or to send the message to its people the COVID-19 is nothing to worry about.” (WHO Director-General’s Opening Remarks at the Media Briefing – 5 May 2023, 2023).

2.2. SARS-COV-2 as a Systemic Risk

Biological risks, such as the SARS-CoV-2 virus, possess systemic properties due to a convergence of factors encompassing complexity, uncertainty, and ambiguity. The intricate interplay of various factors influencing the cause-and-effect relationship contributes to the complexity of these risks. In the case of SARS-CoV-2, the virus interacts with multiple variables, including human behavior, environmental conditions, and public health interventions, making it challenging to fully comprehend its dynamics.

Uncertainty arises as a result of diminished confidence in establishing a definitive cause-and-effect relationship. With SARS-CoV-2, numerous aspects of the virus, such as transmission mechanisms, long-term health effects, and the efficacy of various interventions, are still subjects of ongoing research and debate. This uncertainty complicates risk assessment and decision-making processes, as it becomes difficult to gauge the exact magnitude of the threat and the most effective strategies to address it. Furthermore, ambiguity is inherent in the understanding of the effects of the risk agent, in this case, the SARS-CoV-2 virus, on human health and the subsequent justified decisions or actions taken by different stakeholders. Ambiguity emerges when there is a lack of consensus regarding suitable values, priorities, perceptions, or boundaries for defining potential outcomes and responses. Stakeholders involved in addressing the SARS-CoV-2 pandemic, such as civil protection agents and healthcare professionals, may hold divergent perspectives and priorities, leading to challenges in achieving consensus on risk management strategies.

Unlike some other categories of risk, SARS-CoV-2 exhibits a distinct characteristic - its cumulative and cascading effects. Prolonged exposure to the virus and a sequential chain of secondary and tertiary impacts contribute to the cascading effects. These effects manifest in various ways, including overwhelming healthcare systems, disruptions to economic activities, social upheaval, and long-lasting consequences on mental health.

Given these inherent characteristics, managing the intricate nature of the COVID-19 pandemic requires the development of a comprehensive management strategy involving a diverse range of stakeholders. Incorporating various stakeholders, as proposed by Renn (2005, 2015), necessitates acknowledging the variations in their perceptions and evaluations of risk-related events (Figure 3).

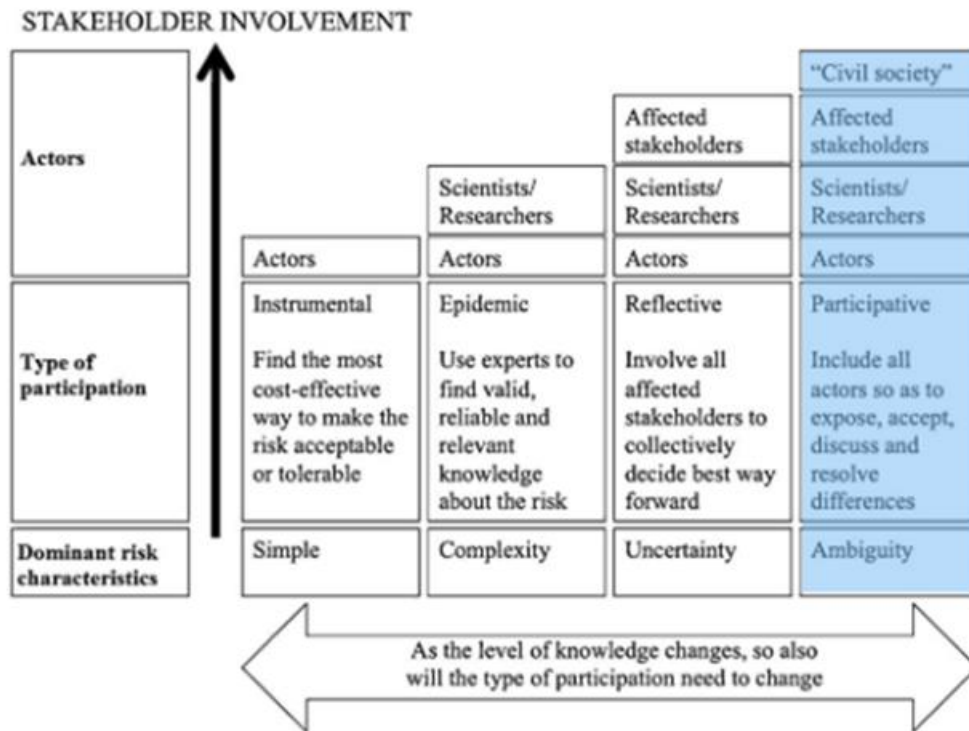


Figure 3. The risk management escalator and stakeholder involvement

However, reconciling disparate value inputs and reaching consensus can be challenging, particularly in the face of ambiguity surrounding suitable values and priorities. Previous research has highlighted the complexities of managing a disaster like the COVID-19 outbreak. While stringent top-down measures were necessary to slow down the virus's spread and mitigate the pandemic's impacts, the interpretation and framing of these measures by communities and stakeholders were influenced by their respective values and priorities. The involvement of civil protection agents and healthcare professionals played a significant role in shaping the perception of risk and the response strategies (Altiparmakis et al., 2021; Hilhorst & Mena, 2021).

In conclusion, SARS-CoV-2 represents a systemic risk due to its complexity, uncertainty, and ambiguity. Its cumulative and cascading effects further exacerbate the challenges associated with managing this risk. Effectively addressing the intricate nature of the COVID-19 pandemic requires a management strategy that encompasses diverse stakeholders and acknowledges their differing perceptions and evaluations of risk. By recognizing and addressing these systemic properties, we can strive towards a more comprehensive and collaborative approach to mitigate the impacts of SARS-CoV-2 on society.

2.3. COVID-19 Risk Social Dimensions

The predominant inherent attributes observed in pandemic crises, such as COVID-19, encompass the manifestation of social stress and anxiety arising from the novelty and uncertainty of the phenomenon, perturbation in the functioning and structure of institutions, and diminished social interactions (Mansouri & Sefidgarbaei, 2021).

Pandemic crises, such as the COVID-19 outbreak, introduce a unique set of challenges and uncertainties that have significant implications for individuals and societies. The novelty of the virus and the lack of prior experience with such a global health threat contribute to heightened levels of social stress and anxiety. The fear of the unknown, the rapid spread of the disease, and the potential for severe health consequences all contribute to increased psychological distress among individuals. Furthermore, the functioning and structure of institutions are disrupted during a pandemic crisis. Healthcare systems face immense pressure and strain as they attempt to provide care for a large number of infected individuals. Other institutions, such as schools, businesses, and government bodies, also experience disruptions in their operations, leading to economic and social consequences. These disruptions further contribute to feelings of uncertainty and instability within society. Moreover, pandemic crises often necessitate the implementation of public health measures such as physical distancing, quarantine, and isolation. These measures result in diminished social interactions, as individuals are encouraged or mandated to limit contact with others. The absence of face-to-face social connections, community gatherings, and events can have adverse effects on mental well-being and social cohesion. Loneliness, isolation, and reduced social support networks are common challenges experienced during a pandemic.

Risk perceptions encompass the subjective evaluation of the probability and magnitude of harm that can arise from a novel epidemic/pandemic outbreak. Individuals form their perceptions based on various factors, including information from authoritative sources, media coverage, personal experiences, and social influences. These risk perceptions play a crucial role in shaping individuals' behavioral responses to mitigate the associated risks. Individuals who perceive the risks associated with a pandemic as high are more likely to adopt preventive behavioral responses. These responses can include adhering to public health guidelines, such as wearing masks, practicing good hand hygiene, and maintaining physical distancing. On the other hand, individuals with lower risk perceptions may be less inclined to engage in such preventive behaviors, potentially leading to higher transmission rates and further challenges in managing the pandemic.

Risk perceptions also evoke emotions and attitudes within individuals. Fear, anxiety, and uncertainty are common emotional responses during a pandemic crisis. These emotions can influence decision-making processes and individual behavior. Moreover, risk perceptions can shape attitudes towards public health interventions, government policies, and the level of trust in authorities, which in turn affect compliance with recommended measures.

2.4. The role of Civil Protection in the response to SARS-COV-2/COVID-19

The fundamental objectives of the Civil Protection framework in Portugal encompass the prevention of collective risks associated with major accidents or catastrophes, the mitigation of their impacts, the safeguarding of individuals and property in peril during such situations, and the restoration of normalcy. The responsibility for planning, coordinating, and executing emergency and civil protection policies, as well as ensuring the coordination of national requirements in civil emergency planning, lies with the National Emergency and Civil Protection Authority. This authority functions as a central service under the direct administration of the State. These measures aim to effectively address crises or war scenarios (Decreto-Lei nº 45/2019 Da Presidência Do Conselho de Ministros, 2019). However, it is acknowledged that there are existing gaps in leadership and decision-making processes within the civil protection domain. Specifically, the involvement of civil protection actors in these decision-making procedures has been identified as an area requiring improvement (Rouco & Ferreira, 2021).

Indeed, within the district command structure of Civil Protection in Portugal, decision-making competences are not explicitly outlined. The primary focus of the Civil Protection district command structure traditionally revolves around responding to disruptive events, such as accidents or catastrophes. In this context, the district command's objectives include ensuring the functionality, operability, and coordination with all civil protection agents within the district's protection and rescue system. They also aim to exercise command and control over situations that necessitate their intervention due to their nature, severity, scope, or resources involved. Furthermore, the district command is responsible for mobilizing, allocating, and deploying personnel and available resources for operational implementation. They oversee the management of airborne resources at the district level, coordinate relief operations among various entities and institutions while respecting their own direction and command, and provide technical and operational support to the district civil protection commissions. Additionally, they propose district strategies,

resource allocation plans, and operational orders (Decreto-Lei nº 45/2019 Da Presidência Do Conselho de Ministros, 2019).

The COVID-19 pandemic has presented a significant challenge that has prompted a reevaluation of the Portuguese Civil Protection's role within the context of "response" and "safety." This ongoing health crisis offers a potential opportunity to expand the scope of the Portuguese Civil Protection's activities and reconsider its involvement in various phases of disaster risk reduction and management, extending well beyond the traditional "response" stage:

“(...) Due to its relevance in the security context, the Civil Protection requires policies based on an imminently preventive framework. Along with forest fires, the emergence of new risks, in an environment of high volatility and uncertainty, will demand from the Civil Protection system an increased capacity to prevent and anticipate the emergence of new risks and, by this way, become a structure of trust in the security context (...).”
(Berenguer, 2022, p. 151)

During the COVID-19 pandemic, the significance of the Civil Protection system in Portugal was widely recognized. Remarkably, it marked the first instance in recent history where the entire Civil Protection system was effectively mobilized, involving coordinated efforts at the local, district, and national levels. Within a matter of days, the system was swiftly activated to combat the pandemic while simultaneously addressing routine responsibilities such as firefighting, transportation of individuals to hospitals, and responding to other disruptive events. To bolster their response, the Portuguese Civil Protection established and operationalized a network of auxiliary local structures, a novel undertaking as far as available records indicate. Furthermore, they developed a network of specialized teams within fire departments to provide comprehensive support in pre-hospital activities. Strategic efforts by the National Commission for Civil Protection and the District Operational Coordination Centers proved not only important but also indispensable in mounting an effective response to the COVID-19 pandemic. To enhance coordination among diverse entities involved and facilitate information exchange and procedural establishment, meetings at the Civil Protection Subcommittee on Civil Protection were convened. These gatherings were anticipated to contribute significantly to harmonizing efforts across various backgrounds and organizations.

From its inception, the ongoing pandemic has presented a continuous learning opportunity for the Civil Protection and its personnel, as it unfolded as an unforeseen situation for which no prior preparation existed. The immediate imposition of restrictions on social contacts and the implementation of limitations on the movement of individuals necessitated a comprehensive reorganization across all local establishments, both public and private. This involved the establishment of smaller task forces capable of analyzing emerging information and formulating appropriate measures. The initial response from the Civil Protection entailed the closure of educational institutions, recreational spaces, markets, fairs, and the cancellation of events. These actions were undertaken in accordance with guidelines issued by public health authorities and mandated by the government.

Throughout this period, the most challenging issues to address were those pertaining to elderly nursing homes. This demographic was identified as particularly vulnerable to the pandemic, given their age-related susceptibilities and the potential for these facilities to become outbreak hotspots. The shortage of staff in these establishments during the onset of outbreaks necessitated the implementation of measures by the Civil Protection, including the creation of volunteer banks to mitigate the staffing shortage.

