Challenges for Conducting Research during Pandemics. 
A Narrative Review

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Abstract
Background: Research during pandemics presents unique challenges and opportunities that are crucial for advancing scientific knowledge and improving public health responses. This study’s topic is significant due to the unprecedented disruptions caused by pandemics like COVID-19, which have impacted all stages of the research process. This study aims to identify and analyze research challenges during pandemics and propose strategies to overcome these obstacles.

Methods: A narrative literature review was conducted, focusing on the challenges of conducting research during pandemics. A comprehensive search strategy was implemented, using databases such as PubMed, Google Scholar, and Web of Science, with keywords including “pandemic,” “research challenges,” “COVID-19 research,” “SARS research,” “clinical trials during pandemics,” “best practices,” and “research strategies.” The review covered studies published from 2004 to 2023, including previous pandemics like SARS, H1N1, and COVID-19. Relevant articles were identified through database searches and manual reference list reviews.

Discussion: The review revealed multidimensional challenges affecting various stages of the research process. Political, economic, administrative, regulatory, logistical, ethical, and social challenges were identified. Logistical difficulties were prevalent, such as limited access to laboratories and supply chain disruptions. Ethical challenges, including informed consent and data privacy, were magnified during health crises. The mental health impacts on researchers and participants were also significant, with increased anxiety and depression affecting engagement and well-being.

Conclusion: The study concludes that while pandemics introduce considerable challenges for conducting research, there are also valuable lessons and best practices that can be applied in future crises. Effective strategies include investing in digital infrastructure, developing flexible ethical frameworks, implementing adaptive clinical trial designs, and supporting mental health for researchers and participants. By learning from the COVID-19 pandemic, the research community can better prepare for and navigate future pandemics, ensuring the continuity and effectiveness of scientific investigations.

Introduction
The advent of pandemics has historically posed significant challenges to global health systems, societies, and economies. The rapid spread of infectious diseases, such as the Spanish flu, SARS, H1N1 influenza, Ebola, and COVID-19, has necessitated swift and effective responses to mitigate their impact. These crises strain healthcare infrastructure and create profound disruptions across various sectors, including scientific research. The urgency to understand and combat these diseases often places research activities at the forefront, highlighting the critical role of research and its myriad challenges during such times [1]

Research during pandemics is essential for developing effective public health responses, including creating diagnostic tools, treatments, and vaccines. However,
the unique context of pandemics introduces a range of obstacles that can hinder research processes. Logistical challenges, such as restricted access to laboratories and clinical sites due to quarantine measures, can delay or halt ongoing studies [2]. Moreover, supply chain disruptions can result in shortages of essential research materials and equipment, further complicating research efforts [3]. These logistical issues underscore the need for adaptable research strategies to maintain continuity in the face of physical and operational barriers.

This literature review aims to systematically analyze the diverse challenges of conducting research during pandemics. By synthesizing findings from various studies, this review will provide a comprehensive overview of researchers’ logistical, ethical, methodological, mental health, and financial challenges. The insights gained from this review will help formulate strategies to enhance research resilience and effectiveness during future pandemics, thereby contributing to global health security and resilience.

**Methods**

**Study Design**

This narrative literature review was designed to analyze and synthesize existing research on the challenges of conducting research during pandemics. The primary aim was to identify the main obstacles researchers faced and highlight effective strategies to mitigate these challenges. The review focused on various types of research, including clinical trials, qualitative studies, and pragmatic clinical trials (PCTs), to provide a comprehensive understanding of the issues across different research methodologies.

**Search Strategy and Information Sources**

A comprehensive search strategy was implemented to gather relevant literature. The following databases were searched: PubMed, Google Scholar, and Web of Science. Keywords used included “pandemic”, “research challenges”, “COVID-19 research”, “SARS research”, “clinical trials during pandemics”, “Best Practices”, and “Research Strategies”. The search included studies published from 2004 to 2023 to cover previous pandemics like SARS, H1N1, and COVID-19. Additionally, reference lists of identified articles were manually searched for further relevant studies.

