REVIEW OF LITERATURE

Exposure to excessive misinformation in infodemic can have serious consequences. For instance, in the past, the use of herbal remedies, such as garlic, beetroot, and lemon juice was promoted by the government as an alternative treatment for AIDS. More than 300,000 lives bore the price of this disreputable action including pregnant mothers and children.

3.1 Misinformation Statistics:

Within the first two months of the inception of the pandemic, about 2300 reports containing misinformation were identified across publications from 87 countries and the number soon multiplied ten times by March 2020. The BBC reported that "at least 800 people died around the world because of coronavirus-related misinformation in the first three months of 2020." It was found that in 2020, more than 3.5 million videos were being uploaded on Youtube within a month. And by this time, the number of tweets related to COVID-19 had reached a figure of more than 550 million per month on Twitter.

An examination of 112 million communications concerning the global health crisis across 64 different languages, carried out by the Bruno Kessler Foundation, revealed that approximately 40% of these messages originated from sources deemed untrustworthy. Another investigation conducted by the COVID-19 Infodemic Observatory highlighted that approximately 42% of tweets discussing the pandemic were generated by automated accounts, with approximately 40% of these tweets being flagged as unreliable.

3.2 Scientific Studies

Datta et al. in March to April 2020, conducted a cross-sectional online survey encompassing medical students, non-specialists, and specialists. Among their respondents, a notable 72% indicated that the dissemination of information has played a role in controlling the spread of COVID-19. Remarkably, the study revealed that nearly half of the medical professionals surveyed expressed difficulty discerning validated and accurate information. It was speculated that the general population's ability to distinguish reliable information might be even lower. In their findings, non-specialist healthcare workers expressed a greater sense of distraction from their usual duties due to the influx of COVID-19 information compared to other groups. This

trend possibly stemmed from their limited exposure to medical knowledge, leading to heightened anxiety about the disease. Additionally, both specialists and non-specialist healthcare workers expressed discomfort stemming from the lack of updated information about COVID-19, in contrast to the students surveyed.

Gruner in August 2020, conducted an experimental investigation in which healthcare professionals were exposed to COVID-19-related narratives sourced from various media categories, including social isolation, economic repercussions, direct health impacts, and significant exaggerations. Participants were tasked with discerning the authenticity of these stories. The study revealed that healthcare professionals exhibited a similar level of accuracy in distinguishing between true and false news stories as students. Furthermore, the inclination towards analytical thinking and open-mindedness positively correlated with the ability to make this distinction. Interestingly, when news stories aligned with existing narratives, participants were more inclined to perceive them as true. This study underscored the critical role of filtering mechanisms in navigating information amidst the COVID-19 pandemic. bubbles and echo chambers in the healthcare subset of the population.

Cinelli et al. in October 2020, investigated the diffusion of COVID-19-related information through extensive data analysis of various social media platforms, including Twitter, Instagram, YouTube, Reddit, and Gab. A comparative analysis was conducted across these five platforms during the COVID-19 pandemic. The dataset encompassed over 8 million comments and posts spanning 45 days, comprising approximately 1.3 million posts and 7 million comments generated by nearly 4 million users. The study observed that on mainstream social media, posts from questionable sources constituted a small fraction of those from reliable sources. However, in less regulated social media environments, posts from questionable sources accounted for up to 70% of the volume compared to reliable sources. These findings suggested that different platforms may exhibit varying reactions to information from reliable versus questionable sources. The study concluded that the primary drivers of information dissemination were influenced by the distinct characteristics of each platform and the group dynamics of individuals engaged with the topic.

Eysenbach (2020) in his article titled "How to Fight an Infodemic: The Four Pillars of Infodemic Management" introduced a comprehensive strategy to combat the proliferation of misinformation during an infodemic, such as the one accompanying the COVID-19 pandemic. The article proposes four fundamental pillars that form the basis of effective infodemic management.

