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Healthcare Professionals' Experiences in Managing a Global Biological Disaster (COVID-19): A Phenomenological Study

Sağlık Profesyonellerinin Küresel Biyolojik Afeti (COVID-19) Yönetme Deneyimleri: Fenomenolojik Bir Çalışma

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ABSTRACT

With the COVID-19 biological disaster, it is important to evaluate the physical, psychological, and social needs of healthcare professionals whose working conditions have become more challenging and who operate under high-risk conditions. This study aims to detail the experiences of healthcare professionals before, during, and after a biological disaster, including individual and institutional preparations, challenges faced during disaster response, coping experiences, feelings at the end of the process, and demands for potential future biological disasters. This study was conducted using a phenomenological approach. Face-to-face interviews were carried out in the workplace with 15 volunteer healthcare professionals who were involved in responding to the COVID-19 global biological disaster. The interview was transcribed verbatim, coded, and significant statements were identified and themes were created. The coding process was conducted using the MAXQDA 2020 qualitative data analysis software to organize, categorize, and code the information. Healthcare professionals faced numerous challenges during the global biological disaster of COVID-19. Among the demands of healthcare professionals in responding to biological disasters are avoiding staff rotations, planning quarantine measures, improving working conditions, providing psychological support, ensuring accurate information, fostering professional specialization, and offering administrative support. Healthcare professionals with experience in biological disasters should be regarded as valuable human resources for future scenarios, and these experiences should be appropriately rewarded. Addressing the experiences of healthcare professionals holistically can enhance preparedness for biological disasters, contribute to the development of health policies, increase resilience, design appropriate responses, and identify necessary supportive strategies.

Key Words: Disaster management, Biological disaster, COVID-19, Healthcare professionals, Phenomenology

ÖZ

COVID-19 biyolojik afeti ile birlikte çalışma şartları zorlaşan ve yüksek risk altında çalışan sağlık profesyonelinin fiziksel, psikolojik ve sosyal ihtiyaçlarının değerlendirilmesi önemlidir. Bu çalışma, bireysel ve kurumsal hazırlıklar, afet müdahalesi sırasında karşılaşılan zorluklar, baş etme deneyimleri, sürecin sonunda hissedilen duygular ve gelecekteki olası biyolojik afetlere yönelik talepler dahil olmak üzere, sağlık çalışanlarının biyolojik bir afet öncesinde, sırasında ve sonrasındaki deneyimlerini detaylı bir şekilde incelemeyi amaçlamaktadır. Bu çalışma fenomenolojik bir yaklaşım kullanılarak gerçekleştirilmiştir. COVID-19 küresel biyolojik afetine müdahale eden 15 gönüllü sağlık profesyoneli ile iş yerinde yüz yüze görüşmeler yapılmıştır. Görüşmeler kelimesi kelimesine yazıya dökülmüş, kodlanmış, anlamlı ifadeler belirlenmiş ve temalar oluşturulmuştur. Kodlama süreci, verilerin düzenlenmesi, kategorize edilmesi ve kodlanması amacıyla MAXQDA 2020 nitel veri analizi yazılımı kullanılarak yürütülmüştür. COVID-19 küresel biyolojik afeti sırasında sağlık çalışanları çok sayıda zorlukla karşılaşmıştır. Biyolojik afetlere müdahalede bulunan sağlık çalışanlarının talepleri arasında personel rotasyonlarının önlenmesi, karantina önlemlerinin planlanması, çalışma koşullarının iyileştirilmesi, psikolojik desteğin sağlanması, doğru bilgilendirme yapılması, mesleki uzmanlaşmanın teşvik edilmesi ve idari desteğin sunulması yer almaktadır. Biyolojik afet deneyimine sahip sağlık çalışanları, gelecekteki senaryolar için değerli bir insan kaynağı olarak görülmeli ve bu deneyimler uygun şekilde ödüllendirilmelidir. Sağlık çalışanlarının deneyimlerinin bütüncül bir şekilde ele alınması, biyolojik afetlere hazırlığı artırabilir, sağlık politikalarının geliştirilmesine katkıda bulunabilir, dayanıklılığı artırabilir, uygun müdahalelerin tasarlanmasına yardımcı olabilir ve gerekli destekleyici stratejilerin belirlenmesini sağlayabilir.

Anahtar Kelimeler: Afet yönetimi, Biyolojik afet, COVID-19, Sağlık profesyonelleri, Fenomenoloji

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INTRODUCTION

In recent decades, the number of natural disasters causing significant loss of life and property worldwide has increased substantially (1). Factors such as poverty, lack of resources, lack of educational opportunities, increasing population density, poor infrastructure and lack of educated manpower, rapid urbanization, awareness of disasters or lack of preparedness play an important role in the major losses caused by disasters (2). In 2023, there were a total of 399 disasters caused by natural hazards, causing economic damage of approximately 202.7 billion dollars, affecting 93.1 million people and resulting in the death of 86,473 people (3).

One of the types of disasters that deeply affect societies is biological disasters. The National Disaster Management Authority of India, defines a biological disaster as 'scenarios involving widespread disease, disability, or death among humans, animals, and plants due to toxins or diseases caused by living organisms or their products (4). Biological disasters generally manifest as outbreaks or pandemics caused by microorganisms (bacteria, viruses, rickettsia, chlamydia, fungi, toxins) (5). Pandemics generally impact more people compared to other types of disasters and lead to social disruptions, economic losses, deterioration in health, and increased mortality (6).