**Study Selection Process**

The initial search yielded a large number of articles, which were then screened based on their titles and abstracts. Studies that focused specifically on the challenges of conducting research during pandemics and provided insights into best practices were included. Articles that did not meet these criteria were excluded. The remaining studies were subjected to a full-text review to ensure their relevance and quality.

Discrepancies in study selection were resolved through discussion among the reviewers to reach a consensus.

**Data Extraction**

Data from the selected studies were extracted using a standardized extraction form. Key information such as study focus, main challenges identified, best practices recommended, and key findings were documented. This information was then categorized and summarized to identify common themes and patterns across the studies. The extracted data were used to provide a comprehensive overview of the research landscape and to formulate recommendations for overcoming challenges in conducting research during pandemics.

**Literature Review**

Previous studies highlight the significant challenges researchers face during pandemics. A literature review from the early 2000s shows that logistical and ethical challenges during pandemics like SARS and H1N1 influenza greatly impacted research productivity and effectiveness [4]. For instance, during the SARS outbreak, researchers encountered obstacles such as limited access to laboratories, supply chain disruptions, and difficulties maintaining ongoing clinical trials. [2]. Research during pandemics is crucial in responding to public health emergencies. Various research groups focused on the origin of pandemics and their management strategies, including drug and vaccine development through numerous clinical trials. Health scientists confronted pandemics and analyzed their implications through rigorous investigations and clinical research [5].

The COVID-19 pandemic, in particular, posed significant challenges to the research community. Researchers faced reluctance from volunteers and participants, reductions in research funding due to the prioritization of treating and rehabilitating the infected, and difficulties in travel and field investigations. These challenges were compounded by common concerns and pressures among participants, volunteers, the research team, and scientists [6].

Specifically, the pandemic significantly disrupted clinical trials, which are essential for evaluating the safety and efficacy of new medical treatments. Traditionally, the research team carried out many aspects of clinical trials in person, including patient recruitment, obtaining informed consent, and conducting interventions. The pandemic necessitated the development of alternative methods to ensure the continuity of clinical research while prioritizing the safety of participants and researchers [7].

Furthermore, the COVID-19 pandemic affected clinical research in various medical fields, including infectious diseases, cancer, chronic diseases, obstetrics, and gynecology. This widespread impact underscored the need for adaptive strategies and resilient research infrastructures [8,9].
Research Challenges During Pandemics and Best Practices

The body of literature on the challenges faced during pandemics reveals a complex and multifaceted picture of how research is conducted in times of crisis. These studies collectively address various issues, from ethical dilemmas to operational hurdles, and provide insights into best practices for navigating such challenges. Ma et al. (2020) examined the ethical challenges of conducting research during the COVID-19 pandemic, focusing on issues such as informed consent, data privacy, and risk-benefit analysis. Their study, which included interviews with researchers and ethics committee members, highlighted the need for flexible ethical frameworks to balance the urgency of research with maintaining ethical standards. While the study adeptly identifies these critical issues, it falls short of offering concrete, actionable solutions for implementing these frameworks in diverse research contexts. This gap suggests that while the study underscores the importance of transparency and stakeholder engagement, it lacks specific strategies for achieving these goals in real-world settings [10]. Townsend et al. (2020) also delved into the ethical dimensions of pandemic research, emphasizing the need for adaptive ethical frameworks and community involvement. Their qualitative analysis of interviews with researchers and ethicists revealed that prioritizing research topics and ensuring participant safety was paramount. However, the recommendations for ethical foresight and adaptive frameworks provided by Townsend et al. are somewhat general and could benefit from more detailed, practical guidance on how these frameworks can be effectively applied across various research environments [11].

Miguel et al. (2020) explored the vulnerabilities of clinical research units during the COVID-19 crisis, using a cross-sectional survey to identify strategies for maintaining research activities amidst the pandemic's disruptions. The study effectively highlighted the need for remote monitoring and the enhancement of digital infrastructure, reflecting a significant shift towards virtual research practices. Nonetheless, while Miguel et al. demonstrated the importance of these technological solutions, their study could have further explored the long-term sustainability of these digital tools and their impact on future research practices [12].