The first pillar focuses on promoting accurate information and transparency. The article emphasizes the role of authoritative sources, such as public health organizations and experts, in disseminating reliable information. It highlights the need for clear, consistent, and transparent communication to counteract the spread of false information. The second pillar involves monitoring and identifying misinformation. The article underscores the importance of real-time monitoring of social media platforms and digital spaces to track the spread of inaccurate information. Identifying false narratives allows for timely intervention and fact-checking to prevent the unchecked dissemination of misinformation. The third pillar emphasizes promoting a "prebunking" approach, where potential false claims are addressed proactively before they gain traction. By anticipating possible misinformation and providing preemptive accurate information, the article suggests that individuals can be better equipped to critically evaluate information and resist false narratives. The fourth pillar involves empowering individuals with media literacy skills. The article stresses the need to educate the public about evaluating information sources, identifying misinformation, and practicing critical thinking. By enhancing media literacy, individuals can contribute to reducing the impact of the infodemic and making informed decisions based on reliable information. In summary, the article "How to Fight an Infodemic: The Four Pillars of Infodemic Management" proposes a comprehensive approach to tackling misinformation during an infodemic. It outlines four core pillars - promoting accurate information, monitoring and identification, prebunking, and media literacy - as essential strategies for mitigating the negative impacts of false information on public health and society.

Mheidly and Fares, 2020 Islam et al. (2020) explored the infodemic surrounding the COVID-19 pandemic and its implications for public health through a global social media analysis. They conducted a study aiming to assess the scope and trends of

information shared on social media platforms, as well as its potential impact on public health behaviors and attitudes.

Their research involved analyzing a vast amount of social media content related to COVID-19 from around the world. Their work discusses the wide range of information shared, including accurate updates, false claims, conspiracy theories, and rumors. It notes the rapid spread of information through various platforms and highlights the challenge of distinguishing between reliable and misleading content. The study also examined the potential impact of the infodemic on public health behaviors, revealing instances where misinformation led to negative outcomes, such as non-adherence to preventive measures or promotion of unproven treatments. The article underscores the need for coordinated efforts among public health authorities, researchers, and social media platforms to address the infodemic, promote accurate information, and mitigate its adverse effects on public health outcomes.

Mheidly and Fares (2020) discussed the effective use of media and health communication strategies to address the challenges posed by the COVID-19 infodemic. They highlighted how the rapid spread of misinformation and disinformation about the pandemic has exacerbated public health concerns. To counter this, their work suggested leveraging various communication channels such as social media, traditional media outlets, and public health campaigns to disseminate accurate and trustworthy information. The authors emphasized the importance of employing clear, concise, and culturally sensitive messaging to engage diverse populations and combat misinformation. Additionally, the article underscores the role of public health authorities and experts in collaborating with media outlets to ensure accurate information reaches the public, while also dispelling myths and rumors. By combining media literacy initiatives, fact- checking efforts, and strategic communication, society can navigate the complex landscape of the infodemic and promote informed decision-making regarding COVID-19.

In conclusion, the article underscores the significance of strategic communication in combating the COVID-19 infodemic. It calls for a multi-pronged approach involving collaboration between public health agencies, media platforms, and communication experts. By harnessing the power of media to deliver accurate and credible

information, while actively addressing misinformation, society can work towards a better-informed public and more effective management of the pandemic.

Okan et al. (2020) conducted a cross-sectional study investigating coronavirus-related health literacy among adults in Germany during the COVID-19 infodemic. Their study aimed to understand how individuals comprehend and utilize health information amidst the surge of COVID-19-related information, misinformation, and disinformation. Conducted through online surveys, the research assesses participants' health literacy by evaluating their understanding of COVID-19 information, their sources of information, and their ability to distinguish reliable sources from unreliable ones. The study also examines associations between health literacy levels and demographic factors such as age, education, and digital literacy.

The findings of the study reveal that during the COVID-19 infodemic in Germany, a substantial proportion of adults displayed inadequate health literacy regarding coronavirus-related information. Many participants struggled to discern accurate information sources from inaccurate ones, leading to potential misunderstandings and misguided actions. The study highlights the need for targeted health communication strategies that consider various demographic factors to effectively address the infodemic challenges. Improved health literacy efforts could empower individuals to access, comprehend, and utilize reliable information, ultimately aiding in better decision-making during the pandemic.