In recent years, both the number and frequency of outbreaks and emerging infectious diseases have increased (7). The influenza H1N1 (2009) pandemic, the first pandemic of the 21st century, is estimated to have resulted in approximately 151,700 to 575,400 deaths (8). On March 11, 2020, the World Health Organization (WHO) declared the SARS-CoV-2 (COVID-19) pandemic (9). As of 22 November 2023, there have been over 772 million confirmed cases of the disease and 6.9 million people confirmed dead (10). Considering the number of affected individuals, the number of deaths either directly or indirectly attributable to the pandemic, its social and economic impacts, the COVID-19 pandemic has become as an extraordinary biological disaster (10, 11).

Biological disasters, cause longer-term and continuous deterioration compared to other disasters (11). Healthcare professionals play a crucial role in responding to biological disasters and mitigating their impacts (11-13). During the initial phase of the COVID-19 biological disaster, healthcare professionals faced a high risk of infection due to occupational exposures (14). Globally, a significant number of healthcare professionals became infected and lost their lives (15, 16).

Besides the risks of infection and death, healthcare professionals involved in responding to the COVID-19 biological disaster faced an unprecedented number of challenges in terms of occupational, social, psychological, physical, economic, transportation, housing, and nutritional aspects (15-17). These challenges necessitate a closer evaluation of the physical, psychological, and social needs of healthcare professionals who work under extremely stressful conditions and constitute a high-risk group (13). Besides to negative experiences, there is a need for holistic research that includes positive experiences and coping experiences (16, 18). Therefore, the stages before, during, and after the management of the COVID-19 biological disaster should be considered, and the experiences of healthcare professionals should be examined comprehensively.

This study aims to detail the experiences of healthcare professionals before, during, and after a biological disaster, including individual and institutional preparations, challenges faced during disaster response, coping experiences, feelings at the end of the process, and demands for potential future biological disasters. Considering the experiences of healthcare professionals during the COVID-19 biological disaster holistically will provide valuable insights for enhancing preparedness for future pandemic diseases that become biological disasters, developing health policies, increasing resilience, designing appropriate responses, and formulating necessary supportive strategies.

Research Questions

- What experiences did healthcare professionals have in the preparation process for biological disasters prior to the COVID-19 biological disaster?
- What experiences have health professionals had during and after the COVID-19 biological disaster?
- During the COVID-19 biological disaster, what coping strategies did healthcare professionals develop?
- Following the COVID-19 biological disaster, what do healthcare professionals expect and demand in their work and daily lives for more effective preparedness?

MATERIALS AND METHODS

Study Design

Research conducted using a phenomenological design aims to uncover individuals' interpretations, experiences, perceptions, emotions, and the cognitive structures in their minds regarding phenomena they have personally experienced (19). This study was designed in a phenomenological approach, as it aims to evaluate and understand the participants' experiences more deeply from their perspectives without adding any interpretation to the data obtained from the interviews.

Data Collection Technique and Tool

Semi-structured interviews allow participants to describe their perceived world in their own words (20). In this study, a semi-structured interview form and notes taken during the interview were used as they allow for a detailed description of the participant's experiences with a specific phenomenon. The researchers developed the interview form based on a literature review, peer feedback, expert opinions, and pilot interviews. The first section of the interview form, which consists of two parts, includes 10 questions regarding the socio-demographic characteristics of the participants, while the second section contains 13 questions related to their experiences (Table 1).

Table 1. Semi-Structured Interview Guide

Opening Questions	
1.	What does the concept of disaster mean to you? Could you explain your thoughts?
2.	What does the concept of biological disaster mean to you? Could you explain your thoughts?
Questions Regarding Experience	
3.	Can you describe how you felt when you first heard about the COVID-19 pandemic?
4.	After starting to work in the pandemic service, how did you cope with the process and adapt? Could you share your experiences?
5.	How were you psychologically affected during your time working in the pandemic service? Could you describe your experience?
6.	How were you physically affected during your time working in the pandemic service? Could you describe your experience?
7.	How were you socio-economically affected during your time working in the pandemic service? Could you describe your experience?
8.	What kinds of challenges have you encountered during your working hours? Can you provide examples of factors that have affected your performance?
9.	During your time working in pandemic services, did you or any of your loved ones contract COVID-19? If so, how did this situation affect you, and can you describe your experiences?"
10.	What does take on a task in biological disaster response make you feel?
Suggestions and Advice Question	
11.	As a healthcare professional during a biological disaster, is there anything you believe could have improved the management of the process if it had been implemented? Could you explain your thoughts?
12.	As a healthcare professional during a biological disaster process, is there something you believe would have improved the management of the process if it had been absent? Could you explain your thoughts?
13.	What would you think if you were to work in a pandemic service in your future professional career?

Study Group and Data Collection

The inclusion criteria for the study were as follows: (a) having worked or currently working in a COVID-19 unit for at least six months, (b) providing care to COVID-19 patients, and (c) volunteering to participate in the study.

This study employed a purposive sampling method. The working group were reached through both the administrators of the pandemic hospital and the referrals from the healthcare professionals interviewed. The interviews with participants who accepted the invitation to join were conducted face-to-face

and in the working environment. Additionally, collecting the data in the workplace allowed for field notes to be taken and for the data to be examined in its natural context. Participants were given time to prepare themselves, and the audio recording was started once they were ready.

There are no strict rules regarding sample size in qualitative research. Qualitative research typically focuses in-depth on relatively small samples, or even single cases (n = 1), chosen for a highly specific purpose (21). In his 2018 study, Creswell noted that an appropriate sample size for phenomenological research designs is between 3 and 10 participants (22). In this study, saturation was assessed after each interview, and decisions was made regarding the inclusion of new participants. In the last two interviews, no new findings were obtained, and the conclusions of the interviews were repeating previous ones. Therefore, the data collection process was concluded with the 15th participant. The shortest interview duration was 60.1 minutes, and the longest interview duration was 95.4 minutes.