Cagnazzo et al. (2016) reviewed operational challenges and lessons learned from COVID-19 in Italy, focusing on issues such as supply chain disruptions and recruitment problems. The study emphasized the role of digital innovations as a strategy for overcoming these obstacles. Although Cagnazzo et al. effectively showcased how digital tools can address immediate challenges, their findings are somewhat constrained by their focus on the Italian context, which may not fully generalize to other regions facing different pandemic-related challenges [13]. Cardel et al. (2020) investigated the mental health impacts of COVID-19 on research participants, finding that increased anxiety and depression significantly affected participants' willingness to engage in research. The study highlighted the importance of mental health support for maintaining participant engagement, but it could have been enhanced by providing more specific examples of effective support mechanisms and evaluating their success in various research settings [14].

Tamariz et al. (2021) focused on the quality of ethical review processes during the pandemic, calling for standardized guidelines and increased resources to ensure thorough reviews. While the study's emphasis on improving ethical review processes is important, it could have benefited from a more detailed examination of how these processes can be standardized and applied across different research contexts [15].

Mohan (2021) explored administrative challenges in clinical research, emphasizing the role of virtual monitoring and telehealth in maintaining research continuity. The study highlighted the effectiveness of these solutions in addressing administrative disruptions, but it could have been more detailed in discussing how these virtual tools could be adapted for long-term use beyond the pandemic [16].

The impact of the COVID-19 pandemic on global clinical research has been profound, necessitating rapid adaptations and innovative solutions to overcome unprecedented challenges. Park et al. (2021) explored these impacts globally, emphasizing the accelerated adoption of digital technologies and decentralized trials. Despite these advancements, ensuring data integrity and participant safety remained a significant hurdle. The study identified the development of flexible and resilient research infrastructure and integration of digital technologies as essential best practices for maintaining research continuity under such constraints [17].

In Brazil, Caputo et al. (2021) highlighted the challenges faced by epidemiological researchers during the pandemic, particularly in remote data collection and maintaining research timelines. The study underscored the disruptions caused by the pandemic, leading to the adaptation of remote methods. Despite the challenges, preparedness and methodological flexibility were emphasized as critical best practices to ensure effective data collection and participant access [18].

Röhrl et al. (2021) focused on the specific disruptions to clinical trial design and analysis plans for multidomain intervention trials. The global study identified significant data collection and participant adherence issues, proposing adaptive trial designs, robust digital infrastructure, and flexible methodologies as strategies...
to mitigate these disruptions. This adaptive approach allowed for the continuation of crucial clinical research while maintaining data quality and participant involvement [19].

Hensen et al. (2021) delved into the ethical implications of remote data collection in public health research. Their global review found that data privacy and participant engagement were major ethical challenges. The study recommended adapting remote methods, establishing clear ethical guidelines, and assuring data security as best practices to address these ethical concerns, ensuring that research integrity and participant trust were upheld [20].

Tremblay et al. (2021) reflected on using qualitative research methods during the COVID-19 pandemic. Their study, which employed virtual interviews and focus groups, highlighted significant challenges such as maintaining data quality and building rapport with participants. The authors emphasized using innovative digital tools and flexible research designs as best practices for overcoming these challenges. This study is notable for its focus on qualitative research methods during a global crisis, showing that while virtual tools are essential, they require careful implementation to maintain the rigor of qualitative data collection. Tremblay et al.’s emphasis on digital innovation and adaptability aligns with broader trends in pandemic research but also highlights the limitations of virtual methods, such as potential issues with data authenticity and participant engagement [21].

Mobaraka et al. (2022) explored the challenges faced by both students and mentors during the COVID-19 pandemic, focusing on logistical and communication barriers. The study used digital tools and virtual collaboration to address these issues, identifying the need for robust digital infrastructures and flexibility in research approaches. Their findings are valuable as they shed light on the perspectives of both researchers and students, emphasizing that successful virtual collaboration requires technological resources and effective communication strategies. While their study contributes to understanding the logistical difficulties of remote research, it could have benefited from a more detailed examination of specific digital tools and their effectiveness [22].