At the district level, support centers were established to cater to various population groups. These centers served patients who had been discharged from hospitals but lacked sufficient support, individuals who were unable to secure hospital admission, and residential facilities for the elderly, encompassing a wide range of logistical complexities related to staffing, food provision, and healthcare. Subsequently, efforts were made to facilitate epidemiological screening, mass testing, and vaccination campaigns, involving the establishment and maintenance of suitable facilities. As normalcy gradually returned, it became imperative to bolster security and surveillance measures. For instance, additional personnel were deployed in schools to manage increased canteen hours and recreational facilities. These endeavors, alongside other measures not explicitly mentioned, were realized through a policy of close engagement between the district-level Civil Protection structure and its personnel with the general populace. Furthermore, a decentralized approach was adopted to ensure the effectiveness and fairness of implemented measures for the benefit of the community as a whole.

In 2023, a significant milestone was reached in the Civil Protection system through the implementation of a project that led to the replacement of the 18 district commands of operations and relief (CDOS) with 24 sub-regional commands. During the inauguration of the Médio Tejo Sub-Regional Command for Emergency and Civil Protection, the Secretary

of State for Civil Protection emphasized the indispensable role of local authorities, stating that the civil protection system cannot function effectively without this foundation. They highlighted that establishing a closer connection with the populations served and with the civil protection agents, who play a critical role in the system, is a national objective. Moreover, this strategic shift aims to align with international European policies in the realm of disaster risk reduction. By adopting this new approach, the system can more effectively and specifically work towards achieving these objectives. Furthermore, it was strongly emphasized that the framework of the climate crisis is undeniable and inescapable. The imperative to focus on prevention, community resilience, territorial preparedness, and public information was highlighted as essential. The symbol of civil protection, represented by a triangle, underscores the significance of municipalities at its base. Municipalities, being closely connected to communities and territories, play a crucial role in the civil protection system. It was stressed that without this foundation, no matter how much effort is invested at the national level, the civil protection system would be unable to function effectively. Local authorities, represented by municipalities, provide the necessary support at the grassroots level, ensuring the strength and effectiveness of the overall system (Garcia & Garcia, 2023).

2.5. Objectives

Understanding the management strategies implemented by the Civil Protection in Portugal during the COVID-19 pandemic is of paramount importance when assessing the effectiveness of response mechanisms and shaping future crisis preparedness efforts. However, it is equally crucial to delve into the psychosocial predictors that influence civil protection elements' sense of preparedness. By unraveling these factors, it can not only inform the development of targeted interventions and support systems but also enhance Civil Protection resilience and well-being during global health crises. Armed with this understanding, it is possible to design and implement targeted strategies that cater to the specific needs and concerns of civil protection agents, building capacity to respond to future health emergencies while bolstering their mental health and overall well-being.

This holistic approach ensures that the response mechanisms are comprehensive and adaptable, taking into account the multifaceted nature of the civil protection agents' lessons learnt, expectations, needs and psychosocial factors and their influence on preparedness. This knowledge acquisition is poised to contribute significantly to the existing body of knowledge concerning COVID-19 management and psychosocial

responses, thereby fostering more effective and comprehensive approaches to pandemic preparedness and mitigation not only in Portugal but also in other parts of the world.

Inspired by the abovementioned ambition, this study aims to comprehensively ascertain how it occurred the COVID-19 emergency management in Portugal, in the perspective of civil protection elements. Moreover, this study aims to determine the lessons learnt by Civil Protection through the COVID-19 pandemic. To meet these two major goals, specific objectives were established:

1) To comprehensively determine the predicaments and accomplishments of the Civil Protection, regarding the COVID-19 emergency management;

2) To identify the major lessons learnt from the COVID-19 emergency management, inspiring the development of a novel framework for biological risk management, within Civil Protection;

3) To ascertain the Civil Protection's level of preparedness to respond to a novel epidemic or pandemic outbreak;

4) To ascertain whether there are differences between civil protection agents and civil protection actors with a decision-making role, regarding: perceived efficiency regarding COVID-19 emergency management; perceived Civil Protection preparedness for novel epidemic or pandemic outbreaks; perceived amount of lessons learnt; and psychosocial dimensions of biological risk management (e.g., risk perception, institutional trust);

5) To determine the predictors of Civil Protection preparedness for future biological risks.

3. Methodology

3.1. Study design

The present study follows an exploratory sequential mix-methods research design. This sequential mixed-method design consists of applying the quantitative study followed by the qualitative (Onwuegbuzie et al., 2009; Schoonenboom & Johnson, 2017). This research design has the potential to expand the results of qualitative data, by enhancing the validity and reliability of the qualitative findings. Moreover, exploratory sequential mix-methods studies offer several advantages, such as: a comprehensive understanding of the research topic; possibility of integration of different perspectives; complementary data, that shall provide a more comprehensive picture of the phenomenon under study; and enhanced applicability to larger populations or contexts.

For the purpose of this study, in-depth semi-structured interviews were conducted to civil protection agents and decision-makers from Santarem district. The gathered data inspired the development of a survey questionnaire, which was administered at a national level to civil protection agents. Finally, the gathered evidence was integrated, as it is the ‘integration process’ that has the greatest potential of enhancing the value of mixed methods research (Fetters et al., 2013). For this study, data integration followed a ‘merging’ method (i.e., two databases are brought together for analysis and for comparison), according to the principles and practices developed by Fetters et al. (2013). Furthermore, it was used a joint display approach, to merge the results. This is, the findings were integrated by bringing the data together through a visual means – in this study, a matrix of data mixing – in order to draw out new insights beyond the obtained information from the separate quantitative and qualitative results (Fetters et al., 2013). Figure 4 displays the research design of this study.

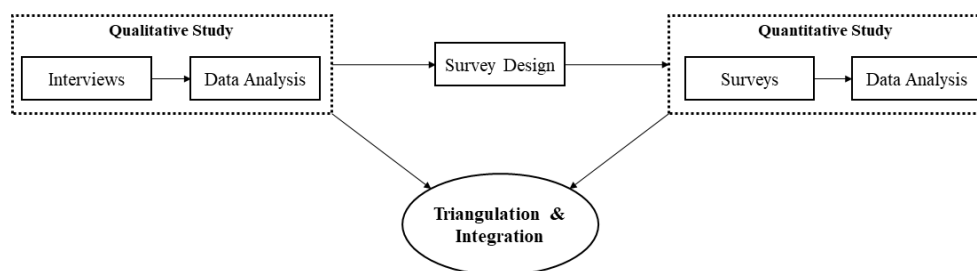


Figure 4. Research design

3.2. Qualitative Study

3.2.1. Data collection

Qualitative data was collected between November 2022 and December 2022. It was used a convenience sampling method, which involves the selection of participants who are readily available and easily accessible to the researcher, thus allowing for a rapid data collection. The inclusion criteria considered for the study were as follows: (1) being 18 years of age or over, (2) living or working in the Santarém district, (3) being a civil protection agent and/or a decision-maker at a municipal level and, (4) having given informed consent to participate in the study.

The semi-structured interview guide was developed to to comprehensively explore the experiences of the involved actors and the meanings that they attribute to those meanings, in the context of COVID-19 risk management. For that, an interview script was designed, based on the study's research question and objectives, as well as, on the existing literature on the theme. In particular, the interview script encompasses the following dimensions: (1) the Civil Protection role in COVID-19 risk management; (2) the collaboration between the stakeholders in COVID-19 risk management; (3) the lessons learnt from COVID-19 risk management; (4) biological risk perception; (5) preparedness; and (6) participatory processes of biological risk management (cf. Appendix).

Interviews were conducted in an online environment, using Google Meet™ meetings' platform. Interviews lasted between one hour to ninety minutes and were audio-recorded, after obtaining participant's informed consent. The interviews were audio-recorded to further be transcribed *verbatim* to further be subject to an in-depth content analysis.

3.2.2. Participants

The qualitative sample consisted of 15 participants. Two of them belong to the National Command for Emergency and Civil Protection. Thirteen participants belong to the National Civil Protection System. From these, 12 are from governmental bodies at municipal level (City Council and/or City Council Civil Protection Service) and 1 is a civil protection agent. The detailed sample characteristics for the participants of the qualitative study is given in Table 1.

Table 1. Sample characteristics for the participants of the qualitative study, $N = 15$

ID	Age	Sex¹	Role in Civil Protection	Institution
P01	49	M	National Command of Emergency and Civil Protection	ANEPC ²
P02	39	M	National Command of Emergency and Civil Protection	ANEPC ²
P03	48	M	Municipal Authority of Emergency and Civil Protection	City Council
P04	32	F	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P05	40	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P06	57	M	Municipal Authority of Emergency and Civil Protection	City Council
P07	39	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P08	43	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P09	51	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P10	45	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P11	44	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P12	39	M	Civil Protection Agent	ANEPC ²
P13	43	F	Civil Protection Agent	ANEPC ²
P14	45	M	Municipal Authority of Emergency and Civil Protection	City Council Civil Protection Service
P15	44	M	Municipal Authority of Emergency and Civil Protection	City Council

Notes:

¹Sex: M = Male; F = Female

²ANEPC- Portuguese National Authority for Emergency and Civil Protection

3.2.3. Data analysis

Qualitative data analysis consisted of an in-depth content analysis, in order to identify, analyse and report the content of interviews to meet to the initial study goals (Bardin, 1977). The analysis was conducted according to the guidelines established by Bardin (1977), considering the following steps:

1. *Preparing and organizing the material.* This first step involves gathering and preparing the material for analysis. For this study, the interviews were transcribed *verbatim*, carefully reviewed, organized, and structured for analysis.
2. *Defining the unit of analysis.* The unit of analysis is the basic element that will be analysed in the content. For the purpose of this study sentences and paragraphs were defined.
3. *Creating coding categories.* Coding categories were established to systematically categorize and classify the content. These categories partially derived deductively from the existing theory on biological risk management. Occasionally, categories emerged inductively from the data itself.
4. *Coding the material.* In this step, the material was systematically coded according to the established coding categories. Each unit of analysis was assigned to one or more categories based on its content and meaning. Coding was facilitated by using a qualitative data analysis software, specifically MAXQDA 2020.
5. *Developing a coding framework.* A coding framework was created to guide the coding process and ensure consistency. It included clear definitions and guidelines for each coding category. The coding framework is essential to ensure reliability.
6. *Data analysis and interpretation.* Once the coding is complete, the data was analysed and further interpreted. This involved examining the patterns, relationships, and themes that emerged from the coded content. Codes' frequency analysis was privileged in this phase.

The qualitative data analysis and its subsequent results' description was conducted based on the Consolidated Criteria for Reporting Qualitative Research (COREQ) standards (Tong et al., 2007).

3.3. Quantitative Study

3.3.1. Data collection and measurement tools

Quantitative data was collected between December 2022 and April 2023, using a convenience sampling method, targeting civil protection agents at a national level. A web-based survey questionnaire was employed, based on the categories and subcategories emerged from the qualitative data analysis. The inclusion criteria considered for the study were as follows: (1) being 18 years of age or over, (2) being a civil protection agent and, (3) having given informed consent to participate in the study.

The survey questionnaire consisted of a sociodemographic questionnaire and measured latent variables related to: civil protection preparedness, perception about COVID-19 risk management, lessons learnt, risk perception, emotional states (i.e., worry), trust and individual preparedness. The measurement scales used to assess the abovementioned constructs are described below.

Civil Protection's preparedness to respond to COVID-19 was measured through one item, in a 10-point Likert scale, as follows "On a scale of 1 to 10, where 1 means 'Not at all Prepared' and 10 'Extremely Prepared', in your opinion, how prepared was civil protection to respond to the COVID-19 pandemic?".

Civil Protection's preparedness to respond to future health emergencies was also measured through one item, in a 10-point Likert scale, as follows "On a scale of 1 to 10, where 1 means 'Not at all Prepared' and 10 'Extremely Prepared', in your opinion, how prepared is civil protection to respond to a new epidemiological/pandemic outbreak?".

COVID-19 emergency management. The COVID-19 emergency management index consist of the individuals' perception regarding the quality and efficacy of the management of the pandemic, regarding: the civil protection preparedness, communication between the civil protection and other public authorities, decision-making participatory processes, and the adequate implementation of precautionary and prevention measures. This index was measured through 5 items (e.g., "The Civil Protection actively participated in the decision-making processes related to the management of the pandemic"), in a 5-point Likert scale (1= Totally disagree; 5 = Totally agree). Participants were asked to indicate to what extent they agreed with each given affirmation. The Perception about COVID-19 risk management index presented a Cronbach alpha of $\alpha = 0.82$, thus high reliability.