Risco et al. (2020) explored the approach taken by Peru to counter the COVID- 19 infodemic, focusing on insights and strategies implemented by the government and other stakeholders. Peru recognized the severe impact of misinformation on public health efforts during the pandemic and undertook various measures to address it. Their work outlines the importance of establishing a centralized communication strategy led by public health authorities to provide consistent and accurate information. It highlights the collaboration between government agencies, media outlets, and fact-checking organizations to ensure the timely dissemination of trustworthy information and the debunking of false claims. The article also underscores the significance of adapting communication strategies to the local context, taking into account cultural diversity and varying levels of digital access. By prioritizing transparent communication, engaging with communities, and leveraging both traditional and

digital media, Peru aimed to combat the infodemic and promote informed decision-making among its population.

The authors conclusively emphasized the effectiveness of a multi-faceted approach in addressing the COVID-19 infodemic, as demonstrated by Peru's efforts. By coordinating efforts across various sectors, employing fact-checking mechanisms, and tailoring messaging to local needs, Peru aimed to mitigate the negative impacts of misinformation. The country's experience underscores the value of proactive and adaptive communication strategies in managing public health crises amidst an information-rich environment.

Solomon et al. (2020) examined the proliferation of information, both accurate and inaccurate, during the COVID-19 pandemic. It delved into the challenges posed by this overwhelming surge of information, often referred to as the "infodemic." The authors discussed how the pandemic's rapid spread was accompanied by an equally rapid spread of information, including misinformation and disinformation. Their article underscores the negative impact of misinformation on public health efforts, as it can lead to confusion, panic, and misguided decisions.

The authors also highlighted the role of social media in amplifying the infodemic and explores the mechanisms through which misinformation spreads. The article suggests that while the digital age offers numerous advantages in information sharing, it also demands a renewed focus on the accuracy of information being disseminated. The importance of scientific expertise and clear communication from health authorities is emphasized as a means to counteract the infodemic's harmful effects. Overall, the article $c_2a_5$lls for concerted efforts to combat misinformation and promote accurate, evidence-based information to ensure public health messages are effectively conveyed during crises like the COVID- 19 pandemic.

Tangcharoensathien et al. (2020) presented a framework of methods for managing the COVID-19 infodemic, following a technical consultation by the WHO. The framework aimed to provide strategies to address the overwhelming spread of information, both accurate and inaccurate, during the pandemic. The authors detailed the methodology used for the technical consultation, which involved engaging a diverse group of experts, researchers, and practitioners through an online platform.

The participants collaborated to identify key challenges related to the infodemic, such as the rapid spread of misinformation on social media, the role of technology platforms, and the need for clear communication from trusted sources. Their results of the consultation led to the development of a framework comprising various approaches, such as promoting critical thinking, amplifying evidence-based information, collaborating with tech companies, and addressing issues of digital inequality. The framework underscores the importance of coordinated efforts by governments, organizations, media, and individuals to combat the infodemic and ensure accurate and reliable information dissemination during health crises like the COVID-19 pandemic.

Sharma et al. in July 2020, studied the phenomenon of Infodemic in the Indian population. They conducted an analysis of the patterns observed in messages originating from mass media, which were then amplified and disseminated through popular digital outlets and social media platforms. The study revealed that newspapers, television channels, and radio significantly influenced public opinion and policymaking on critical issues within Indian society. Their findings underscored the necessity for enhancing health journalism to enhance its quality, credibility, and relevance, particularly in a country like India where mass media consumption is high while health literacy remains low. The study emphasized the pivotal role of robust health journalism in combatting the "infodemic" of misinformation during health crises, with a specific focus on the Indian context. It stressed the importance of accurate and evidence-based reporting in mitigating the spread of false information and its adverse effects on public health. Furthermore, the study shed light on the considerable challenges posed by the infodemic during the COVID-19 pandemic in India.. It discusses the widespread dissemination of misinformation through various media channels, including social media, and the resulting confusion and fear among the public. The study asserted that robust health journalism plays a vital role in dispelling rumors, providing clear and accurate information, and promoting informed decision-making among the public. It suggested that journalists must prioritize fact-checking, responsible reporting, and collaboration with health experts to ensure that accurate information prevails and to combat the negative consequences of misinformation on public health. The authors emphasized the role of accurate

reporting in combating the infodemic, fostering public trust, and contributing to informed health-related behaviors among the population.