Sanllitan et al. (2022) investigated the challenges of maintaining research networks during the pandemic through a perinatal research network case study. The study highlighted communication and resource availability barriers, proposing virtual communication tools and adaptable protocols as best practices for overcoming these obstacles. This study is particularly relevant as it offers practical solutions for sustaining research productivity in specialized fields. However, while it provides valuable insights into virtual communication and protocol flexibility, it could have explored the long-term sustainability of these practices and their impact on the overall research network [23].

Sharma et al. (2022) explored the challenges and opportunities in conducting research on older adults with dementia during COVID-19. Their study revealed that while remote assessments and virtual engagements increased accessibility, they also introduced significant technical challenges. Tailored communication and flexible protocols were crucial in addressing issues related to the vulnerability of participants and difficulties in obtaining consent [24]. This study underscores the importance of adapting research methods to the needs of specific populations while managing the inherent technical challenges.

Sevelius et al. (2020) investigated the difficulties of conducting research with marginalized communities during the pandemic. Their qualitative approach utilized technological support and community engagement to overcome barriers such as limited technology access and health disparities. The study highlighted that community-specific strategies and technological support were essential for improving data reliability and engagement [25]. This research demonstrates that addressing health disparities requires tailored approaches that integrate community engagement with technological solutions.

Hashem et al. (2020) identified obstacles in clinical trial research, focusing on remote monitoring and adaptive trial designs. They found that while these methods helped mitigate some challenges, issues such as logistical adjustments and regulatory compliance remained significant. Their findings emphasize the need for robust adaptive designs and solutions for overcoming logistical and regulatory barriers during pandemics [26].

Panda et al. (2020) reviewed challenges and strategies in clinical research during COVID-19, emphasizing remote monitoring and virtual consultations. Although these methods facilitated research continuity, they also presented technical and ethical challenges. The study recommended adaptive trial designs and robust digital infrastructures as best practices for patient recruitment and data collection [7]. This review highlights the importance of balancing technological advancements with the practical and ethical aspects of clinical research.

Nomali et al. (2023) conducted a narrative review to investigate the challenges and solutions in clinical research during COVID-19. They identified that while remote methods allowed for research continuity, issues with data quality and participant engagement emerged. The study advocated for enhanced digital infrastructure and flexible protocols to maintain data integrity and regulatory compliance [27]. Their work reinforces the need for continuous adaptation and
interdisciplinary collaboration to address challenges in pandemic research. Caputo et al. (2021) focused on epidemiological research challenges in Brazil, identifying issues in recruitment, data collection, and sample representativeness due to reliance on internet-based methods. They suggested alternative recruitment strategies and acknowledged methodological limitations to improve data accuracy and sample representativeness during pandemics [18]. This study highlights the need for innovative approaches to overcome challenges in data collection and representation.

Sigfrid et al. (2020) conducted a scoping review on clinical research responses to emerging epidemics and pandemics, identifying challenges across various domains such as political, economic, and ethical issues. They recommended enhancing global collaboration, expediting funding, and strengthening healthcare infrastructure as key strategies for improving outbreak response [1]. Their findings emphasize the importance of comprehensive and flexible response plans for future pandemics.

Jones et al. (2021) assessed delays in reporting and publishing trial results from past pandemics, including H1N1, Ebola, and Zika. Their analysis revealed significant delays, with only 42% of trials meeting WHO standards for timely reporting and a median delay of 42 months for the registry and 21 months for publication. The study identified political and public pressures, limited pre-clinical data, and the urgency of trial initiation as key factors compressing timelines. This critique highlights the challenge of balancing the need for rapid results with thorough, rigorous processes, emphasizing that the haste driven by pandemics can lead to delays that hinder the timely dissemination of critical findings [28].