Data Analysis

One of the methods frequently used for data analysis in phenomenological research is the Colaizzi (1978) method (23). In this study, Colaizzi's seven-step method was used for data analysis. These steps are: (a) transcribing the interviews recorded on the voice recorder verbatim and repeatedly reading the participants' statements; (b) extracting significant statements from each explanation; (c) formulating meanings from these significant statements; (d) organizing these formulated meanings into themes; (e) integrating the results of the data analysis into the description of the phenomenon under study; (f) sending the results to the participants for verification; and (g) incorporating any new, relevant data into the fundamental structure of the phenomenon.

The data analysis process of this research began with a literature review and continued throughout all stages. The interview was transcribed verbatim, coded, and significant statements were identified and themes were created. The coding process was conducted using the MAXQDA 2020 qualitative data analysis software to organize, categorize, and code the information.

Validity and Reliability

In this study, to ensure validity and reliability, the criteria of credibility, transferability, dependability, and confirmability as defined by Lincoln and Guba (1986) were considered (24). Several steps were taken to enhance the credibility of this research, long-term interaction with participants, deep focused data collection, expert review, comparison with existing literature, and participant confirmation. To ensure transferability, purposeful sampling was used to conduct interviews with healthcare professionals of varying ages, genders, educational levels, and clinical experiences. Significant statements and meanings were extracted, and two authors analyzed and coded the data to formulate categories; this further enhanced the dependability of the interview results. Measures were also taken to improve consistency, such as using a structured interview form, selecting appropriate research methods, maintaining a consistent writing style across sections of the article, and directly quoting participant statements. To ensure confirmability, the original interviews were followed and the participants' responses were presented directly.

Ethical Aspects of Study

Before starting this study, we obtained necessary permissions from the General Directorate of Health Services of the Ministry of Health (document number 2022-03-28T15_23_51, dated March 28, 2022). Ethical approval was granted by the Scientific Research and Publication Ethics Committee of Gümüşhane University (document number E-95674917-108.99-86712, dated March 23, 2022). Additionally, permission to conduct interviews with healthcare professionals was obtained from the Kütahya Provincial Health Directorate (document number E-19978298-604.02.99-

846, dated May 5, 2022). Written and verbal consent was obtained from the participants, and maximum effort was made throughout the research process to ensure participant confidentiality. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

RESULTS AND DISCUSSION

Of the participants, 14 are female and 1 is male; 10 are married and 5 are single. Of the participants, 4 live alone, while 11 live with their families. The participants' ages ranged from 24 to 49 years, with an average age of 35 years. The participants' socio-demographic characteristics were detailed in Table 2.

Table 2. Demographic and Individual Characteristics of the Study Group

1	2	3	4	5	6	7	8	9	10	11	12
P1	25-29	F	Unmarried	Associate degree	Nurse	Alone	1-5	Night shift	22-24	Twice	74.3
P2	45-49	F	Married	Licence	Midwife	Family	5-30	Night shift	22-24	Twice	70.1
P3	25-29	F	Unmarried	Associate degree	Nurse	Alone	5-10	Night shift	22-24	Once	74.4
P4	45-49	F	Married	Licence	Nurse	Family	25-30	Night shift	22-24	Once	91.2
P5	45-49	F	Unmarried	Licence	Nurse	Family	25-30	Night shift	22-24	Once	95.4
P6	25-29	F	Married	Licence	Nurse	Family	1-5	Night shift	18-20	Once	95.3
P7	35-39	F	Married	MSc	Nurse	Family	5-10	Day shift	22-24	Zero times	67.1
P8	40-45	M	Married	Secondary education	Nurse	Family	20-25	Night shift	20-22	Zero times	61.1
P9	20-25	F	Married	Associate degree	Nurse	Family	1-5	Night shift	12-14	Once	65.5
P10	25-29	F	Unmarried	Licence	Nurse	Alone	1-5	Night shift	22-24	Once	68.1
P11	45-49	F	Married	Licence	Midwife	Family	25-30	Night shift	22-24	Once	87.5
P12	35-39	F	Married	Licence	Nurse	Family	10-15	Night shift	22-24	Zero times	64.4
P13	25-29	F	Unmarried	Licence	Nurse	Family	1-5	Night shift	16-18	Twice	62.1
P14	25-29	F	Unmarried	Associate degree	Midwife	Alone	1-5	Night shift	22-24	Once	60.1
P15	45-49	F	Married	Licence	Nurse	Family	25-30	Night shift	22-24	Twice	63.3

1=Code, 2=Age, 3=Gender, 4=Marital situation, 5=Education status, 6=Duty, 7=Lifestyle, 8=Years of working, 9=Work setting, 10=Working experience in pandemic (months), 11=COVID-19 transmission to herself/himself, 12=Interview time (min)

Themes and Categories

In this study, the findings obtained from the content analysis of qualitative data are categorized under 3 main themes, 7 analytical themes, and 23 descriptive themes (Figure 1).