Lessons learnt. The amount of lessons learnt measures to what extent, in the perspective of the respondents, the Civil Protection has adopted novel good practices to

respond to future health emergencies, such as augmented collaboration with other public authorities in decision-making processes, adoption of a greater role in prevention and preparedness for public health emergencies, updated emergency plans and enhanced preparedness. This subscale consists of 7 items (e.g., “Emergency plans for the event of a public health emergency have been readjusted following the COVID-19 pandemic”), measured in a 5-point Likert scale (1 = Totally disagree; 5 = Totally agree), and presented an acceptable internal consistency, $\alpha = 0.75$.

Risk perception. Risk perception towards a biological hazard refers to how individuals perceive and evaluate the potential risks associated with exposure to biological agents, such as infectious diseases, pathogens, or other biological hazards. It involves an individual's subjective judgment and assessment of the likelihood and severity of harm posed by the hazard. For the purpose of this study, the risk perception index consists of two items (e.g., “The probability of occurrence of a new epidemiological/pandemic outbreak in the next 5 years is high”), in a 5-point Likert scale (1 = Totally disagree; 5 = Totally agree), and presented a Cronbach alpha of $\alpha = 0.71$, thus acceptable reliability.

Emotional States. For this study, emotional states, particularly ‘worry’ was assessed as, previous research has widely demonstrated that feeling worried about a potential risk is related to a proactive behaviour towards prevention, mitigation, preparedness and adaptation (Lerner et al., 2015). Worry was measured through two items (e.g., “I am extremely worried about the potential occurrence of a new epidemiological/pandemic outbreak”) in a 5-point Likert scale (1 = Totally disagree; 5 = Totally agree). The scale presented an high internal consistency, $\alpha = 0.83$.

Trust. Trust on both Civil Protection’s and Public Authorities’ capacity to properly manage a novel health emergency risk was measured through two items (e.g., “I trust in civil protection regarding its capacity to manage a potential new epidemiological/pandemic outbreak”) in a 5-point Likert scale (1 = Totally disagree; 5 = Totally agree), and presented a Cronbach alpha of $\alpha = 0.78$, thus acceptable reliability.

Individual preparedness. Individual preparedness to a biological hazard refers to the actions and measures taken by individuals to mitigate the potential risks and impacts of a biological event, such as an infectious disease outbreak. It involves proactive steps to enhance personal and household readiness, minimize exposure, and respond effectively to the hazard. Individual preparedness was measured through two items (e.g., “I attempt to inform myself about biological risks and possible prevention and mitigation measures”) in a 5-point Likert scale (1 = Totally disagree; 5 = Totally agree). The scale presented a

questionable internal consistency, $\alpha = 0.67$. It is worth mentioning that, when scales have few items it is not unusual to have low internal consistency, as measured by coefficients like Cronbach's alpha, as the internal consistency estimate is dependent on the correlation between the two items. That said, the internal consistency of a two-item scale should not be the sole basis for evaluating its quality. Other considerations, such as content validity and theoretical relevance should also be taken into account (Boateng et al., 2018). For the abovementioned reasons, it was decided to maintain the individual preparedness scale for further analysis.

3.3.2. Participants

A total of 262 individuals enrolled in the quantitative study, by filling the survey questionnaire. From these, the majority are men ($n = 197$, 68.1%) and have a mean age of ≈ 43 years old ($SD = 9.27$). Only 3 participants referred not be Portuguese ($n = 3$, 1.1%). Most participants have secondary education ($n = 108$, 41.2%) or a bachelor's degree ($n = 104$, 39.7%). Regarding participants' residency and/or working zone, most of them are from Portugal central region ($n = 76$, 29.0%) or from Lisbon Metropolitan Area ($n = 75$, 28.6%). Finally, concerning the participants' role in Civil Protection, more than a half of the participants are civil protection agents, this is, professional or volunteer firefighters ($n = 149$, 56.9%). The detailed sample characteristics for the participants of the qualitative study is given in Table 2.

Table 2. Sample characteristics for the participants of the quantitative study, $N = 262$

	<i>n</i>	%
Gender		
Female	64	24.4
Male	197	75.2
Non-binary	1	0.4
Age*	42.83(9.27)	
Nationality		
Portuguese	259	98.9
Other	3	1.1
Education		
Primary education (≥ 3 rd cycle)	9	3.4

Secondary education	108	41.2
Bachelor's degree	104	39.7
Master's degree	41	15.6
Residency/Working Zone¹		
Central Region	76	29.0
Lisbon Metropolitan Area	75	28.6
North Region	65	24.8
Alentejo	26	9.9
Algarve	8	3.1
Autonomous Region of the Azores	3	1.1
Autonomous Region of the Madeira	9	3.4
Role in Civil Protection		
National Command of Emergency and Civil Protection	12	4.6
Municipal Authority of Emergency and Civil Protection	93	35.5
Civil Protection Agent (i.e., professional or volunteer firefighter)	149	56.9
Regional Command of Civil Protection Service from Madeira	8	3.1

Notes: * Mean (SD); ¹ According to NUTS II

3.3.3. Data analysis

With regard to the quantitative analysis, a paired-sample *t*-test was computed, in order to ascertain whether there were differences between Civil Protection preparedness to manage the COVID-19 pandemic and the Civil Protection preparedness to manage future biological risks. Independent sample Student's *t*-tests were also calculated to ascertain whether there were differences between civil protection agents and actors with a decision-making role (i.e., those who belong to the National Command of Emergency and Civil Protection, Municipal Authorities of Emergency and Civil Protection, and Regional Command of Civil Protection Service from Madeira) regarding Civil Protection's related variables (i.e., Civil Protection's preparedness to respond to COVID-19 and future pandemics; perception about COVID-19 risk management; and lessons learnt for future biological risk management) and individual-level variables (i.e., risk perception, worry, trust and individual preparedness). To ascertain the predictors of individual and Civil Protection preparedness for future biological risks, structural equation models were computed, specifically univariate multiple regression models. For each tested model, violations of assumptions were assessed beforehand, in order to assure that possible

violations did not compromise the findings and interpretations from the maximum likelihood estimations. Statistical analyses were performed using IBM SPSS Statistics and AMOS, version 26.

3.4. Ethics

This study was developed in accordance with the international ethical and methodological guidelines for research with human beings, as established by the American Psychological Association (2017) and Fisher and Anushko (2008). With regard to the qualitative study, before starting the interviews, the study's objectives were presented to the participants. The interviews only proceeded after the obtained informed consent from the participants, and the permission to record the audio for later transcription. With regard to the quantitative study, an information sheet as the first page of the online survey was presented to the participants, with general information on the purposes of the research. The informed consent for participation was obtained at the beginning of the survey, with participants required to check a box to indicate consent before getting into the survey. In both studies data protection, anonymity, confidentiality and privacy standards were ensured to the participants and strictly followed.

4. Results

4.1. Qualitative study results

From the in-depth content analysis of the gathered qualitative data, two main themes emerged from the participants' narratives: Biological Risk Management and Emergency Response and Biological Risk Social Dimensions. Those themes resulted in main categories, each one comprising specific subcategories. The categorical tree map, with the prevalence results of the categories and subcategories, is given in Figure 5.

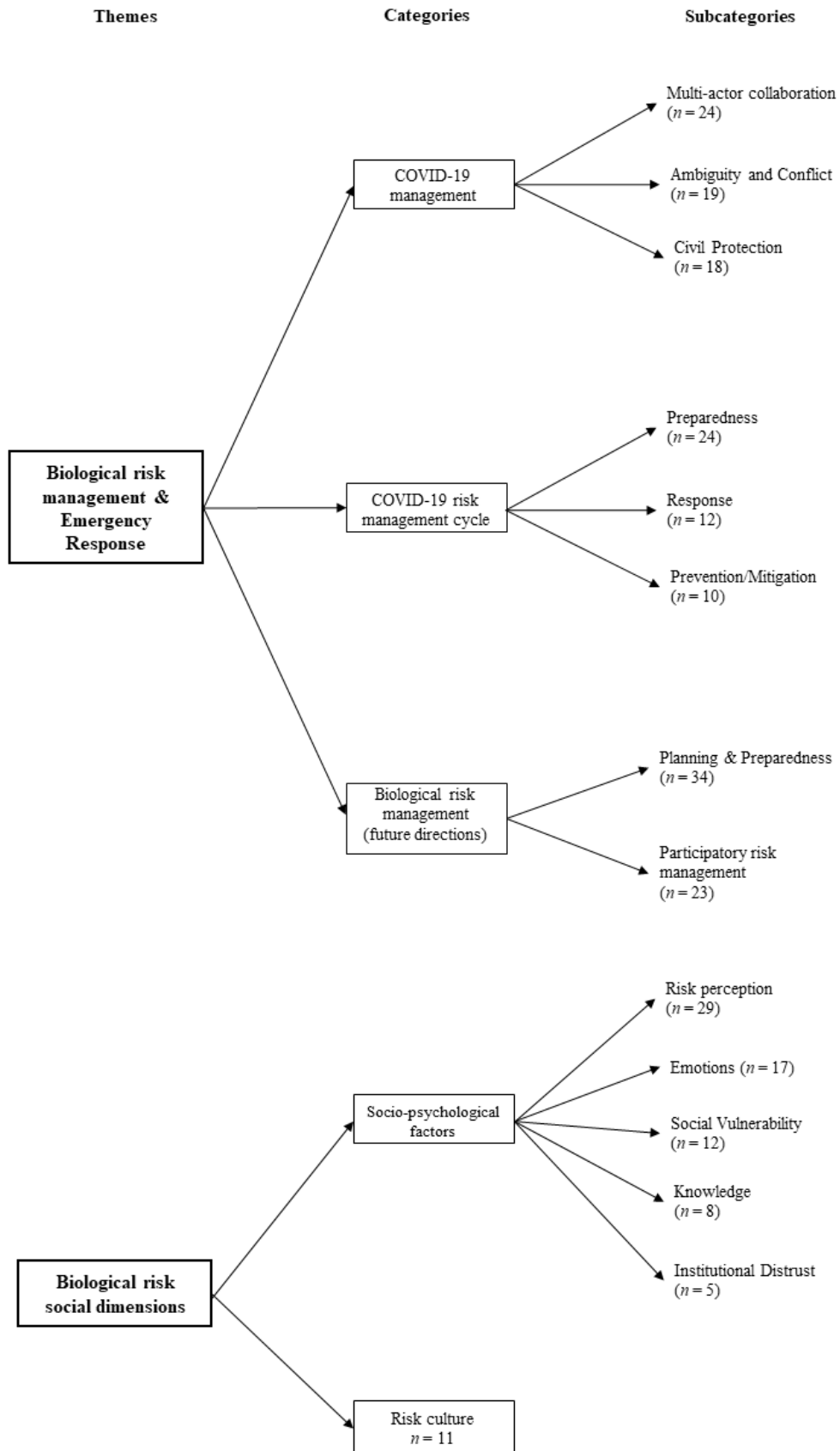


Figure 5. Categorical Tree Map

4.1.1. Biological Risk Management and Emergency Response

‘Biological Risk Management and Emergency Response’ refers to the systematic and strategic approach taken to identify, assess, and mitigate risks and respond to biological disasters, as it was COVID-19. It shall involve a set of practices, protocols, and procedures designed to minimize the potential adverse effects of biological hazards on human health. However, according to Djalante et al. (2020), despite the existing mechanisms and strategies for disaster resilience to respond effectively to epidemics and even global pandemics, global and some regional responses to the COVID-19 emergency revealed little implementation of those mechanisms. Indeed, in this theme, participants’ narratives were, somehow, controversial. Whilst some participants revealed that it existed a smooth multi-actor collaboration, other interviewed reported interagency coordination problems and some unclarity of each institution role in responding to the pandemic.

COVID-19 Emergency Management

With regard to the ‘COVID-19 Emergency Management’, more than 29% of the participants acknowledged that the ‘*Multi-actor collaboration*’ ($n = 24, 29.27\%$) were a major challenge to the COVID-19 Management. According to the interviewed, the involvement of all stakeholders (e.g., municipal-level policymakers, healthcare authorities, civil protection) has been an important requirement for efficient and fair risk management. As it was stated, the collaboration of different actors consisted on the integration of the different interests, knowledge and needs of all stakeholders, enhancing the whole risk policy-making/planning process. At the same time, this multi-actor collaboration was acknowledged to be a valuable tool to deal with the major challenges of COVID-19 risk management: complexity, uncertainty and ambiguity.

"The District Committee of Civil Protection was composed by the municipal mayor who led it. I have also proposed the integration of two more colleagues from Lezíria area (...), the directors of two hospital centers (...) and the director of the Social Security Institute. The Portuguese Immigration and Borders Service also took part, as well as the district command of the PSP and GNR, the Institute of Legal Medicine, and public health authorities. In that time, we met every day. No one replaced anyone. There was an excellent collaboration and articulation work between all the entities." (P6, 57y/o, Municipal Authority of Emergency and Civil Protection)

Whereas some participants acknowledged that the multi-actor collaboration enabled a smooth decision-making regarding COVID-19 response, other participants revealed that there was not a real collaboration between the different stakeholders involved in the COVID-19 emergency response.