Gallotti et al. (2020) explored the concept of "infodemics" in the context of responding to the COVID-19 pandemic. The article addresses the proliferation of information during the COVID-19 pandemic, including misinformation, rumors, and unverified claims. It highlights how the infodemic can complicate public health responses and contribute to confusion among the public. They discussed how information plays a crucial role in shaping public perceptions, behaviors, and attitudes during epidemics. Accurate information is essential for individuals to make informed decisions about their health and adhere to recommended preventive measures. The authors also underscored the potential dangers of misinformation during an epidemic. False or misleading information can undermine trust in official health sources, promote harmful behaviors, and hinder

effective public health interventions. They examined how digital media platforms, including social media, play a significant role in the rapid dissemination of information and misinformation. These platforms can facilitate the spread of rumors and unverified claims, often faster than accurate information can be verified and shared. The authors further discussed challenges related to health communication during an infodemic. Public health agencies need to develop strategies to combat misinformation, engage with the public, and ensure that accurate information reaches the widest possible audience. The authors introduced the concept of using mathematical and computational models to understand the dynamics of infodemics. These models can simulate the spread of both information and misinformation and offer insights into potential interventions to mitigate the negative impacts. Their work emphasizes the importance of interdisciplinary collaboration between public health experts, social scientists, data analysts, and communication specialists to effectively manage infodemics during epidemics. The authors concludes by discussing policy implications and recommendations for addressing infodemics. Strategies may include proactive communication, fact-checking, promoting media literacy, and engaging with digital platforms to curb the spread of misinformation. Overall, their work highlighted the need for effective communication strategies, interdisciplinary collaboration, and

data-driven approaches to mitigate the negative impact of infodemics on public health efforts.

Bechmann (2020) addressed the issue of disinformation and infodemics, particularly in the context of media policies. Their article emphasizes the need for policy changes to effectively combat the spread of false information and its detrimental impacts on public health and society. He acknowledged the prevalence of disinformation and infodemics, especially in the digital age where information spreads rapidly through vari$_{2}$o$_{8}$us media channels. These phenomena can lead to confusion, fear, and the undermining of accurate information. He further emphasized that media policies play a crucial role in managing disinformation. Well-crafted policies can set standards for accurate reporting, fact-checking, and responsible dissemination of information. The article highlights the critical link between misinformation and public health outcomes. False information about health, especially during epidemics like the COVID-19 pandemic, can lead to harmful behaviors, reduced trust in authorities, and compromised health interventions. The author addressed the role of digital platforms and social media in the spread of disinformation. It calls for platforms to take responsibility for moderating content and preventing the amplification of false information. The author also underscored the need for international collaboration in tackling disinformation. Given the global nature of the internet, coordinated efforts among countries can be more effective in curbing the spread of false information. His work suggested that media policies should also focus on promoting media literacy among the public. Educating individuals to critically evaluate information sources can empower them to discern accurate information from misinformation. Overall, his work highlighted the necessity of updating media policies to address the challenges posed by disinformation and infodemics. By implementing changes that promote accuracy, responsibility, and accountability in media reporting, society can better manage the spread of false information and its adverse effects.