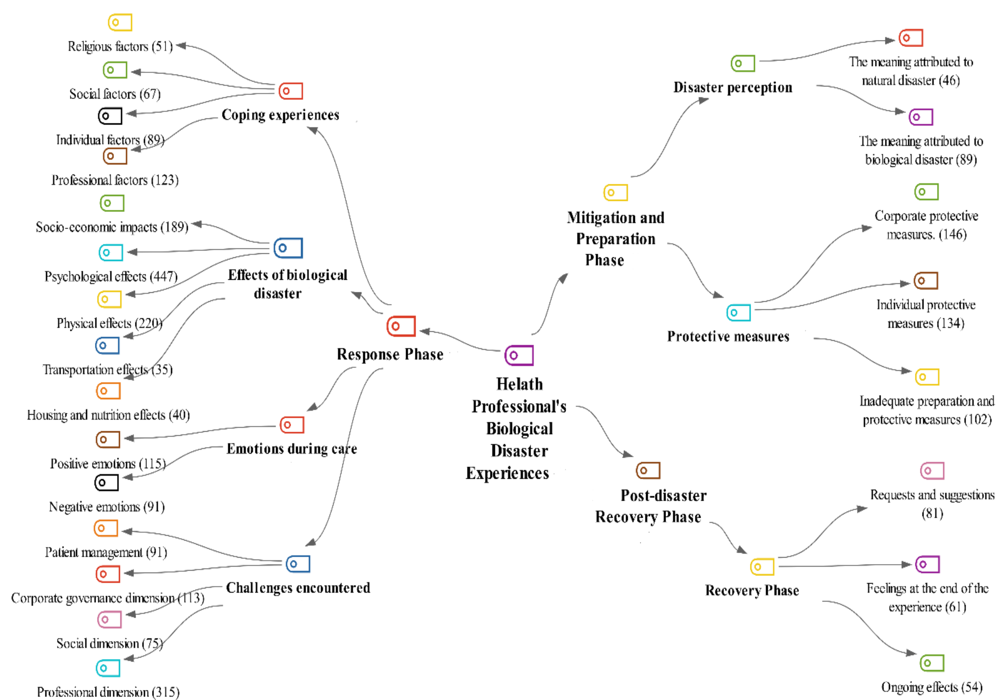

Figure 1. Main Theme, Analytic Themes, Descriptive Theme and Frekans

Frequency distributions of descriptive themes regarding the experiences of healthcare professionals during the COVID-19 biological disaster are presented (Figure 2).

Figure 2. The Code Cloud on Topics that Healthcare Professionals Focus on Most during Interviews

The findings presented in this discussionngs, which help us better understand healthcare professionals' preparations and deficiencies before the biological disaster, the impacts and emotions during the disaster, the challenges faced, coping experiences, and, their after disaster demands.

Main theme 1: Mitigation and Preparedness Phase

Mitigation and preparedness phase is one of the most important elements of disaster management, as it reduces the adverse impacts of disaster-related risks.

Analytical theme 1: Disaster Perception

In Türkiye, the most frequently occurring disasters include earthquakes, floods, landslides, avalanches, and rockfalls (25). In disasters or emergencies, feelings such as loss of life, fear, anxiety/panic, helplessness, sadness, uncertainty, the feeling of losing loved ones, and confusion are usually felt (26, 27). In our study, participants predominantly mentioned natural disasters such as earthquakes, floods, fires, and landslides, along with the negative emotions and impacts these disasters bring. When perceptions of biological disasters were examined, some of participants in the study by Dölek et al. stated that past epidemics reoccur in varying scales at certain intervals (27). Additionally, factors such as the uncertainty of the true natural reservoirs of Coronaviruses and suspicions of biological weapons (28) can lead to perceptions of human-caused and biological warfare. In our study, some participants considered the pandemic as a biological disaster, indicating that epidemics could be ongoing and part of nature's balance. The participants' opinions are as follows.

When the word disaster is mentioned, events like earthquakes and fires come to mind—emergencies that deeply impact and challenge society. For me, a disaster signifies panic, confusion, fear, and anxiety. (P5)

Tuberculosis is also a biological disaster in a way. It became an epidemic and many people died until a vaccine was found. COVID-19 is similar to it, being a biological disaster. (P3)

COVID-19 seems like a form of biological warfare... Yes, there is a virus, but it was presented as if it was disseminated from somewhere with different purposes. (P4)

Analytical theme 2: Protective Measures

During the COVID-19 biological disaster, healthcare professionals took additional individual measures to protect themselves and their families (29). Individually, they have taken measures such as proper use of personal protective equipment (PPE), washing clothes at high temperatures, consuming foods rich in vitamins and proteins and taking frequent showers (29-32). In our study, the primary individual measures taken by participants include isolation measures aimed at protecting both themselves and their families. They have stated that in addition to isolation measures, they pay attention to hygiene rules, take frequent showers, try to improve their sleep quality, and take nutritional and vitamin supplements to strengthen their immune systems. The participants' opinions are as follows:

We did not interact with many people outside of our family. I was careful not to make contact with others, not to socialize excessively, and to ensure that the children did not spend too much time outside. (P2)

We were taking vitamin supplements, calcium, and vitamin C daily. In addition, we were consuming a significant amount of protein. (P15)

Institutions such as hospitals have organized emergency services, inpatient services, and intensive care units, or some hospitals have been designated as pandemic hospitals. Additionally, structural arrangements have been made to isolate and quarantine patients, PPE has been prepared, new personnel have been hired, and training sessions have been conducted (33, 34). In our study, some participants mentioned that the institutional protective measures taken at the beginning of the pandemic were insufficient. However, it was noted that these deficiencies were quickly addressed, and overall, the protective measures taken by the institution were mentioned adequate. The participants' opinions are as follows:

There was an intense effort towards taking protective measures. Institutions had taken precautions regarding protective clothing, distancing, and isolation. (P1)