"(...) as I remember, the hospitals rarely came to the foreseen meetings. They were neither seen nor found. That is, they are involved in the civil protection process because we have to take patients or victims somewhere, but they were never actually involved in the decision-making process." (P1, 49y/o, National Command of Emergency and Civil Protection)

"(...) because at the beginning of the pandemic, they did not appear [referring to the Social Security] (...). They were not present and we could not rely on them to respond to the children or to the elderly" (P15, 44y/o, Municipal Authority of Emergency and Civil Protection)

In this line, “*Ambiguity and Conflict*” ($n = 19, 23.17\%$), frequently arose when it came to establish agreements on definition and implementation of efficient mechanisms, as each actors’ values, priorities, assumptions or limits were not legitimated. According to the interviewed, conflicts in COVID-19 risk management have emerged mainly over the role of each actor, such as the unclear definition of the Civil Protection role to respond to the COVID-19 emergency and the absence of action from some Public Institutions, whose responsibilities turned out to be assumed by Civil Protection.

"So when this whole situation initially started I spoke to the municipality, as the highest civil protection agent in the county. I requested a meeting with all the other elements that could be involved, such as the Public Health, schools, nursing homes and everything else. I may say that I was mistreated by an element of Public Health, who told me that I was making a big deal out of this, because supposedly none of this was going to happen (...)." (P13, 43y/o, Civil Protection Agent)

"Now, the Social Security, which until now had done nothing and did not know how to manage these institutions [referring to elderly nursing homes] from their responsibility. We, in Civil Protection, managed to (...) support these institutions, and it was our municipality economically facilitated it." (P14, 45y/o, Municipal Authority of Emergency and Civil Protection)

Still on this subcategory, differences in organizational cultures, competing priorities, or lack of effective mechanisms for interagency coordination, were mentioned by the participants. For instance, the interviewed revealed that was truly challenging to deal with the *modus operandi* of highly bureaucratic institutions involved in the pandemic

emergency management, which compromised an efficient and fair performance of the Civil Protection.

"(...) to say that, for example, we had extreme difficulty in articulating with Social Security, especially in the initial phase. We also had extreme difficulty in articulating with hospitals. The hospital works in one way, the health delegates work in another way, the ACES [Agrupamento de Centros de Saúde] in another way. And those [referring to ACES] are who basically control the region, right? They worked differently. Therefore, everyone worked in a different way and could not articulate." (P1, 49y/o, National Command of Emergency and Civil Protection)

Occasionally, other sources of institutional conflict were mentioned, related to jurisdictional disputes (i.e., when different public institutions had overlapping responsibilities and jurisdictions), resource allocation (e.g., competing demands for limited resources, particularly those related to personal security equipment) and information sharing (e.g., conflicting or inconsistent messaging between the different entities, which was acknowledged to undermine citizens' trust).

Another debated topic under the pandemic emergency response, was the role of "Civil Protection" ($n = 18, 21,95\%$). As it was widely stated, the management of COVID-19 emergency was assumed, as if it was any other catastrophe or serious accident. This is, the Civil Protection was only taken into account for its role in responding to emergencies.

"The Civil Protection is not just a bunch of firefighters. But this is the problem. This is something that is deeply rooted in the population." (P12, 39 y/o, Civil Protection Agent)

"The Civil Protection services are those that are always up for grabs for the municipalities and the population. Our role was of permanent support and response; from the beginning until now." (P14, 45y/o, Municipal Authority of Emergency and Civil Protection)

COVID-19 Disaster Risk Management Cycle

Unlike natural disasters, that mostly have an undefined onset and huge amount of population is immediately affected; epidemic/pandemic outbreaks start sporadically and increase based on the rate of transmissibility, infectiousness and mitigation capacity. These characteristics can compromise the stages of a risk management cycle, from Preparedness, through Prevention/Mitigation, to Response and, even, Recovery.

With regard to the Civil Protection “*Preparedness*” ($n = 24, 52,17\%$) to respond to the pandemic emergency, few participants – particularly those from the National Command – referred that the know-how brought from other catastrophic situations was decisive for the effectiveness of their actions during the pandemic.

“Better or worse, we [referring to the Civil Protection] are always prepared for the emergency response.” (P13, 43y/o, Municipal Authority of Emergency and Civil Protection)

However, the Civil Protection preparedness was, somehow, arguable. This was specially verified in the Civil Protection agents’ (e.g., professional or volunteer firefighters) narratives that frequently mentioned barriers regarding limited knowledge and training specific to pandemic response, including understanding the nature of the infectious disease, its transmission, appropriate infection control measures, and the use of personal protective equipment.

“It was all new. I wasn't even prepared for that. A municipal emergency plan was not even prepared (...).” (P4, 32y/o, Municipal Authority of Emergency and Civil Protection)

“Being prepared for this type of situation? We weren't prepared at all. And we also weren't able to understand how we needed to prepare ourselves (...). And to make matters worse, the lack of personal protective equipment for ourselves, that was the extremely costly, which unavoidably brought us some constraints.” (P9, 51y/o, Municipal Authority of Emergency and Civil Protection)

With regard to the “*Response*” ($n = 12, 26.09\%$), the interviewed narratives were commonly consensual. Participants considered that the Civil Protection played a crucial role in the response to a pandemic outbreak, regardless the lacking information on the disease. For that purpose, some participants referred that the knowledge acquired and the contingency planning developed for past epidemic outbreaks (e.g., H5N1 avian influenza) was crucial to develop a COVID-19 contingency plan: “(...) *we turned the bird flu contingency plan into our COVID contingency plan.*” (P1, 49y/o, National Command of Emergency and Civil Protection).Furthermore, it seemed pretty clear for the interviewed what were the roles they played in the response to the pandemic, based on the best available knowledge on that time, such as: provide pre-hospital care to patients affected by the

disease, such as administering life-saving interventions, providing oxygen therapy, stabilizing patients, and managing symptoms; transport patients to appropriate healthcare facilities, including hospitals; provide targeted support and care for vulnerable populations during the pandemic; decontaminate public spaces; and surveillance.

“First, we had a rescue action, then the management of the public space, and then the management of the masses that came with the mandatory curfews. We drove on our cars through the streets giving information to people. We also did a lot of stupid things, like spreading hypochlorite on equipment for public use. We spent fortunes on what we thought was the most correct. We have modified behaviors throughout the pandemic, we have also reinvented ourselves with remote assistance, bringing culture to people.” (P15, 44y/o, Municipal Authority of Emergency and Civil Protection)

Contrary to the emergency response, about which participants shared a clear image of what was the Civil Protection’s role in the pandemic management, “Prevention/Mitigation” ($n = 10$, 21.74%) of biological risks, as it was COVID-19, is a critical predicament of Civil Protection, according to the interviewed narratives. Despite acknowledging that the Civil Protection’s *modus operandi*, deeply rooted in emergency response, must be extended to the other disaster risk management cycle phases; in the case of the pandemic, the Civil Protection was unable to implement concrete prevention (i.e., implementation of proactive measures in advance to avert the occurrence of COVID-19 in the community) and/or mitigation (i.e., implementation of reactive measures to reduce the severity, duration, or effects of the pandemic, and facilitate recovery) measures.

“In terms of prevention, we did nothing. But COVID also brought a basic change here, especially in the municipal emergency plans that, from now on, must include these risks.” (P8, 43y/o, Municipal Authority of Emergency and Civil Protection)

“We continue to bet on what intervention is and we forget what prevention is; which costs much less.” (P9, 51y/o, Municipal Authority of Emergency and Civil Protection)

“I believe that we are prepared to react (...) and this is our main weakness.” (P15, 44y/o, Municipal Authority of Emergency and Civil Protection)

Biological Risk Management (future directions)

Interestingly, whenever the topic of future directions for biological risk management was discussed, almost 60% of the interviewed mentioned benefits from improving the “*Planning and Preparedness*” ($n = 34, 59.62\%$). As ascertained from participants' narratives, the population would greatly benefit from an institutional investment on preparedness, instead of relying solely in reactive measures, such as the emergency response.

“Obviously, the major lesson learnt is the need for a reformulation of the organizational systems, procedures and our culture (...) which is obviously outdated. In terms of Civil Protection, measures must be taken in anticipation, rather than in reaction (...). And when I say Civil Protection, I also mean in terms of institutional coordination with the organizations that are involved [in biological risk management] (...).” (P2, 39y/o, National Command of Emergency and Civil Protection)

“And we must always participate more in anticipation than in reaction. (...) Unfortunately our Civil Protection system was created to react and has not yet been able to give more (...). It is still not possible for us to commit more effort to anticipation than to reaction. This is a fact and one of the greatest barriers we must surpass.” (P2, 39y/o, National Command of Emergency and Civil Protection)

Moreover, a “*Participatory Risk Management*” ($n = 23, 40,35\%$) for biological hazards was clearly privileged by the interviewed. According to the participants, in the future, biological risk management would great benefit from collaborative decision-making processes, that incorporate input from diverse stakeholders, from national policymakers and public health officials to local leaders and institutions (i.e., Civil Protection at a municipal level), in order to ensure that decisions align with local contexts, values, and priorities, increasing the likelihood of effective risk management strategies.

“Whoever is at the top (...) has to understand that the decision-making at a higher level will have repercussions at the district level, and ultimately at the municipal level. Such decisions may be too demanding for the municipal infrastructure (...). In this way, I do not comply. We must be heard.” (P9, 51y/o, Municipal Authority of Emergency and Civil Protection)

“The decision always has to be political, doesn't it? That is beyond any reasonable doubt. (...) But when it comes to the local level... well, when I say local, I mean that decisions had to be taken based on what is the highest priority for that local community.” (P1, 49y/o, National Command of Emergency and Civil Protection)

“(...) how can we respond with a municipal service if the legislation itself does legitimate a municipal technician [referring to civil protection agents]? The government just talks about the coordinator and the municipal authority and that's it! And then, how is the service done? What are you going to do? I guess we have a word.” (P8, 43y/o, Municipal Authority of Emergency and Civil Protection)

“The problem is that Public Health has no resources. Let's be real: they don't have resources. And that's it! Once again, it will go down to the local level (...) what if the local level can't make a first response everything else today doesn't work.” (P8, 43y/o, Municipal Authority of Emergency and Civil Protection)

4.1.2. Biological risk social dimensions

Socio-psychological factors

The vast majority of functions assigned to Civil Protection workers, whether from the central or local administration, includes elements of the physical and human environment, tools and technologies, and work procedures. All elements interact and produce loads of physical, psychological and cognitive stress in these workers which, in turn, affect individual outcomes, such as health, well-being and performance at work, as widely mentioned by the interviewed. Associated with civil protection agents had the repetitive exposure to these elements during long hours per day of work. During the COVID-19 pandemic all the participants have worked in complex and dynamic environments with various psychosocial work stressors that increase risks for civil protection agents, such as high time pressure, varying workloads, and frequent exposure to potentially traumatic events.

On this theme, participants' *“Risk Perception”* ($n = 29, 32.58\%$) was recurrently ascertained from participants' narratives. Risk perceptions consists of subjective assessment of the likelihood and severity of harm that may result from a novel epidemic/pandemic outbreak, as well as the emotions and attitudes evoked by these perceptions. In the case of civil of the interviewed, it seemed to occur an amplification of

the risk, probably related to their experience with the pandemic, either personally or within their community. From the participants' narrative, it is possible to infer that their previous firsthand experience with the impact of the COVID-19, had led to heightened concerns and a greater sense of vulnerability regarding a potential novel outbreak, clearly enhanced by their role in the emergency response to the current pandemic. However, when it comes to population's risk perception, the interviewed seemed more skeptical, referring that the psychological distance of the biological risk, especially in terms of time, will lead individuals to develop a sense of invulnerability, in which citizens will not believe that a potential novel outbreak will not affect them personally, leading to a reduced perception of risk. In the perspective of the participants, this can result in complacency and a lack of adherence to preventive measures.