Greenspan et al. (2020) investigated the relationship between pandemics, the spread of misinformation (referred to as infodemics), and their impact on human memory. The article examines how exposure to inaccurate information during pandemics can influence people's memory and understanding of the events. The article discusses how pandemics often coincide with an abundance of information, including

misinformation and rumors. This infodemic can distort people's perceptions of the crisis and complicate public health responses. Their work explored the concept that exposure to misinformation during a pandemic can alter individuals' memory of events. This occurs through a phenomenon known as "misinformation acceptance," where individuals accept and remember false information as true. They delved into the cognitive processes that contribute to the acceptance of misinformation. These include source credibility, repetition, emotional resonance, and cognitive biases. These factors can shape how individuals remember and interpret information related to the pandemic. he distortion of memory due to misinformation can have practical implications for public health efforts. Individuals who recall false information as accurate may make decisions that are not aligned with recommended health practices, which can hinder containment efforts. The author also discussed the potential long-term effects of misinformation on collective memory and public perception of pandemics. The distortion of events due to misinformation can shape historical narratives and influence public attitudes toward public health interventions.

The authors examined the relationship between pandemics, misinformation spread, and the alteration of individual and collective memory. Their work emphasizes how exposure to false information during pandemics can lead individuals to remember inaccurate details, affecting their understanding of events and subsequent behaviors. It also underscores the importance of effective communication, critical thinking, and fact-checking to mitigate the impact of misinformation on memory during health crises.

Jindal et al. (2020) analyzed the interplay between exposure of the people to the news, their trust to these sources of information, and the propagation of such misinformation on social media platforms. The study explores the concept of "infodemics" and how exposure to news sources influences individuals' trust in news, their susceptibility to believing false COVID-19 information, and their likelihood to share such information on social media.

Their research involved analyzing survey data from participants regarding their news consumption habits, trust in various news sources, belief in COVID-19 misinformation, and tendencies to share such information on social media. Their findings suggested that individuals who trust traditional news sources and consume

news more frequently tend to have higher media literacy levels, resulting in a lower likelihood of believing in fake COVID-19 news and sharing it on social media. However, those who trust social media as a news source tend to be more prone to believing and spreading false information. Their study emphasizes the critical role of media literacy and responsible news consumption in countering the infodemic phenomenon, underscoring the importance of trusted news sources and the need to educate individuals about verifying information before sharing it on social media platforms.

Patel et al. (2020) discussed the concept of the "infodemic" surrounding the COVID-19 pandemic, highlighting the extensive spread of misinformation and its impact on global public health. The authors argued that the proliferation of false information, often spread through various media channels, has created a parallel pandemic of misinformation that poses significant challenges.

Their work underscored that the rapid dissemination of information, both accurate and inaccurate, has been amplified by the prevalence of digital communication platforms. It explored the origins of the term "infodemic" and its relevance to the current situation, where the overwhelming volume of information and the ease of sharing on social media has led to the rapid spread of both factual updates and rumors.

The implications of the infodemic are profound, with the article highlighting the potential consequences of misinformation on public health efforts. It discusses how false information can lead to unwarranted panic, encourage ineffective or harmful behaviors, and erode trust in authoritative sources. The authors called for a coordinated response to address the infodemic, involving media literacy campaigns, responsible reporting by the media, and transparent communication from public health authorities. Their work underscores the need for collaborative efforts to address misinformation and suggests strategies to counter its impact on public perception, behaviors, and health outcomes.

Schillinger et al. (2020) presented a fresh perspective on how social media can play a pivotal role in public health efforts. They addressed the prevalent issue of misinformation and the rapid spread of inaccurate health-related information, often referred to as "infodemics," on social media platforms. The article proposed a

transformative view that sees social media as a potential powerhouse for health promotion, rather than just a source of problems. To facilitate this shift, the authors introduced a comprehensive framework comprising four key dimensions- Information Dissemination, Community Engagement, Health Communication, and Behavior Change. The authors also suggested several strategies that public health agencies can employ to harness social media's potential effectively which include Collaborating with Influencers, promoting accurate information, fostering community involvement, and strategic platform utilization.