Sala-Bubaré et al. (2024) explored how researchers coped with the impact of COVID-19 through an online survey. The study highlighted significant personal and institutional challenges, including increased workload, stress, burnout, and difficulties in maintaining work-life balance, with women and those with caregiving responsibilities facing greater difficulties. This study emphasizes the gendered and personal nature of pandemic-related challenges, stressing that pandemics exacerbate existing inequalities and create new barriers for researchers. The findings point to the need for targeted institutional support and personal coping mechanisms to address these challenges [29].

Racionero-Plaza et al. (2021) investigated research challenges during Spain's COVID-19 home confinement using online interviews with volunteers working on homelessness. The study revealed that traditional research methods were impractical during the lockdown, necessitating methodological innovation to engage with vulnerable populations and maintain ethical standards. This research underscores the difficulties of conducting research under restrictive conditions and the need for new, flexible approaches to address the unique needs of affected individuals during pandemics [30].

AlNaamani et al. (2020) provided a comprehensive narrative review of the challenges and best practices in medical research during COVID-19. They identified key challenges such as patient hesitancy, quarantine restrictions, and the need for rapid research methods. Patient hesitancy was a significant barrier, delaying recruitment and participation due to safety and treatment efficacy concerns. Quarantine measures added logistical complexities, requiring innovative trial designs and international collaboration to address these barriers. The study emphasized that the pandemic necessitated adaptable and creative approaches to advance medical research while maintaining rigorous safety protocols and ensuring long-term follow-up studies [31].

Snyder et al. (2022) explored the impact of COVID-19 on nursing research through virtual focus groups with registered nurses. Their study revealed challenges including technological barriers, such as difficulties with virtual platforms, and maintaining rapport in virtual environments. They also highlighted the increased need for palliative care education and adaptation to new research guidelines. These challenges underscored the broader trend of technological adaptation in research during the pandemic, reflecting a shift toward virtual environments and the necessity for swift adaptation to new technologies and guidelines [32].

Sigfrid et al. (2020) conducted a scoping review using the PEARLS framework to explore challenges and solutions in clinical research during outbreaks. Their review identified political, economic, administrative, regulatory, logistical, ethical, and social challenges exacerbated by the pandemic. Political and economic pressures complicated the research process, while administrative and regulatory barriers slowed down new research initiatives. The study highlighted the importance of global collaboration, improved funding mechanisms, and enhanced research capacities to address these multifaceted challenges in future outbreaks [1,33].

Almufleh and Joseph (2021) advocated for using pragmatic clinical trials (PCTs) during pandemics, contrasting them with traditional clinical trial designs. They argued that PCTs are more adaptable and can be implemented more rapidly than traditional trials, which are often hindered by rigid protocols and lengthy approval processes. Their review recommended enhancing regulatory frameworks and streamlining approval processes to support the use of PCTs in future pandemics [34].
Fuellen et al. (2020) focused on proactive strategies for managing chronic inflammation in the elderly during pandemics. Their review emphasized the potential of advanced biomarker collection and data analysis for predicting and mitigating health issues related to infections and other pandemic-related problems in older adults. The study recommended improving biomarker validation techniques and conducting longitudinal studies to enhance these preventive strategies [35].

An et al. (2022) reviewed the challenges and opportunities of conducting self-perception research among individuals with eating disorders during pandemics. They found that remote research methods could overcome barriers like physical distancing but also faced methodological rigor and sample diversity challenges. The study suggested focusing on enhancing the quality of remote research methods and ensuring diverse and representative samples for effective studies during pandemics [36].

Bunting et al. (2023) provided comprehensive guidelines for the construction industry, focusing on workforce protection, project management, and legal aspects. Their review integrated insights from industry organizations and experts, identifying best practices such as flexible procurement strategies and clear communication. This study reinforces the idea that addressing pandemic-induced uncertainties requires a structured approach to workforce protection and project management, which aligns with Jones and El-adaway’s findings on the need for adaptability and resilience [37].