Even though there were times when the protective equipment was insufficient or inadequate, we did not experience significant difficulties during that period. (P4)

Although individual and institutional measures were taken, there were points where preparations and protective measures were insufficient. Some of these points include triage, isolation, infection prevention training and PPE, as well as a lack of information, personnel, infrastructure, and physical conditions (35-38). In our study, participants indicated that preparations were made only after the disease began to spread and cases were reported in Türkiye. One of the notable findings in our study is the late detection of the pandemic in Türkiye and the belief that the outbreak would remain confined to a limited area. This situation may have led to disruptions in preparations. Additionally, participants reported deficiencies in isolation, PPE, triage, training, and capacity. The participants' opinions are as follows:

Due to the lack of equipment, we had the opportunity to replace an N95 mask every 24 hours. (P9)

I do not think the provided training is sufficient... I thought that if it infected me, I would die anyway. I did not know what to do. (P14)

The triage and isolation was insufficient. Patients and healthy individuals were waiting together. (P9)

I predict that the disease was present in Türkiye before March. In December or January, we, as all the service nurses, had a very severe flu. (P11)

Main theme 2: Response Phase

Similar to other disasters, healthcare professionals play a key role in responding to biological disasters, face many challenges, and are among the most at-risk groups.

Analytical theme 3: Challenges Encountered

The professional challenges encountered before the biological disaster were exacerbated and continued during the disaster (30). On a professional dimension, they have faced challenges such as uncertainty, adhering to constantly changing and even conflicting clinical guidelines, workload, long working hours, equipment issues, changes in the work environment, inexperienced staff, and noncompliance (12, 15, 16, 38, 39). In our study, participants experienced difficulties during the biological disaster response process due to excessive workload, unfamiliarity with the disease, staff shortages, inexperienced and incompatible personnel, and a lack of knowledge regarding diagnosis/treatment. They have indicated that they feel burned out due to the mentioned challenges, are considering resignation/retirement, and have lost trust in the healthcare system. The participants' opinions are as follows:

In the beginning, no one possessed any knowledge. It seemed that all progress was achieved through a process of trial and error. (P5)

Two nurses cannot take care of thirty COVID patients. They expected the energy, strength, and performance of three people from one person. We were very inadequate. This was a great cruelty... (P15)

Our newly appointed nurse colleagues suddenly came into the field, here. You are caring for pandemic patients with someone who has not experienced anything... Working with inexperienced people has become problematic. (P12)

The fear of death caused by the disease has led to patients becoming agitated and reacting against isolation measures (30). In patient management, challenges such as violence, non-compliance with hospital visiting hours, pediatric patients, and elderly patients with comorbidities such as dementia and Alzheimer's disease have been encountered (18, 30, 31). In our study, participants reported experiencing challenges in patient management due to triage deficiencies, abandonment by patients' relatives, difficulties associated with patients' relatives, violence, communication inadequacies, and the burdens of caring for comorbid patients. The participants' opinions are as follows:

In another room, the mother and father are receiving treatment. The child wants to move from one room to another, wants to wander around, and you can't stop him. He wants to run in the corridors. (P2)

The physician and I were attacked by an companion. (P12)

You provide services to patients with Alzheimer's and dementia. You do not know how they will behave towards you. (P4)

In the dimension of corporate governance, healthcare professionals have faced challenges such as being unsupported and isolated, not being included in management decisions, lack of transparency in data and information, insufficient communication, and injustices in the distribution of responsibilities and duties (37, 39, 40). In our study, participants reported feeling unsupported in the dimension of corporate governance, excluded from management, blamed when they were ill, and experiencing incompetence and injustices. The participants' opinions are as follows:

We were left very unsupported. No one understood us. No one provided psychological assistance. (P1)

We were left very alone... None of our supervisors visited the service. We never saw them in the service during that period... No one came. No one asked. Who are you? What are you doing? Is there a problem? No one asked. (P5)

Some individuals, who have the same educational background as you or are nurses like you, were placed in specific positions. They were given privileges as responsible personnel, etc. They never transitioned to a field related to disease. (P4)

When we were ill, our managers behaved as if we were at guilty. (P1)

One of the most significant factors contributing to these social challenges is the media. The media can play a role in increasing uncertainty, and because the accuracy of updates or shared news cannot be verified, it can exacerbate psychological impacts (30). Furthermore, the public's failure to adhere to protective measures has further deteriorated the morale of healthcare professionals (30, 31, 36, 39). In our study, participants reported facing difficulties due to the media's portrayal of the disease, being away from family, and the public's lack of seriousness regarding the disease. The participants' opinions are as follows:

The fear spread by the media also scared me quite a lot, to be honest... The disease was misrepresented by the media. (P1)

I am away from my family and alone. I am also working under difficult conditions. I had thought about resigning during those times as well. (P14)

If it must be followed, then all citizens should follow it. If some are walking around, some are wearing masks, and some are walking without masks, you are putting the citizens at risk. I warned those who were not wearing masks. Some reacted negatively. (P11)

Analytical theme 4: Emotions During Care

Healthcare professionals experienced both positive and negative emotions while providing care to patients during the COVID-19 biological disaster. Among positive emotions, feelings such as empathy, sacrifice, compassion, and professional satisfaction stand out (40, 41), while among negative emotions, sadness, panic, stress, anxiety, and becoming robotic are prominent (30, 31, 42). In our study, participants reported experiencing positive emotions such as conscience, compassion, sacrifice, and empathy during caregiving, while also experiencing negative emotions such as sadness, fear of contamination, panic, stress, being on the front line, and becoming robotic. The participants' opinions are as follows:

The dedication, conscience, and compassion of that period were truly very important in patient care. (P15)

You are becoming breathless yourself in order to make others breathe. (P4)

I felt like a soldier. We were at the frontline in the army... Fear and death. We would either die or keep moving forward. (P14)

We would administer the treatment and immediately leave the room. It felt as if we were experiencing the roboticized version of purely human actions. (P8)

Analytical theme 5: Effects of Biological Disaster

Among the psychological issues affecting the behavior of healthcare professionals during a biological disaster response are fear of infection and transmitting it to their families, sadness, unhappiness, longing, anger, stress, depression, restlessness, uncertainty, guilt, pessimism, desperation, hopelessness, anxiety, unworthiness, dispiritedness, and a sense of meaninglessness (12, 30, 34, 43, 44). In our study, participants reported feeling sadness due to the losses they witnessed (relatives, colleagues, etc.), experiencing intense fear of transmitting the infection to their families, irritability, fear of death, anxiety/nervousness, uncertainty, panic, exhaustion, stress, helplessness/hopelessness, and feelings of tension/depression. The participants' opinions are as follows:

A colleague of mine passed away at a young age. It's terrible, what can I say? (Tears fill their eyes) One also feels sorrow for those left behind. His children are left without a father and will grow up fatherless. (P5)

You are experiencing a breakdown. That breakdown, makes you irritable over small things. You feel trapped, as if you are in a swamp and cannot get out, and you have an urge to shout at everything. (P3)

We were face to face with death. In other words, we were on the brink of death. (P5)

Uncertainty and desperation were very difficult situation. You are battling the disease... And you are also battling the unknown... (P15)

Among the most significant social problems experienced by healthcare professionals during the COVID-19 biological disaster are stigma/exclusion, isolation, loneliness, family issues, and the inability to engage in close physical contact, such as playing with, hugging, and kissing their children (16, 30, 31). Economically, healthcare professionals have also faced difficulties. Despite a significant increase in their workload, they felt forgotten and left behind in terms of financial support, leading to feelings of anger and worthlessness (18, 32, 40, 45). In our study, participants reported experiencing stigma/exclusion by society, feeling lonely, weakened social relationships, affected family ties, and a blurred line between home and work life. They also mentioned that they were not receiving the wage they deserved. The participants' opinions are as follows:

Our neighbors were perceiving us unfavorably. As if the virus was me... If you were a healthcare professional everyone avoids you. (P6)

I am not just a nurse. I am also a mother and a spouse. They have expectations too. I do not think I was able to fulfill the emotional needs of being the mother they wanted during that period. The same goes for my spouse. (P5)

Work and work, yet it has no economic reward. Am I to spend my life for this? (P10)

During the COVID-19 biological disaster, healthcare professionals faced physical challenges due to uncertainty, the presence of inexperienced staff, personnel shortages, the high number of patients, the use of PPE, the course of the disease, and the lack of adequate protocols. The most common physical challenges were fatigue, skin damage, sleep disorders, headaches, dizziness, muscle pain, shortness of breath, sweating, impaired vision, and insufficient rest (16, 34, 43). In our study, participants reported experiencing fatigue, sweating, shortness of breath/headaches, scars, skin problems, and insomnia due to the use of PPE and excessive workload. The participants' opinions are as follows:

It was a very exhausting process. You don't take off the mask for fourhours. You don't get out of the coveralls. One day, my blood pressure rose to 18 when I came out... It's indescribable in words. The next day, when you step on your foot, there were days we said, "How am I going to walk with this foot? (P4)

We would stay inside those masks and coveralls for hours. We would come out drenched. We would get sick. There were also scars. There were times when our visors and glasses left marks on our faces. (P7)

There was no regular sleep. The shifts were intense until morning. This resulted in sleep problems. (P13)

When examining the effects of nutrition, changes in work routines, intense work demands, the difficulty of working with PPE, and a contaminated environment can affect the food and fluid intake of nurses, potentially leading to weight gain and obesity (29, 30, 43). Regarding the effects on housing, institutions have not provided adequate support for healthcare professionals who are unable to return to their homes due to the risk of infection and transmission (13). In our study, participants reported that the meals provided by the institution were inadequate, that their eating habits had changed during the process, that they did not have the opportunity to eat due to the intensity of their work, and that they experienced weight changes. All participants who experienced housing problems during the process were newly appointed and came from different cities. The participants' opinions are as follows:

Meals were always cold, and we never had good food. The meals provided did not support us well. (P1)

You're coming in the morning. It's 3:30 in the middle of the night and you're still up. Either you're showing something

superhuman, or you don't even have time to eat. You don't have time to drink a cup of tea. (P5)

I came here from another city. We don't have a home, not a place to settle. The authorities did not provide any assistance. That process was very exhausting for me. (P1)

Healthcare professionals have faced difficulties in commuting to their workplaces. Nurses working in remote areas, such as district hospitals, have experienced transportation issues (42). During the Ebola outbreak, society believed that the disease was spread by healthcare professionals and was afraid of those wearing protective clothing. During this period, healthcare professionals were not allowed to use taxis (46). In our study, participants reported experiencing difficulties due to the hospital being located outside the city and the limited number of public transportation services. When they used public transportation, they encountered negative reactions from the community. The participants' opinions are as follows:

After our shifts, we used to wait for hours in the cold for the bus. We would finish our shifts exhausted, unable to go home or reach our workplace. (P1)

Initially, the public did not want us to use the buses... There was a lot of backlash when we started taking the buses. (P2)