The authors conclusively highlighted the transformative potential of social media in public health. By adopting a proactive approach that leverages the four dimensions of information dissemination, community engagement, health communication, and behavior change, social media can shift from being a source of misinformation to a robust tool for promoting accurate health information and empowering individuals to make informed and healthier choices. This underscores the importance of collaboration between public health agencies, influencers, and online communities to harness the positive impact of social media on public health outcomes.

Gruner et al. (2021) explored the ability of healthcare professionals and students to detect false news stories related to the coronavirus, focusing on the phenomenon of "infodemics" where false information spreads rapidly alongside a pandemic. Their study aimed to determine whether healthcare professionals, due to their expertise, are more adept at identifying false information compared to students. Their participants were presented with a set of news stories related to the coronavirus, some of which were true and some false. Participants were asked to evaluate the credibility of each story. The results of their study suggested that healthcare professionals demonstrate a higher ability to distinguish between accurate and false news compared to students. The study attributes this difference to the professionals' medical expertise and their familiarity with reliable sources of information. Their findings underscore the importance of media literacy education, especially among students, to enhance their critical thinking skills and enable them to navigate the barrage of information during health crises effectively.

Pian et al. (2021) conducted a systematic review to investigate the origins, consequences, and potential solutions to the information overload and

misinformation, referred to as the "infodemic," surrounding the COVID-19 pandemic. Through a comprehensive analysis of existing literature, the review identified various factors contributing to the infodemic, including social media's role in accelerating the spread of information, the inherent uncertainty of a novel virus, and the proliferation of conspiracy theories. The review underscored the adverse impacts of the infodemic, including increased anxiety, public confusion, and mistrust in health authorities, all of which can hinder effective pandemic control.

To address the challenges posed by the infodemic, the review proposed a range of countermeasures. It emphasized the importance of reliable and transparent communication from trusted sources, such as public health organizations and governments, as a means to combat misinformation. The review also suggests promoting media literacy to empower individuals to critically evaluate information sources and recognize false or misleading content. Furthermore, it highlights the potential of collaborative efforts between technology platforms, fact-checking organizations, and health authorities to identify and curtail the spread of misinformation. Ultimately, the review emphasizes the necessity of a multi-pronged approach involving public health efforts, media engagement, and individual education to mitigate the harmful effects of the COVID-19 infodemic.

Purnat et al. (2021) focused on the development of a methodology for detecting potential "information voids" within online conversations during the COVID-19 pandemic, a concept referred to as "infodemic signal detection." Their study addressed the challenge of identifying gaps in reliable information that might lead to the emergence of misinformation or confusion in online discussions. The methodology involved analyzing patterns in social media conversations to recognize when important information is lacking or insufficiently addressed, potentially giving rise to misleading or false narratives. By identifying these information voids, the approach aimed to enhance early warning systems for potential misinformation outbreaks, enabling timely interventions to address gaps in accurate information.

The article explains that the proposed methodology combines natural language processing techniques and network analysis to effectively identify areas within online conversations where reliable information is lacking or insufficient. By monitoring trends, keywords, and engagement patterns, the approach seeks to preemptively

recognize situations that might foster the spread of misinformation. The article emphasizes the importance of real-time monitoring and collaboration between researchers, social media platforms, and health authorities to swiftly address information voids, provide accurate information, and curb the potential negative impacts of the COVID-19 infodemic. In conclusion, the study's methodology serves as a proactive strategy to combat misinformation by targeting its sources and promoting the dissemination of accurate information during the pandemic.

Tiwari et al. (2021) investigated the impact of the COVID-19 crisis on the mental health of physiotherapy students. Their study acknowledged the significant disruptions caused by the pandemic, including changes in educational formats, social isolation, and increased stress levels. Through surveys and assessments, the study aims to understand the psychological well-being of physiotherapy students during this challenging period. Their findings indicated a notable negative effect on mental health, with students reporting increased levels of anxiety, depression, and stress. The study emphasized the importance of providing adequate mental health support and interventions for students in healthcare fields, especially during times of crisis, to ensure their overall well- being and ability to perform effectively in their academic and future professional roles.