“This pandemic may well be a window of opportunity to look differently to this stuff. I don't know if it will happen something similar in the next five years. But in the next twenty years? We will have a serious pandemic again. I think it is very likely to happen again. If you ask me whether we are prepared for a new outbreak; we are not.” (P3, 48y/o, Municipal Authority of Emergency and Civil Protection)

“(…) I think that security is not a priority in this world. I think that biohazards are now a novel weapon of war (...) and I think it's very likely that something similar will happen once again. And the mobility that we all have now, with which we travel the world, also comes to augment the probability of occurring a new thing like this.” (P15, 44y/o, Municipal Authority of Emergency and Civil Protection)

“We've already been through one pandemic, which is not important, you know? The perception of risk, technically speaking, the perception of risk won't be no longer the same (...) when we all be out of touch with this reality. When this happens again, everyone will say ‘Ah, this is nothing!’ and, in the meanwhile, we are increasing its impact [regarding a potential novel outbreak]”. (P10, 45y/o, Municipal Authority of Emergency and Civil Protection)

“(…) in general, of course, most people think that it's already intrinsic [regarding the individual prevention measures, such as respiratory etiquette or disinfect frequently touched surfaces]. But I think that within half a year, nobody will remember again (...).” (P8, 43y/o, Municipal Authority of Emergency and Civil Protection)

Interestingly, the experienced “*Emotions*”, ($n = 17, 19.10\%$) by both civil protection agents and common citizens, emerged from the participants’ discourses. According to the interviewed, the COVID-19 pandemic has elicited a wide range of negative emotions in people and first responders, namely on civil protection agents. The most frequently mentioned emotions were fear and anxiety. In their perspective the uncertainty and rapid spread of the virus have triggered fear and anxiety in many citizens (e.g., fear of contracting the virus, concerns about the health and safety of loved ones, and anxiety about the long-term consequences of the pandemic). Moreover, civil protection agents experienced heightened anxiety due to the increased exposure to the virus and the potential risks to their own health and, consequently, to their families, which appeared to be an issue of major concern, according to their narratives. Furthermore, grieving processes were occasionally mentioned. In one hand, grief was brought up with regard to the obvious impact of a death of a loved one in their relatives. On the other hand, participants acknowledged that the pandemic has disrupted traditional grieving processes, with restrictions on funerals and memorial services, exacerbating the emotional burden. Finally, stress and burnout was critically discussed by the interviewed. As mentioned by the participants, the pandemic has created high levels of stress, particularly for civil protection agents who have faced increased workloads, long hours, and challenging working conditions. The constant pressure, the risk of exposure, and the emotional toll of dealing with severe illness and death have contributed to burnout and mental exhaustion.

“(…) it was the sense of uncertainty and that uncertainty quickly turned into fear. And I really say that the word is fear (…). Fear of what? Fear of not knowing what the progression of the virus would be, this is, the development of the pandemic.” (P2, 39y/o, National Command of Emergency and Civil Protection)

“It was not easy to find people available, even with a good financial reinforcement, to go and work in these places [referring to elderly nursing homes]. Because working with death...? Yes, near death is a big unknown; and many people actually died. And the only thing we actually knew about the COVID-19, it was that this disease caused the death.” (P6, 57y/o, Municipal Authority of Emergency and Civil Protection)

“In many situations in which people started to get stressed and depressed. This is another thing that nobody talks about. How this pandemic affected the populations psychologically, isn't it? Because, as human beings (…) we need contact with other people, we need human

contact, don't we? And this has messed up a lot our minds.” (P12, 39y/o, Civil Protection Agent)

The “*Social Vulnerability*” ($n = 12$, 13.48%) to the pandemic was preoccupying issue mentioned by a wide range of participants. According to the interviewed discourses, the social vulnerability was mainly related to the susceptibility and increased risk faced by certain populations or individuals due to social, economic, and structural factors. It was often highlighted the disparities and inequities in how different groups were affected by the pandemic, such as: 1) individuals with lower socioeconomic status, such as people living in poverty; 2) marginalized and minority populations, including racial and ethnic minorities and immigrants (e.g., Nepalese immigrants community); 3) older adults and individuals with underlying health conditions, with a great focus on illegal elderly nursing homes; 4) overcrowded living conditions (i.e., related to illegal immigration); and 5) disparities in access to quality education and to and use of digital technologies.

“These were the most difficult moments for the District Commission for Civil Protection. It was the discovery of situations of dozens of people who were in miserable conditions.” (P6, 57y/o, Municipal Authority of Emergency and Civil Protection)

“One of the most dramatic situations that we had was near Santarém. It was an elderly nursing home that was not referenced by the Institute of Social Security. This is, it was illegal (...), in which where people were completely abandoned.” (P6, 57y/o, Municipal Authority of Emergency and Civil Protection)

“We had to learn how to care for our immigrants, which was a population that challenged us. They were not very receptive. You can imagine the reasons why. But we then found one representative to make this connection with them.” (P15, 44y/o, Municipal Authority of Emergency and Civil Protection)

“And we had other people, who simply don't have a home. And during the pandemic, they didn't have the support from charity, even for food (...). We have realized that we needed to know exactly who they were and what they needed, in order to provide some sort of support.” (P7, 39y/o, Municipal Authority of Emergency and Civil Protection)

Cognitive factors regarding biological risk management, such as the “*Knowledge*” ($n = 8$, 8.99%) about the COVID-19 and other biological hazards, was considered critical

by the interviewed. Indeed, the lack of knowledge was pointed out to significantly hinder the response to a pandemic. Especially, the lack of knowledge and accurate information about the nature, transmission, and severity of the disease; which may have led to misconceptions and misinformation and, in turn, and overall underestimation of the risks posed by the pandemic. Based on this predicament, identified during the pandemic, some interviewed pointed out few future directions towards increasing the Civil Protection knowledge about biological hazards.

“(…) the scientific and academic community is constantly moving and will never stop. I believe that we, here in Civil Protection, sometimes compare the issue of COVID-19 with rural fires. Many people have been studying rural fires for decades, but no one has ever come to an effective conclusion that produces results (...). Similarly, to rural fires, we felt a lack of science-based information on this COVID-19 issue (...). There was nothing.” (P2, 39y/o, National Command of Emergency and Civil Protection)

“(…) continuous training and information. Here is the solution. We are talking about training the agents themselves or empowering the civil protection agents to respond to a biological hazard” (P10, 45y/o, 45y/o, Municipal Authority of Emergency and Civil Protection)

Surprisingly, “*Institutional Distrust*” ($n = 5$, 5.62%) had occasionally emerged from the participants’ discourses. From the gathered data, it was possible to ascertain a lack of confidence, skepticism, or suspicion towards institutions and organizations responsible for handling and managing the pandemic, such as public health agencies and government bodies (at a national level). It was verified a belief or perception that these institutions may not have acted in the best interest of the public or may have hidden agendas, leading to a breakdown of trust and credibility from the Civil Protection.

“(…) even from the part of doctors and pediatricians, there was a lot of resistance. Some of them stated to be against decontamination or even vaccination. They did not agree with a series of actions. And when we such persons who did not agree with all of this... then, who may we believe?” (P9, 51y/o, Municipal Authority of Emergency and Civil Protection)

“We had several institutions that were not prepared at all or didn’t know how to respond to this. Like our health delegates. Can you imagine? They were trained for other types of actions and we did not have a sufficient number of health delegates to respond to all the

municipalities. And then there was nothing prepared in terms of work methodology to respond. Another troubling institution was Social Security. They don't have enough technicians and the dynamism required to respond this situation. This was so obvious.” (P7, 39y/o, Municipal Authority of Emergency and Civil Protection)

Risk Culture

Even though was not the objective of this study, and thus was not covered in the interview guide, unavoidably, a substantially criticized matter, within the Portuguese society, was the lack of “*Risk Culture*” ($n = 11$, 9,1%). Commonly, the interviewed referred to a societal mindset in which risks, regardless the type (e.g., natural, biological), are not acknowledged, understood, and effectively managed by the society in general, and citizens in particular. As ascertained from the gathered narratives, this lack of risk culture comes to difficult the actions that are expected to be implemented by civil protection agents. Within this matter, few participants even pointed out that schools would have a critical role at enhancing a risk culture in Portugal, by creating environments that promotes risk awareness, responsible decision-making, and proactive risk management among students.

“We are a people very resistant to change and we have always got used to the idea that things only happen to others (...). This is related to our security culture.” (P9, 51y/o, Municipal Authority of Emergency and Civil Protection)

“It seems to me that people have learned to live with risk and normalized it, as if it was a distant thing. COVID-19 no longer exist in people's collective memory (...) because we do not have as a society or culture of risk.” (P13, 43y/o, Civil Protection Agent)

“It is our society that still lacks culture. Better saying we are not culturally prepared to receive this information with the importance that it has [referring to biological risks]. Therefore, people don't have any awareness towards risks and thus towards of our role [referring to the Civil Protection's role] in mitigating them.” (P2, 39y/o, National Command of Emergency and Civil Protection)

“What we all lack? The implementation of a program, in my opinion, in schools. This must start at the school level and then progressively be extended to other layers of society. It's not about legislation, it's not about rules, it's about projecting them into people, isn't it?” (P2, 39y/o, National Command of Emergency and Civil Protection)

4.2. Quantitative study results

4.2.1. Preparedness, perception about COVID-19 risk management and lessons learnt

Results from the paired-sample *t*-test demonstrate that participants consider that, at the moment, the Civil Protection is by far more prepared to respond to future health emergencies ($M = 6.82$, $SP = 2.09$), rather than it was to respond to the COVID-19 emergency ($M = 5.25$, $SP = 2.35$), $t(261) = -12.95$, $p < 0.001$.

In order to compute independent sample Student's *t*-tests, it was considered the actors without a decision-making role, this is civil protection agents ($n = 149$, 56.9%) and the actors with a decision-making role ($n = 113$, 43.1%), which are agents from the National Command of Emergency and Civil Protection, Municipal Authority of Emergency and Civil Protection, and Regional Command of Civil Protection Service from Madeira. The abovementioned statistical test was employed to ascertain whether there are differences between civil protection agents and actors with a decision-making role regarding their perception about the level of Civil Protection's preparedness to respond to COVID-19 and future pandemics; perception about COVID-19 risk management; and the lessons learnt for future biological risk management.

Considering the perception of the level of Civil Protection preparedness to respond to the COVID-19 pandemic, it was not identified significant differences between civil protection agents ($M = 5.09$, $SP = 2.50$) and actors with a decision-making role ($M = 5.46$, $SP = 2.12$), $t(260) = 1.28$, $p = 0.20$. In turn, when it comes to the preparedness to respond to future health emergencies, the actors with a decision-making role consider that the Civil Protection is by far more prepared to respond to future epidemics/pandemics ($M = 7.43$, $SP = 1.55$), than the civil protection agents ($M = 6.36$, $SP = 2.32$), $t(260) = 4.24$, $p < 0.001$.

With regard to participants' perception about COVID-19 risk management, it was found significant differences between civil protection agents and actors with a decision-making role, $t(260) = 2.73$, $p = 0.007$. In other words, those actors with a decision-making role ($M = 3.51$, $SP = 0.71$) consider that the pandemic risk management quality was better comparing to the civil protection agents ($M = 3.22$, $SP = 0.92$).

Concerning the level of lessons learnt for future biological risk management, it was not ascertained significant differences between civil protection agents ($M = 3.96$, $SP =$

0.60) and actors with a decision-making role ($M = 4.04$, $SP = 0.48$), $t(260) = 1.04$, $p = 0.30$.

4.2.2. Psychosocial dimensions of biological risk management

Similarly, to the previous topic, Student's t-tests were employed to ascertain whether there are differences between civil protection agents and actors with a decision-making role regarding the psychosocial dimensions of biological risk management, specifically regarding risk perception, emotional states (i.e. worry), trust and individual preparedness.

Concerning biological risk perception, it was not ascertained significant differences between civil protection agents ($M = 4.08$, $SP = 0.77$) and actors with a decision-making role ($M = 4.06$, $SP = 0.76$), $t(260) = -0.22$, $p = 0.83$. In other word, both groups appear to have similar levels of risk perception towards the potential occurrence of a biological hazard. Moreover, a deeper inspection of the descriptive statistics obtained for this construct reveal that both groups appear to have high levels of biological risk perception, $M = 4.06 - 4.08$.

With regard to emotional states, specifically worry, it was also not ascertained significant differences between civil protection agents ($M = 3.97$, $SP = 0.91$) and actors with a decision-making role ($M = 3.82$, $SP = 0.92$), $t(260) = -1.33$, $p = 0.18$.

Interestingly, significant differences were found between civil protection agents and actors with decision-making role regarding the levels of trust in the capacity of Civil Protection and Public Authorities to manage future biological risks, such as novel epidemic/pandemic outbreaks, $t(260) = 3.62$, $p < 0.001$. Indeed, it appears that civil protection agents have higher levels of distrust ($M = 3.40$, $SP = 0.96$) in Civil Protection and Public Authorities, when compared with actors with decision-making role, who demonstrated higher levels of trust in these institutions ($M = 3.81$, $SP = 0.81$).

Finally, when it comes to individual preparedness to manage potential future epidemic/outbreaks, both groups obtained similar results (civil protection agents: $M = 4.16$, $SP = 0.71$; actors with decision-making role: $M = 4.17$, $SP = 0.61$), which means that it was not found significant differences on individual preparedness, $t(260) = 0.08$, $p = 0.93$.