Seeger et al. (2023) examined the impact of COVID-19 on action research conducted by graduate students. Their study revealed that the pandemic disrupted research implementation, data collection, and analysis, emphasizing the need for flexible research practices and resilience in educational settings. This study highlights how COVID-19 affected public health research and educational research, revealing that long-term effects on research quality and altered research timelines were significant concerns [38].

Almutairi et al. (2023) explored the barriers to research and publications among family medicine residents in Saudi Arabia. The study revealed several significant obstacles, such as a lack of overall interest in research projects (40.2%), a lack of interest in completing research (38.6%), limited knowledge of the research process (36.2%), and insufficient time to complete research activities (24.4%). Despite highlighting these prevalent issues, the study’s findings are limited to the specific context of Riyadh, which may not be entirely applicable to other regions within Saudi Arabia or beyond [39].

Conclusion
This study aimed to identify and analyze the challenges associated with conducting research during pandemics. The comprehensive literature review revealed multidimensional challenges affecting various stages of the research process, from initiation and approval to patient recruitment and data analysis. These challenges underscored the need for adaptive strategies and flexible research structures to ensure the continuity of scientific investigations during crises.

Conducting research during a pandemic exposed researchers to a range of complex challenges that could impede the progress and integrity of scientific studies. Political, economic, administrative, regulatory, logistical, ethical, and social challenges were identified across multiple studies, highlighting the intricate environment in which researchers operate. Political and economic pressures complicated the research process, while administrative and regulatory barriers delayed the initiation of new research projects.

Logistical and ethical difficulties were among the primary challenges identified during pandemics. During the SARS and COVID-19 outbreaks, researchers commonly faced issues such as limited access to laboratories, supply chain disruptions, and difficulties in maintaining ongoing clinical trials. Additionally, researchers encountered reluctance from volunteers and participants, decreased research funding, and travel restrictions that impacted field investigations. These problems necessitated the development of alternative methods, such as remote monitoring and electronic data collection, to ensure the continuity of research activities.

The review also emphasized the significant impact of pandemics on clinical trials. Traditionally, clinical trials involve in-person patient recruitment, obtaining informed consent, and implementing interventions. However, the COVID-19 pandemic necessitated a shift to remote and virtual trial methods to maintain participant safety and comply with social distancing measures. This transition highlighted the importance of digital infrastructure and innovative trial designs in overcoming pandemic-induced barriers.

Furthermore, the mental health impacts on both researchers and participants emerged as notable challenges. Increased anxiety and depression among participants affected their willingness to engage in research, while researchers faced heightened stress and fatigue. Addressing these psychological challenges was crucial for maintaining participant commitment and ensuring the well-being of the research team.

In conclusion, by enhancing digital infrastructure, developing flexible ethical frameworks, implementing adaptive trial designs, utilizing remote methods, providing psychological support, fostering global collaboration, and ensuring methodological flexibility,
the research community can overcome the significant challenges of conducting research during pandemics.

**Recommendations**

To overcome the challenges of conducting research during pandemics, several strategies should be implemented. First, enhancing digital infrastructure is crucial. Investment in high-speed internet access, secure data storage solutions, and advanced telecommunication tools will facilitate remote monitoring and virtual trials, supporting research continuity through remote data collection and analysis. Developing flexible ethical frameworks that adapt to the urgent needs of pandemic research, while balancing ethical standards like informed consent and data privacy, is also essential. Adaptive clinical trial designs, such as pragmatic clinical trials (PCTs), can overcome the rigid protocols and lengthy approval processes of traditional trials. Utilizing remote methods and electronic equipment for data collection and monitoring requires adequate infrastructure and processes of traditional trials. Utilizing remote methods to overcome the rigid protocols and lengthy approval designs, such as pragmatic clinical trials (PCTs), can be beneficial in this context.

Finally, preparing for future pandemics through flexible research methodologies, contingency plans, scenario-based training, and protocols for rapid adaptation will enable researchers to adjust swiftly to evolving conditions. By implementing these strategies, the research community can effectively navigate the challenges of pandemic research.

**References**