This place is far from the city, for instance, during that period, we also had transportation problems. Buses were hourly or they didn't take us. (P6)

Analytical theme 6: Coping Experiences

During the COVID-19 biological disaster, healthcare professionals have turned to various activities based on their interests to cope with adverse situations. They have attempted to mitigate the destructive effects of the pandemic through activities such as spending time with their families, walking, gardening, joking with friends or family members and painting (16, 30). In our study, participants indicated that individual factors such as thinking about the end of the process, listening to music, going to green spaces, exercising, not thinking about the work environment, receiving psychological support, and engaging in handicrafts helped them cope with the process. The participants' opinions are as follows:

People often reassure themselves by saying, 'Yes, it will pass, it will end... Everyone will get better, it will end. I have also reassured myself in this way. (P10)

When I leave here, I walk barefoot on the soil to balance negative things. I have also cultivated some plants in my garden. These are activities I engage in to clear my mind after returning from the hospital. (P4)

I sought psychiatric consultation and used medication for a period. (P5)

Healthcare professionals have reported that their job satisfaction and motivation increase when patients recover and are discharged, when they receive positive feedback, and when the rates of infection and mortality decrease over time (29, 36). Healthcare professionals, through professional solidarity, have provided greater social and psychological value and support to one another (13, 16, 18, 30). Healthcare professionals who love their profession and have previously been involved in combating infectious diseases experienced less fear and uncertainty, while younger, less experienced personnel felt more anxiety and were adversely affected (13, 36, 47). In our study, participants reported that professional factors such as patients' recovery and satisfaction, colleagues, professional sensitivity, previous experiences, responsibility, and love for the profession are important in coping with the process. The participants' opinions are as follows:

Patients' recovery was our motivation. It was a very gratifying feeling. (P2)

My colleagues here were really great... At least in the hospital, we found an environment to laugh and have fun... Our friendship bond strengthened. I can say that we learned to become a family. (P10)

I have already worked in the infection department. I have experience with diseases such as Crimean-Congo Hemorrhagic Fever, Swine Flu, and Avian Flu. (P5)

I felt a sense of duty towards my state and nation. (P4)

My love for the profession was a source of motivation for me. (P6)

In a new world where social life is prohibited, healthcare professionals have facilitated coping with the process by utilizing multiple social factors, including families, friends, and the community (16, 17, 29, 39). In Türkiye, the public has applauded healthcare professionals to boost their morale (30). While some healthcare professionals have expressed that positive feedback from patients, favorable media coverage, and being applauded at a certain hour each evening empower and satisfy them (48), some healthcare professionals have felt that these gestures are insufficient compared to the workload, risks, and challenges they face (30). In our study, participants reported that social factors such as family support, friends, receiving applause, and community support helped them cope with the process. However, some participants mentioned that receiving applause did not hold any significance for them. The participants' opinions are as follows:

My advantage was staying with my family. I would have conversations with my siblings... My support here is being with my family. Perhaps if I were alone here, this process could not have been advanced. (P6)

We used to talk among our colleagues. We would share examples we observed with our friends, highlighting the good and bad ones. These talks kept us resilient. (P7)

Applauding healthcare professionals from balconies... Why did we do it? It was merely symbolic and lasted for only a brief period. Our value could have been demonstrated in other ways. (P12)

One of the best coping strategies to reduce negative emotions during the COVID-19 biological disaster is religious factors (42). Healthcare professionals reported seeking refuge in Allah to cope with the demanding and prolonged challenges of the pandemic, delivering patient care with a strong sense of duty, love, compassion, and receiving prayers in return (41, 49). In our study, participants indicated that religious factors—including spiritual feelings, belief in fate, receiving prayers, reliance on Allah (tawakkul), and seeking Allah's approval—played a significant role in their coping strategies during the pandemic. The participants' opinions are as follows:

We were fasting. We had not broken our fast. We said to ourselves, since there is death, if we are to die, let me at least go with my faith and purity. Thus, we stood firm. (P4)

A profession that receives prayers. I believe in it. You know, when a person prays, it motivates you more. (P7)

Fear of God, doing for the sake of God. I did it solely with God in mind. (P9)

Main theme 3: Post-disaster Recovery Phase

At this phase, it is particularly important to address the long-term health, psychological, economic, and social impacts, as well as to restore normal health and social functions.

Analytical theme 7: Recovery Phase

Although the devastating effects of the COVID-19 biological disaster have diminished, the emotions felt by healthcare professionals at the end of the experience are quite complex. The acquired pandemic experience enhances preparedness for possible future pandemics (47). Therefore, healthcare professionals with such experience should be regarded as valuable human resources and appropriately rewarded (18, 45). Healthcare professionals who have served during outbreaks such as Ebola and MERS-CoV have expressed a desire to volunteer in future pandemics, citing their experiences, professional and ethical obligations as motivating factors (37, 45). Healthcare professionals who have served during pandemics have reported feeling

unappreciated for their efforts, abandoned by their administrators, and lacking adequate financial and psychological support. Therefore, they have experienced feelings of disappointment and neglect (18, 36). Contrary to these feelings, when patients recovered, they became aware of the sanctity of their profession, felt like heroes, and took pride in it (18, 29, 48). In our study, while some participants expressed a willingness to take on duty in the event of a potential biological disaster at the end of their experiences, some stated that they did not want to take on such duty due to the challenges and impacts they faced. At the conclusion of their experiences, participants reported feeling positive emotions such as gaining experience and feeling proud, as well as negative emotions such as not wanting to remember, feeling empty, and being forgotten. The participants' opinions are as follows:

I do not want to work emotionally. Like everyone else, I am human too. I also want to live longer. I also want to live happier. Why should I be left with sequelae? (P4)

I would volunteer directly. Because I believe experienced people should be on the field. Instead of someone who has no knowledge and won't provide any benefit going, I should go. At least I would adapt faster, or I could show something to someone who doesn't know, or I could learn something new myself. (P12)

I cannot remember right now, you know? It feels like a dream... Actually, it has an impact, but I don't remember. It feels like a empty. It just seems bad and dark to me. Yes, I lived through those times, but right now it feels like a dream, a nightmare... Maybe I want to erase it from my mind. (P9)

Because we defeated the pandemic, I feel strong and proud. It is an honor to have been there when everyone else was running away. (P14)

Healthcare professionals face psychological challenges With the pandemic, nurses experienced burnout, emotional breakdowns, sleep difficulties, doubts, loneliness, increased obsessions, and suicidal thoughts (16, 32, 36, 44). Healthcare professionals stated that, despite facing numerous challenges during the pandemic, they learned to be patient, understood the value of their freedom and possessions, and matured (42). In our study, participants reported that they still feel the effects of the challenging period they experienced, with psychological impacts persisting and changes in their habits. Participants also indicated that the pandemic has affected the social structure and that they have learned lessons about their lives during the pandemic process. The participants' opinions are as follows:

There has been a destruction among people... A coldness has developed between individuals (like a social disaster). The act of visiting, so to speak, has significantly diminished. Those customs, traditions, and practices no longer remain. (P7)

I might have become obsessive. I constantly touch something and immediately wash my hands. (P14)

I have had many recollection with patients and have learned significant lessons from them... It truly is a period I will share with my children and grandchildren in the future. (P1)

Determining the demands and suggestions of healthcare professionals who have worked in the field during the challenging COVID-19 biological disaster process is crucial in both mitigating or eliminating its adverse effects and identifying the shortcomings in responding to a potential biological disaster. Some studies have identified various organizational strategies to assist healthcare professionals during viral respiratory disease outbreaks. These strategies include financial incentives or bonuses, frequent communication with managers, counseling sessions, improved working conditions, setting maximum working hours, reasonably adjusting shifts to protect healthcare providers from overworking, and regular training programs (13, 14, 16, 17). In our study, participants stated that in order to respond better to the next biological disaster, there should be no rotations, quarantine measures should be planned, working

conditions should be improved, psychological support should be provided, accurate information should be given, professional specialization should be ensured, and managerial support should be provided. The participants' opinions are as follows:

As our department change, a person's stress levels increase significantly... You feel like you are in a home. You work with your friends, you confide in them, you are in solidarity, and then you are in another department. It takes time just to get to know new people. You already feel lonely at that time. Then the same thing happens again... For me, it was unhappiness, nothing else. If only my department had not been constantly changed. (P9)

Certainly, if we had received psychological support, it might have been better... Perhaps we wouldn't have been as affected. (P3)

In the case of biological disasters, we need certified nurses who can go to the field and say, 'This is how we will manage things. Our plan is this.' The profession needs to become more specialized. We also need to train personnel in this field. (P12)

CONCLUSION AND RECOMENDATIONS

The COVID-19 biological disaster has deeply affected healthcare professionals in many areas such as psychological, socio-economic, physical, housing, nutrition, and transportation. Despite many adverse conditions, it has also been revealed that healthcare professionals have the potential to learn and be better prepared in crisis situations like biological disasters. Healthcare professionals with more professional experience were less affected and managed the process better compared to those with less experience. Therefore, policymakers should consider healthcare professionals with experience in biological disasters as valuable human resources for future biological crises and appropriately reward their expertise. Healthcare professionals did not receive adequate support from the community and administrators during the COVID-19 biological disaster process and were not included in the decision-making processes. Supporting healthcare professionals by the community and administrators, and involving them in the policy development processes, can facilitate the management of the process based on the information gathered from the field. Creating a cohesive work team, limiting rotations, regulating working hours, salaries, leave, statuses, and work environments are requests that can significantly enhance motivation, and it is crucial that politicians take these into account. Additionally, healthcare professionals who are negatively affected during biological disasters should be provided with psychological support, and the long-term psychological effects should be monitored.

Limitations and Strengths of the Work

The findings and conclusions of this study are limited to the participants of the study and cannot be generalized. Considering that the interviews were conducted in the work environment and after working hours, the reluctance of participants to stay at the institution after their shifts may have negatively affected the sharing of experiences. As COVID-19 case reporting continued, maximum compliance with precautions was ensured. Although utmost care was taken to prevent these situations from hindering communication and the established rapport, unnoticed effects may have reflected in the responses.

In addition to the limitations, the present research can have several strengths. The first strength is the use of the phenomenological approach, which allowed for a comprehensive understanding of healthcare professionals' biological disaster experiences. Through face to face interviews with participants, the challenges, emotional experiences, and perspectives of healthcare professionals' were directly identified. The

second strength is the diversity captured in the sample group of 15 individuals regarding age, gender, lifestyle, marital situation, years of working, work setting. This heterogeneous sample enabled the identification of different aspects of the experience. The third strength is adopting a holistic perspective on the biological disaster experience. This approach brought to light the pre-disaster, during-disaster, and post-disaster experiences of healthcare professionals', providing a comprehensive view.

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Data Availabitiy Statement

The qualitative data generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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CRediT authorship contribution statement

Nahsan KAYA: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; and Writing - review & editing. **Aydın KIVANÇ:** Investigation; Methodology; Software; Supervision.

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