To ascertain the predictors of individual preparedness for future biological risks, the individual preparedness was modelled, using a multiple regression model, taking into account the following exogenous variables: risk perception, worry, and trust. The adjusted model to individual preparedness regarding the imputed exogenous variables explains 32%

of the variability of individual preparedness to future biological risks ($R^2 = 0.32, p < 0.001$). The paths ‘Risk perception → Individual preparedness’ ($\beta = 0.19, p = 0.002$), ‘Worry → Individual preparedness’ ($\beta = 0.24, p < 0.001$) and ‘Trust → Individual preparedness’ ($\beta = 0.11, p = 0.004$) are statistically significant. With exception for risk perception and worry, which demonstrated a significant correlation, $r = 0.48, p < 0.001$, the remaining predictors do not correlate significantly. To sum up, risk perception, worry and trust are significant predictors of individual preparedness for future biological risks. A deeper inspection of the obtained standardized regression coefficients, reveals that emotional states, this is, worry (i.e., $\beta = 0.24, p < 0.001$), are the strongest predictor individual preparedness for future biological risks. The multiple linear regression model between ‘Individual preparedness’ and the predictor variables and its results is displayed in Figure 6.

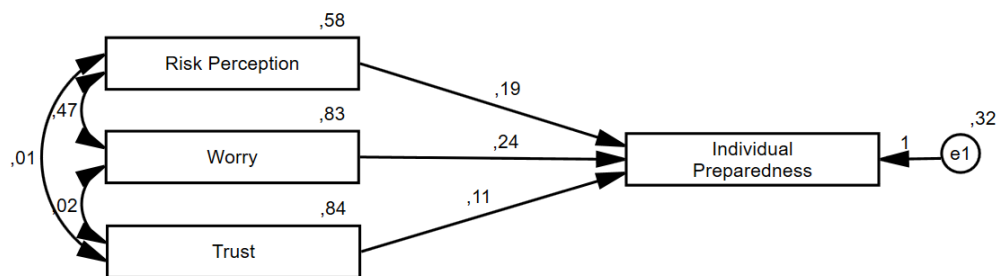


Figure 6. Multiple linear regression model between ‘Individual preparedness’ and the predictor variables.

4.2.3. Predictors of Civil Protection preparedness for future biological risks

To ascertain the predictors of Civil Protection preparedness for future biological risks, Preparedness was modelled, using two multiple regression model, taking into account the following exogenous variables: perception about COVID-19 risk management and lessons learnt (model 1); and risk perception, emotional states (i.e., worry), trust and individual preparedness (model 2).

Model 1 explains 58% of the variability of Civil Protection preparedness for future biological risks ($R^2 = 0.58, p < 0.001$). Both paths ‘Perception about COVID-19 risk management → Civil Protection preparedness’ ($\beta = 0.46, p < 0.001$) and ‘Lessons learnt → Civil Protection preparedness’ ($\beta = 0.26, p < 0.001$) revealed to be statically significant. Furthermore, the correlation between predictor variables is also significant, $r = 0.54, p < 0.001$. The obtained results from model 1, demonstrate that both the perception about COVID-19 risk management and the lessons learnt

are predictors of Civil Protection preparedness for future biological risks. A deeper inspection of the obtained standardized regression coefficients demonstrates that COVID-19 risk management is a stronger predictor of Civil Protection Preparedness, when compared to the lessons learnt. The multiple linear regression model between ‘Civil Protection preparedness’ and the predictor variables and its results is displayed in Figure 7.

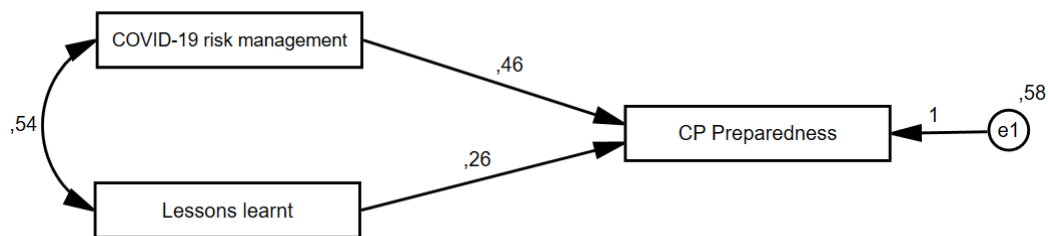


Figure 7. Multiple linear regression model between ‘Civil Protection preparedness’ and the predictor variables (model 1).

Model 2 explains 60% of the variability of Civil Protection preparedness for future biological risks ($R^2 = 0.60$, $p < 0.001$). However, only the path ‘Trust → Civil Protection Preparedness’ ($\beta = 0.67$, $p < 0.001$) revealed to be statistically significant. In other words, from the individual variables imputed in the model, only trust in institutional capacity to manage future biological risks reveals to be a strong predictor of Civil Protection preparedness. The multiple linear regression model between ‘Civil Protection preparedness’ and the individual-level predictor variables and its results is displayed in Figure 8.

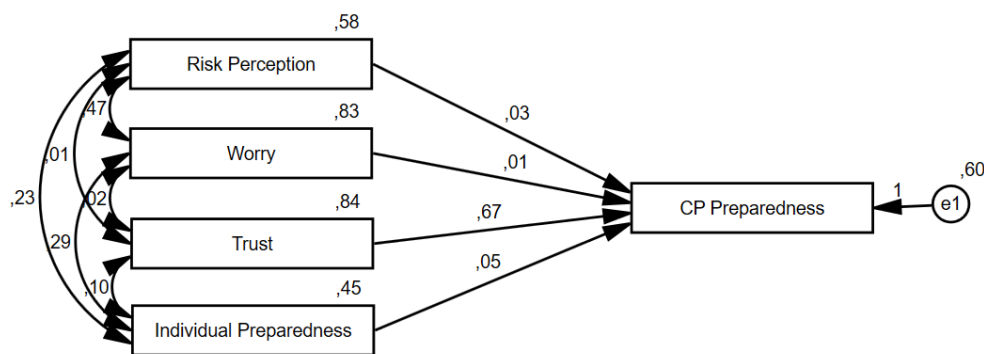


Figure 8. Multiple linear regression model between ‘Civil Protection preparedness’ and the individual-level predictor variables (model 2).

5. Discussion

In order to combine the findings from both the quantitative (i.e., QUAN) and qualitative (i.e., QUAL) studies, a matrix of the most prominent results was developed, following the guidelines suggested by Guest and Fleming (2015). Three core themes emerged from the quantitative and qualitative results' triangulation, whose discussion will be centred on the most prominent evidence. The matrix of data mixing for the role of Civil Protection on biological risk management is presented in Table 3.

Table 3. Matrix of data mixing for the role of Civil Protection on biological risk management

Core themes and subthemes	QUAL results	QUAN results
<i>COVID-19 emergency management</i>		
Predicaments	Unarticulated COVID-19 management & Response; Ambiguity and Conflict; Lack of preparedness	Perceived better COVID-19 management and response by actors with a decision-making role, when compared to civil protection agents.
<i>Future directions for biological risk management</i>		
Participatory processes	Acknowledgement of the importance of implementing participatory processes of biological risk management, in order to ensure that decisions align with local contexts, values, and priorities, increasing the likelihood of effective risk management strategies.	-
Preparedness	Sense of unpreparedness, due to lack of information and training.	Perceived greater preparedness for future biological risk management among actors with a decision-making role. Perceived unpreparedness for future biological risk management among civil protection agents.
<i>Capacity building</i>		
Emotional regulation	High levels of stress, burnout and anxiety ↓ Implementation of coping-based interventions in times of public health crisis.*	Specific emotional states, such as worry, as significant predictor of individuals' preparedness for biological risks. ↓ Development of tailored communication to enhance worry states and thus greater awareness regarding biological risks.*

Risk perception	High levels of risk perception towards the occurrence of a novel epidemic/pandemic outbreak ↓ Implementation of strategies (e.g., continuous training) to sustain individuals' risk perception; Foster a Risk Culture, focused in biological risks.*	Risk perception as significant predictor of individuals' preparedness for biological risks. ↓ Implementation of strategies to sustain individuals' risk perception and thus preparedness for the potential occurrence of a novel epidemic/pandemic outbreak.*
Trust building	Importance of implementing trust building strategies, for instance through inclusive and deliberative decision-making processes.	

*Practical implications derived from the obtained results

As widely acknowledged by the scientific community, the COVID-19 pandemic “*was neither unpredictable nor unforeseen*” (Collins et al., 2020, p. 1073). Although the scientific community's efforts to warn humanity for the heightened risk for such biological disaster, a sense of complacency about public health risks has prevailed among the society, and worrisomely among governments and public institutions or organizations with a crucial role in managing biological risks (Collins et al., 2020; Forman et al., 2022). Consequently, when the COVID-19 crisis erupted, risk managers (e.g., policymakers, public health authorities) were blind-sided which resulted in an overall failure to contain the spread of the virus across the world (Collins et al., 2020) and, dramatically, to the date, in almost seven million fatalities (World Health Organization, 2023). Several *tragic* decisions were taken in the midst of the pandemic, revealing the obvious uncoordinated strategies that world organizations, national governments and institutions, were implementing to respond to such a disaster. To begin with, and as pointed out by Larionova and Kirton (2020, p. 9), “*as the central multilateral organization for health, the WHO (...) was slow to act*”. As argued by the authors, the World Health Organization had been alerted to a potential novel virus by the Chinese authorities on the 31st of December, 2019. It was needed more than three months, more than 170.000 confirmed cases, more than 8300 confirmed deaths and the worldwide spread of the virus (e.g., > 120.000 confirmed cases in Europe) (World Health Organization, 2023), for the formal declaration from WHO, in which was stated that COVID-19 was a pandemic, on the 11th of March, 2020 (Larionova & Kirton, 2020). Unfortunately, the lack of timely and concerted measures was not only verified at a world organizations level. It probably remains in our collective memory when the former United States President, Donald Trump promised the virus would “magically disappear” despite the warnings from the scientific community and public health authorities (Comfort et al.,

2020; Glenn et al., 2020). Trump's leadership in establishing consistency and national consensus in response to the pandemic resulted in a disastrous impact for the country (Kapucu & Moynihan, 2021). Similarly, the United Kingdom faced several notable failures in its management of COVID-19, such as the implementation of delayed lockdown measures; the insufficient preparedness that resulted in shortages and inadequate distribution of personal protective equipment (PPE) for healthcare workers; and a dysfunctional communication strategy with mixed messaging and confusion, such as changes in guidance on mask usage and conflicting advice on social distancing (Frowde et al., 2020). Portugal, like many other countries, also faced challenges in managing the COVID-19 pandemic. Indeed, as argued by Correia et al. (2022, p. 10), *"the crisis management that followed the COVID-19 resulted in distinctive solutions by the central and regional authorities, often leading to unarticulated responses within the same country"*. Aligned with the authors (cf. Correia et al., 2022), results from this study clearly come to corroborate that the COVID-19 crisis management was unarticulated, especially within the Civil Protection. Results from both the qualitative and quantitative studies, demonstrate that there was a general sense, among the participants, that the COVID-19 management had several remarkable failures that compromised the smooth response of Civil Protection. According to the interviewed key areas where shortcomings occurred were related to the coordination and collaboration with other stakeholders (e.g., Public Health Authorities, Social Security), and the lack of preparedness.

With regard to the pointed out challenges concerning to the collaborative management of the COVID-19 crisis, these results may well be explained by the characteristics of the COVID-19 risk *per se*, i.e., a combination of high complexity, uncertainty and ambiguity (cf. Renn, 2015). Therefore, and ideally, when hard policy choices and trade-offs were established during the pandemic, it would be important to set up systems that could provide for open and inclusive decision-making in an institutionalized manner rather than as *ad hoc* efforts (Norheim et al., 2021). However, what was verified in the context of the COVID-19 crisis, the pace of the infection's spread was a key constraint in the risk management and decision-making processes, making policymakers and public authorities to decide on unprecedented mass restrictions at great speed, under ongoing uncertainty and based only in the knowledge that the cost of failure could be translated in a very high numbers of deaths (Collins et al., 2020). With daily rising death tolls, and the subsequent time pressure, it is not surprising that was not possible to properly implement an analytic-deliberative model of stakeholder involvement, based on a

broader deliberation (cf. Renn, 2015). The inability of implementing an analytic-deliberative model of stakeholder involvement, by including a broad range of stakeholders (e.g., civil protection agents) in COVID-19 crisis management, was clearly ascertained from participants' narratives. It was pretty clear that the interviewed members of Civil Protection consider that the taken decisions did not adequately address the needs and concerns of the Civil Protection (which was considered underrepresented on the decision-making processes) and those unclear decisions were based on limited information or incomplete understanding of the role and capacity of Civil Protection regarding the response to the COVID-19 crisis. Furthermore, the articulation between Civil Protection and other public institutions (e.g., Public Health Authorities, Social Security) was broadly considered problematic. In line with the gathered evidence, Leiras and Martins (2020) have concluded that the cooperation between Civil Protection and Public Health Authorities was severely lacking, as it could be ascertained from an analysis of the existing Districtal Emergency Plans. Moreover, in an early phase of the pandemic, the articulation between the Civil Protection, the General Directorate of Health and the National Health System was pointed out to be diffuse, which may have hindered the smooth action of other public institutions (e.g., Armed Forces) (Reis, 2021).