Overall, their work highlights how the COVID-19 crisis has adversely affected the mental health of physiotherapy students. The article underscores the need for institutions and policymakers to recognize and address these challenges by implementing measures to support students' mental well-being. By doing so, educational institutions can help mitigate the negative psychological impacts of the pandemic on future healthcare professionals, ensuring their preparedness to contribute effectively to healthcare systems despite the unique stresses posed by global crises.

Zhang et al. (2021) presented an exploratory study that delves into the nature of the COVID-19 infodemic on Chinese social media platforms. The study investigated the abundance and characteristics of information related to the pandemic, aiming to uncover patterns of information dissemination and identify prevalent themes. By analyzing a large dataset of posts and comments, the research shed light on the types of information being shared, including official health guidelines, rumors, conspiracy

the ories, and personal experiences. The study also examined user engagement and interactions within these conversations.

Through the analysis, the article reveals the complexity of the COVID-19 infodemic on Chinese social media, encompassing a diverse range of information sources and viewpoints. The findings underscored the importance of understanding the multifaceted nature of the infodemic phenomenon, as it encompasses not only misinformation but also legitimate concerns and valuable insights from the public. The authors concluded by highlighting the need for strategic approaches to managing the infodemic, which include promoting accurate information from reliable sources, engaging with user-generated content in a meaningful way, and leveraging the potential of social media to disseminate vital health information effectively. By comprehensively characterizing the infodemic, the study contributes to a better understanding of how information spreads in the digital age and offers insights into addressing the challenges posed by misinformation during health crises like the COVID-19 pandemic.

Melki et al. (2021) analyzed the interplay between the exposure of the population to the news, their trust in these sources of information, and the propagation of such misinformation on social media platforms. The study explored the concept of "infodemics" and how exposure to news sources influences individuals' trust in news, their susceptibility to believing false COVID-19 information, and their likelihood to share such information on social media. Their research involved analyzing survey data from participants regarding their news consumption habits, trust in various news sources, belief in COVID-19 misinformation, and tendencies to share such information on social media.

Their findings suggested that individuals who trust traditional news sources and consume news more frequently tend to have higher media literacy levels, resulting in a lower likelihood of believing in fake COVID-19 news and sharing it on social media. However, those who $t_3r_6$ust social media as a news source tend to be more prone to believing and spreading false information. Their work emphasizes the critical role of media literacy and responsible news consumption in countering the infodemic phenomenon, underscoring the importance of trusted news sources and the

need to educate individuals about verifying information before sharing it on social media platforms.

Focosi et al. (2021) delved into the significant influence of both mainstream and social media on information dissemination during the COVID-19 pandemic. They examined how these platforms contribute to both the spread of accurate information and misinformation, and discussed their implications for public health and society. Their study acknowledged the existence of an "infodemic" during the pandemic, characterized by an overwhelming flood of information that can challenge individuals' ability to discern reliable sources from falsehoods. Mainstream and social media platforms were recognized as key players in shaping public perceptions, attitudes, and behaviors related to the pandemic.

The authors proposed several strategies to address these challenges. They stressed the importance of media literacy education to empower individuals to critically evaluate information sources and distinguish between accurate and false content. Additionally, they advocated for collaborative efforts between health authorities and media organizations to ensure the accurate and timely dissemination of information. Social media platforms were encouraged to implement measures to mitigate the spread of misinformation, such as promoting fact-checking, flagging false information, and reducing the algorithmic amplification of dubious content.

Their research highlighted the dual nature of media influence during the pandemic. While mainstream and social media platforms can disseminate crucial information, they also contribute to the proliferation of misinformation. The article underscored the significance of responsible reporting, media literacy, and collaborative efforts to combat the negative impact of infodemics and ensure the prevalence of accurate information during health crises.