As a result of the poor cooperation between the Civil Protection and other public institutions, institutional conflicts have emerged, as stated by the interviewed. Those conflicts were especially related to jurisdictional disputes, i.e., when different public institutions had overlapping responsibilities and jurisdictions. To illustrate, and as widely mentioned by the interviewed participants, the illegal elderly nursing homes in the district posed a major challenge to Civil Protection that, after multiple attempts to collaborate with Social Security in order to find a solution for these care homes, turned out to respond without any formal guidance from this public authority. In fact, in an early phase of the pandemic, was up to the Civil Protection (from the Santarém district) to identify the elderly nursing homes that were operating without proper licenses or registration, thus, circumventing regulatory frameworks; to provide personal protective equipment and the standard sanitary conditions, by implementing disinfection campaigns; and to identify COVID-19 positive cases and, in case of need, transfer patients to the hospital (cf. *Jornal Expresso*, 2020, May 27; Veiga, 2020).

Besides the emergence of conflicts between the involved stakeholders in the pandemic management, the absence of participatory processes of COVID-19 risk management may well have contributed to the verified diminished legitimacy and trust in

the public institutions to respond to biological risks, as ascertained in this study. Indeed, as well established in literature, excluding stakeholders from decision-making processes can erode trust and legitimacy in public authorities (Norheim et al., 2021). From the gathered narratives, the interviewed perceived decisions as arbitrary, biased, or unresponsive to the Civil Protection's best interests. This could have led to skepticism and resistance among the participants from this study that, at the moment, appear to perceive that both public authorities and the Civil Protection do not have the capacity to respond to future biological hazards. At this point, it is worth mentioning that the eroded trust in public authorities and in Civil Protection structure itself was not found homogeneously among the participants in this study. Interestingly, higher levels of distrust were found between civil protection agents, when compared to actors that within the Civil Protection structure have a decision-making role. These results may relate to several factors. For instance, actors with a decision-making role may have access to a broader range of information (e.g., scientific data, expert advice, internal government assessments), which may provide a more nuanced understanding of the challenges, trade-offs, and complexities involving biological risk management (Head, 2015). Moreover, actors with a decision-making role have the responsibility of balancing various priorities, including civil protection emergency response, resources' administration and allocation, and follow political or regulatory frameworks. Therefore, their decisions are often guided by a broader set of factors beyond the biological emergency response *per se*, as probably expected by civil protection agents (Head, 2022). Another possible factor explaining these results may relate to a defensiveness posture from these actors with a decision-making role. Indeed, they are often accountable for their actions and may be defensive about their choices. This attitude may lead to a tendency to emphasize positive outcomes and downplay failures or criticisms (Lerner et al., 2015). In turn, civil protection agents may have less vested interest in defending decisions and can freely express their concerns and assessments regarding the Civil Protection structure and dynamics.

Building trust in Civil Protection management structures, among civil protection agents is crucial for the legitimacy of those structures and will unavoidably facilitate the effective implementation of measures and guidelines regarding civil protection agents' actions. Moreover, agents trust in Civil Protection management structures is particularly crucial during times of crisis. Agents' trust enables the Civil Protection to effectively respond and manage a potential novel health public crisis, as it was COVID-19. When civil protection agents trust that the Civil Protection management structures is acting in their

best interest, they are more likely to follow guidelines, cooperate with measures, and support mitigation efforts. For the given reasons, building trust among civil protection agents is of utmost importance, and will necessarily require a combination of strategies aimed at fostering transparency, communication, fairness, and accountability. Once again, even within Civil Protection, inclusive and deliberative decision-making processes may be a valuable tool to enhance civil protection agents' trust in the organization capacity to manage future biological risks. According to Norheim et al. (2021), three strategies may be implemented, such as: inclusive deliberative bodies; hearings to gather relevant insights from civil protection agents; and open, self-selective public participation mechanisms.

Another prominent issue emerged from the qualitative results and further confirmed in the quantitative study, was the Civil Protection's preparedness to manage future biological risks. As argued by Kingdon (2003), crises as focusing events – such as the COVID-19 pandemic – provide a window of opportunity for lesson drawing and learning to make changes to improve decision-making. Such lesson-drawing was not that apparent from the gathered evidence. In fact, from the quantitative study, it was possible to ascertain that, in general, the respondents consider that the Civil Protection is now, by far, more prepared to respond to future biological risks, rather than it was at the onset of the COVID-19 pandemic. A deeper inspection of the quantitative data comes to demonstrate, once again, that when compared with actors with a decision-making role, civil protection agents consider that the Civil Protection is unprepared to manage future biological risks. Consistently, interviewed participants, in general, referred that the Civil Protection is deeply rooted in emergency response and thus tend to disregard other phases of disaster risk management, such as prevention, mitigation and preparedness. Notably, this perception among the interviewed is not aligned with the formally established roles for the Portuguese Civil Protection, which *“is responsible for planning, coordinating and executing civil protection policy, namely in the fields of prevention and response to major accidents and disasters, protection and relief of populations”* (European Commission, 2022). This is, Civil Protection has much broader roles, beyond providing emergency responses in case of major accidents and disasters, such as rural fires, for which, the Civil Protection, may well be considered the protagonist on this hazard management, even regarding preparedness, i.e., *“Wildfire-related activities are very advanced. They [referring to the Civil Protection] make use of additional data and advanced assessment methodologies that translate into dedicated forest and fuel management plans, based on a grid structure.”* (European Commission, 2019, p. 53).

This evidence is somehow preoccupying, considering that, beyond a reasonable doubt, the emergence of novel infectious diseases or the re-emergence of previously known diseases with a few mutations is very likely to take place in a near future (Behl et al., 2022; Choudhary et al., 2022). Therefore, there is a scientific consensus claiming for a global preparedness against future pandemics (Behl et al., 2022; Choudhary et al., 2022; Cueni, 2023; Edwards et al., 2022; Forman et al., 2022); which apparently comes to defy the internal dynamics and priorities of the Portuguese Civil Protection. As argued by Clancy et al. (2021), more than ever before, preparedness must begin to signify the ability to rapidly develop and deploy a dynamic and responsive action plan to meet the emerging challenges, such as biological disasters (e.g., regional outbreaks and epidemics, global pandemics). According to the author, an innovative and smart preparedness strategy should enable local flexibility to tailor responses matched with local threats, needs, and assets while accounting for the risk of emerging infectious diseases globally (Clancy et al., 2021). The dynamism, responsiveness and flexibility needed to be prepared and respond to novel biological disasters were not acknowledged by this study's participants. Instead, the sense of unpreparedness towards the management of future biological risks among these civil protection agents has become apparent, raising important questions about the readiness of our emergency response systems and the urgent need for comprehensive preparedness strategies.

One of the key factors contributing to the sense of unpreparedness among first civil protection agents is the lack of specific training on biological hazards risk management. While emergency response personnel undergo rigorous training for a wide range of disasters and emergencies (e.g., rural fires), as above-mentioned, novel epidemics or pandemics present unique challenges that demand specialized knowledge and skills (Marion et al., 2022). The rapidly evolving nature of these outbreaks, the infectious nature of the pathogens involved, and the complex logistics of managing large-scale outbreaks require tailored training programs (Marion et al., 2022) that go beyond standard emergency response protocols.

Another critical aspect impacting the preparedness of civil protection agents is the shortage of necessary resources and equipment. In the face of a novel pandemic, the demand for personal protective equipment and other essential resources surges, often overwhelming the existing stockpiles. In fact, it is outstanding how the COVID-19 pandemic tested the resilience and robustness of supply chains, with several public entities experiencing severe and prolonged shortages of personal protective equipment (Sodhi et

al., 2021). It was the case of the Civil Protection that, when facing a shortage of personal protective equipment, faced major challenges on giving continuity to its emergency response (e.g., transporting patients to the hospitals), whilst exposing their agents to a heightened risk of being infected with the SARS-CoV-2 virus (e.g., Jornal Expresso, 2020, March 26). It is thus obvious that the scarcity of these resources compromises the safety and effectiveness of civil protection agents, making them susceptible to infection and hindering their ability to provide optimal care. Drawing from the lessons learned from the COVID-19 pandemic, an adequate resource allocation and proactive measures to maintain sufficient stockpiles are essential (Sodhi et al., 2021) to enhance Civil Protection preparedness to manage future biological risks.

Another factor undermining Civil Protection's preparedness for future biological risks may be related to communication and coordination challenges. Indeed, major emergencies and crises – such as public health emergencies – require action from all levels of government (i.e., at a national, municipal and local levels) and the involvement of numerous organizations from other public institutions and from private and nonprofit sectors (Kapucu & Hu, 2022). Therefore, an effective communication and coordination among different response agencies is vital during an epidemic or pandemic outbreak. However, as it could be ascertained from the interviewed discourses, the Civil Protection frequently faced challenges in establishing seamless communication networks and coordinated efforts, especially with other public institutions. The lack of interoperability among different emergency response systems, insufficient information sharing, and limited collaboration between healthcare and public safety sectors hinder the collective response to a novel outbreak (Clancy et al., 2021). Therefore, enhancing communication infrastructure, promoting cross-agency cooperation, and streamlining information sharing protocols are essential for improving preparedness and response coordination towards novel biological risks, thus enhancing Civil Protection preparedness for a novel epidemic or pandemic outbreak.

Finally, one could argue, that the sense of unpreparedness among civil protection agents is not limited to logistical or technical aspects. The psychological and emotional toll of confronting a novel pandemic can be overwhelming, which, in the words of one interviewed civil protection agent, *“is another thing that nobody talks about”* (P12, 29 y/o). The uncertainties, high caseloads, personal risks, and witnessing the suffering and loss of life can take a severe toll on the mental well-being of frontline responders, such as civil protection agents. At this level, research has demonstrated that frontline personnel, in

general, felt largely unprotected and stigmatized with being a frontline during the pandemic, whilst experiencing depression, generalized anxiety symptoms, post-traumatic stress, emotional exhaustion and rampant burnout (Hendrickson et al., 2021; Robertson et al., 2020; Shah et al., 2022; Zolnikov & Furio, 2020). What is more, and specifically concerning civil protection agents, it is worth-mentioning that prehospital settings, subject these agents to constant emotional strain. According to Alanazi (2012) and Khan et al. (2020), in *normal* circumstances, stress levels among these workers can range from 6% to 80%. Indeed, as argued by Al-Wathinani et al. (2023, p. 1-2), “*unpredictable environments, as well as daily and cumulative trauma contribute to mental distress and psychological injury among ambulance personnel (...) involved in prehospital or interhospital transport of patients requiring emergency care or life support services*”. Despite the inexistence of evidence regarding the levels of stress experienced by civil protection agents during the pandemic, one may infer that these agents would have experienced severe levels of stress, when comparing with the results reported by Alanazi (2012) and Khan et al. (2020) (developed in *normal* circumstances), and from the interviewed narratives. Therefore, and not surprisingly, future recommendations towards enhancing mental health support targeting frontline personnel in health emergency crises are emerging in scientific literature (e.g., Al-Wathinani et al., 2023; Novilla et al., 2023; Wiedermann et al., 2023). Those recommendations include addressing the psychological needs of first responders through comprehensive support systems, including mental health services and support targeting individual-level factors like resilience, and emotion regulation skills and peer support programs, in order to enhance frontline workers preparedness and effective response to novel epidemics or pandemics (Al-Wathinani et al., 2023; Araujo et al., 2022; Fino et al., 2021; Henshall et al., 2022; Kaye-Kauderer et al., 2021; Novilla et al., 2023; Wiedermann et al., 2023).

Related to the latter, this study provided robust evidence that specific emotional states, such as worry, and risk perception are strong predictors of one's preparedness for biological risks. The predictor effect of worry and risk perception on preparedness for biological hazards is a complex interplay that shapes individuals' proactive behaviors (Gallego & Tejero, 2023). Worry acts as a motivational factor (Ekinci & Van Lange, 2023), while risk perception serves as a cognitive framework for understanding the potential risks (Li & Huang, 2022). Therefore, the above discussed measures to provide emotional regulation to civil protection agents would benefit from taking into account these psychological determinants to effectively promote preparedness and build resilience in the

face of biological hazards. By addressing worry and influencing risk perception, individuals can be empowered to take proactive measures, contributing to a more resilient Civil Protection prepared to mitigate the impact of future biological hazards.

Limitations and Future studies

This study has several limitations that must be underlined. The first limitation regards the sample itself. The gathered evidence results exclusively from the discourses and perceptions of Civil Protection's elements. Therefore, interpretation and extrapolation of the obtained results should be conducted with caution. Future studies are recommended to analyze the perspective of other stakeholders involved in the management of the COVID-19 pandemic, such as Public Health Authorities, healthcare professionals or even policymakers, in order to draw a more holistic outlook of the predicaments and accomplishments of the COVID-19 pandemic management in Portugal.

Another critical limitation of this study regards the sample sociodemographic characteristics. In both qualitative and quantitative studies, the samples were not gender-balanced, with a higher prevalence of male individuals. Even though this may be explained by the structure of the Civil Protection, which accounts for more men than women, future studies are strongly encouraged to employ a probability sampling method, e.g., stratified sampling, in order to gather data from gender-balanced samples.

Finally, evidence from this study was unable to empirically demonstrate the specific type of relationship (e.g., mediation, moderation) between the psychological features (e.g., risk perception, institutional trust) with participants' perception of Civil Protection's preparedness for biological risks. In this line, it is strongly encouraged future research to determine the social and psychological determinants of Civil Protection's preparedness for biological risks, in order to contribute to the design and implementation of tailored interventions and/or initiatives effective at augmenting this organization preparedness for future epidemic and pandemic outbreaks.

6. Conclusion

The findings of this study shed light on critical aspects of risk management for biological hazards in Portugal, particularly in the context of the COVID-19 pandemic. Civil Protection elements expressed concerns regarding the unarticulated COVID-19 risk management, emphasizing the need for inclusive and deliberative decision-making processes in future biological risk scenarios. These results highlight the importance of engaging multiple stakeholders and considering diverse perspectives to foster effective and comprehensive risk management strategies.

Furthermore, Civil Protection elements reported a worrisome sense of unpreparedness for future biological risk management. This finding underscores the pressing need for proactive measures to enhance preparedness, ensuring that response efforts are swift, coordinated, and adaptable to emerging biological threats. Investments in training targeting psychological features (e.g., risk perception, worry), resources, and infrastructure can bridge the gaps in preparedness and build resilience in the face of future biological hazards.

Importantly, institutional distrust emerged as a significant concern among civil protection agents. This indicates a lack of confidence in the efficacy and transparency of existing institutions responsible for managing biological risks, even in the Civil Protection structure itself. Addressing institutional distrust is crucial for fostering a collaborative and cooperative environment where effective risk management can thrive. Efforts should be made to enhance communication, transparency, and accountability to rebuild trust among civil protection agents and their organization and other public institutions.

In conclusion, this study highlights the need for a paradigm shift in biological risk management. Inclusive and deliberative decision-making processes should be prioritized to ensure that diverse perspectives are considered, leading to more robust and comprehensive risk management strategies. The sense of unpreparedness reported by civil protection agents requires urgent action to improve resources, training, and coordination for future biological risk events. Additionally, addressing institutional distrust is vital for fostering a conducive environment where collaboration and effective risk management can flourish. By addressing these key areas, Civil Protection can enhance its resilience and response capabilities and be better prepared to navigate the challenges of future biological hazards.

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Appendix 1

Interview Script (Portuguese Version)

Dados sociodemográficos

- (a) Sexo
- (b) Idade
- (c) Município onde exerce funções
- (d) Papel (e.g., presidente do município; membro do executivo)

Resposta institucional à SARS-CoV-2/Covid-19

- (1) Qual foi o papel da Proteção Civil na resposta à SARS-CoV-2/Covid-19?
- (2) Quais foram as medidas, ações, atividades, implementadas pela Proteção Civil por forma a responder à pandemia e, ao mesmo tempo, assegurar o bem-estar, segurança e qualidade de vida dos munícipes?
- (3) Como foi a colaboração/comunicação entre a Proteção Civil, municípios e agentes de saúde pública? Considera que a articulação entre os três organismos funcionou adequadamente para responder eficazmente à pandemia?
- (4) Quais as aprendizagens que retira relativamente à gestão e resposta à pandemia? O que implementaria de forma igual ou diferente, em caso de ocorrência de um novo surto epidémico/pandémico?

Perceção dos riscos biológicos

- (5) Na sua opinião, qual a probabilidade de ocorrência de um novo surto epidémico ou pandémico, nos próximos 5 anos?
- (6) Na sua opinião, quais os fatores de risco para a potencial ocorrência de um novo surto epidémico ou pandémico?
- (7) Quão preocupado se sente relativamente à potencial ocorrência de um novo surto epidémico ou pandémico? O que mais o preocupa; em particular no que diz respeito à resposta da Proteção Civil?

Gestão dos riscos biológicos

- (8) Considera que a Proteção Civil estaria preparada para responder a um novo surto epidémico/pandémico? Se sim/não, porquê?
- (9) Em caso de ameaça de ocorrência de um novo surto epidémico/pandémico, quais os procedimentos que a Proteção Civil adotaria?

(10) Em caso de ameaça de ocorrência de um novo surto epidêmico/pandêmico, através de que fontes/organismos, a Proteção Civil procuraria informar-se, antes de adotar quaisquer medidas de precaução ou prevenção?

(11) Em caso de ameaça de ocorrência de um novo surto epidêmico/pandêmico, a Proteção Civil, dispõe de planos a implementar com o objetivo de diminuir a exposição da comunidade ao risco?

(12) Em caso de uma óbvia exposição da comunidade a um novo surto epidêmico/pandêmico, a Proteção Civil dispõe de planos de prevenção para proteger a comunidade e acautelar a segurança e o bem-estar da comunidade; e.g., diminuir o risco de transmissão?

(13) Na sua opinião, e a par do governo central e autoridades públicas de saúde, a proteção civil deve participar no desenvolvimento de estratégias de gestão e resposta aos riscos de saúde pública? Porquê?

(14) Na sua opinião, quais as principais barreiras encontradas pela proteção civil relativamente à sua participação ativa no desenvolvimento de estratégias de gestão e resposta aos riscos de saúde pública? Que estratégia poderiam ser adotadas para diminuir essas barreiras?

Appendix 2

Informed Consent and Survey Questionnaire (Portuguese Version)

Consentimento Informado

O presente estudo insere-se num projeto de investigação desenvolvido no âmbito do Mestrado em Dinâmicas Sociais, Riscos Naturais e Tecnológicos da Faculdade de Economia da Universidade de Coimbra; e tem como objetivo principal **compreender o posicionamento e a opinião dos agentes da proteção civil relativamente à gestão da SARS-CoV-2/Covid-19 e futuros riscos biológicos.**

Dada a importância estratégica das estatísticas sobre relativamente à participação da Proteção Civil nos processos de gestão dos riscos biológicos, vimos pedir a sua colaboração no preenchimento do presente protocolo de investigação.

- Os dados recolhidos servem apenas propósitos científicos, não servindo a quaisquer propósitos comerciais e/ou governamentais.
- Não há quaisquer riscos ou custos relacionados com a sua participação no presente estudo.
- Garantimos o seu anonimato e a confidencialidade das suas respostas.
- O tempo de preenchimento do questionário é, em média, 3 minutos.

Antecipadamente, agradecemos a sua indispensável colaboração.

A equipa de investigação,

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Declaro que tenho mais de 18 anos e concordo em participar voluntariamente no estudo. Mais acrescento que fui informado/a sobre os objetivos da investigação de maneira clara e detalhada, tendo esclarecido as minhas dúvidas.

Data: ___/___/202__

O/A Participante:

(assinatura/rúbrica)

O/A Investigador:

(assinatura/rúbrica)

Questionário

(1) Género

Feminino

Masculino

Não Binário

(2) Nacionalidade

Portuguesa

Outra

Qual? _____

(3) Idade

Idade:

(4) Zona de residência

Norte

Algarve

Centro

Região Autónoma dos Açores

Lisboa e Vale do Tejo

Região Autónoma da Madeira

Alentejo

(5) Estado Civil

Solteiro/a

Divorciado/a

Casado/a

Viúvo/a

União de facto

(6) Escolaridade (*último nível avançado concluído*)

Ensino primário incompleto ou nulo

Licenciatura

Ensino Básico

Mestrado

Ensino Secundário

Doutoramento

(7) Função/Papel na Proteção Civil:

Comando Nacional de Emergência e Proteção Civil

Serviço Regional de Proteção Civil e Bombeiros dos Açores

Proteção Civil de âmbito Municipal

Serviço Regional de Proteção Civil da Madeira

Agente de proteção civil (e.g., bombeiro sapador ou voluntário)

Numa escala de 1 a 5, em que 1 significa “discordo totalmente” e 5 significa “concordo totalmente”, indique o quanto concorda com as seguintes afirmações.

	1	2	3	4	5
Gestão da SARS-CoV-2/Covid-19					
8. A Proteção Civil estava preparada para responder à pandemia da COVID-19.					
9. Existiu uma articulação eficaz entre as entidades competentes (e.g., proteção civil, autoridades de saúde pública, municípios) na gestão da pandemia.					
10. A Proteção Civil participou ativamente nos processos de tomada de decisão relacionados com a gestão da pandemia.					
11. Os planos de emergência existentes à época foram determinantes na resposta à pandemia.					
12. A Proteção Civil teve um importante papel na implementação de medidas de precaução e prevenção para minimizar a exposição da comunidade à COVID-19.					

	1	2	3	4	5
Gestão do risco biológico – Aprendizagens					
13. A par das autoridades públicas de saúde, a proteção civil deve participar no desenvolvimento de estratégias de gestão e resposta aos riscos de saúde pública.					
14. Além da resposta em caso de emergência de saúde pública, a proteção civil deverá ter um papel fundamental na prevenção e preparação para este tipo de risco.					
15. Os planos de emergência em caso de emergência de saúde pública foram reajustados após a pandemia da COVID-19.					
16. A proteção civil está preparada para responder eficaz e eficientemente a uma potencial emergência de saúde pública.					
17. No seu entender, difundiram-se novas técnicas de proteção civil, permitindo desenvolver uma nova consciência cívica no que diz respeito à capacitação das comunidades para riscos biológicos?					
18. Considera importante conhecer a vulnerabilidade dos atores, das estruturas, para desta forma se poder aplicar de modo correto o que é definido na fase de planeamento à fase da prática de socorro?					
19. Na sua opinião, a consciência social dos riscos biológicos, aliada à crescente intolerância subjetiva ao risco, faz com que seja cada vez mais importante o desenvolvimento de ações da proteção civil junto das populações?					
Dimensões Psicossociais					
20. A probabilidade de ocorrência de um novo surto epidemiológico/pandémico nos próximos 5 anos é elevada. (<i>Perceção do Risco</i>)					
21. Os riscos biológicos, particularmente surtos epidemiológicos/pandémicos, serão um problema muito sério para as gerações futuras. (<i>Perceção do Risco</i>)					
22. Preocupa-me bastante a potencial ocorrência de um novo surto epidemiológico/pandémico. (<i>Emoções - Preocupação</i>)					
23. Confio nas autoridades de saúde pública relativamente à sua capacidade de gestão de um potencial novo surto epidemiológico/pandémico. (<i>Confiança</i>)					
24. Confio na proteção civil relativamente à sua capacidade de gestão de um potencial novo surto epidemiológico/pandémico. (<i>Confiança</i>)					
25. Tenho receio que a curto-prazo tenhamos que enfrentar um novo surto epidemiológico/pandémico. (<i>Emoções - Preocupação</i>)					
26. Procuro informar-me sobre os riscos biológicos e possíveis medidas de prevenção e mitigação. (<i>Adaptação/Preparação</i>)					
27. Sinto que devo estar preparado/a para a ocorrência de um novo surto epidemiológico/pandémico. (<i>Adaptação/Preparação</i>)					

28. Numa escala de 1 a 10, em que 1 significa “Nada Preparada” e 10 “Extremamente Preparada”, na sua opinião, quão preparada estava a proteção civil para responder à pandemia da COVID-19?

1 2 3 4 5 6 7 8 9 10

29. Numa escala de 1 a 10, em que 1 significa “Nada Preparada” e 10 “Extremamente Preparada”, na sua opinião, quão preparada está a proteção civil para responder a um novo surto epidemiológico/pandémico?

1 2 3 4 5 6 7 8 9 10