Nascimento et al. (2021) presented a comprehensive summary of existing research on infodemics and health misinformation. The authors conducted a systematic review of reviews to examine the scope, trends, and impacts of infodemics, particularly in the context of health-related information. Their work highlighted the prevalence of infodemics across various health topics and disease outbreaks. It outlined the numerous sources from which health misinformation emanates, including social

media, news outlets, and personal narratives. Their review indicated that misinformation can contribute to distorted public understanding, erode trust in authoritative sources, and even result in adverse health behaviors. It discussed how misinformation spreads rapidly through digital platforms and emphasizes the challenges faced by individuals and healthcare professionals in navigating the deluge of information.

The article underscored the potential harm that can arise from misinformation, including the spread of false treatments, vaccine hesitancy, and ineffective preventive measures. It also notes the role of cognitive biases and echo chambers in amplifying misinformation's impact. The article calls for coordinated efforts among researchers, policymakers, and media organizations to combat the negative effects of infodemics. This includes promoting media literacy, fact- checking, and developing strategies to counter misinformation during health crises. Their work highlights the challenges posed by misinformation in the digital age and underscores the urgent need for collaborative strategies to address these issues, safeguard accurate information dissemination, and enhance public health responses.

Luo et al. (2021) introduced a dataset specifically designed for identifying and combating misinformation in the Chinese context. With the term "infodemic" referring to the overwhelming spread of misinformation during crises, their article addressed the need for accurate information dissemination by providing a dataset that aids in identifying false content.

The dataset created by the authors contained a substantial collection of Chinese-language social media posts related to COVID-19. These posts encompass both misinformation and accurate information, offering a diverse set of content for analysis. The article outlines the methodology used to construct the dataset, including the process of selecting and categorizing posts to cover various types of misinformation prevalent during the pandemic.

The authors discussed the significance of the dataset for advancing research on misinformation detection. They highlighted the potential applications, such as training machine learning models to automatically identify and flag false content. Additionally, the article emphasized the importance of international collaboration in addressing

infodemics, noting that the dataset can contribute to the global effort to combat misinformation. Overall, they introduced a dataset focused on identifying misinformation related to COVID-19 in the Chinese context. Their article outlines the dataset creation process, its potential applications, and underscores the importance of global collaboration to counteract the spread of false information during crises.

Zielinski et al. (2021) provided a historical overview of infodemics, tracing their origins to earlier infectious disease outbreaks like the H1N1 influenza pandemic in 2009 and the Ebola epidemic in West Africa. These events highlighted the rapid dissemination of inaccurate information through various channels, including social media, which could potentially hinder effective public health responses. They discussed certain key issues related to the infodemic which included digital age challenges, risks to public health, infodemiology as a discipline, data sources and analysis, collaboration with public health and future implications. The authors highlighted the challenges posed by the rapid spread of misinformation during health crises and introduces the concept of infodemiology as a means to study and address these challenges. The article underscored the need for collaboration between various stakeholders to develop strategies that harness the power of digital communication while mitigating the risks associated with infodemics. This field has the potential to significantly impact public health efforts and contribute to more effective communication strategies during disease outbreaks and health emergencies.

Alvarez-Galvez et al. (2021) presented a comprehensive analysis of the factors contributing to the emergence and spread of "infodemics" during disease outbreaks. They conducted a systematic review to identify key determinants behind the occurrence of infodemics during disease outbreaks. The authors sought to understand the underlying causes of infodemics during disease outbreaks. By systematically reviewing relevant literature, the authors aimed to identify common themes and factors that contribute to the spread of misinformation. A thorough review of existing research studies was performed that investigated the phenomenon of infodemics. They analyzed various dimensions, such as the sources of misinformation, the types of misinformation, the platforms facilitating its spread, and the impact of misinformation on public perception and health behaviors. The review reveals several determinants that contribute to the emergence of infodemics which include

information vacuums, misinterpretation of information, fear and anxiety, misleading sources, cognitive biases, lack of health literacy, and cultural and social factors. The authors provided insights into the factors that contribute to the spread of misinformation during health crises. By identifying these determinants, the article offers valuable guidance for public health officials, policymakers, and communication experts to develop effective strategies that mitigate the impact of infodemics and ensure accurate information reaches the public during disease outbreaks.

Banerjee et al. (2021) explored the concept of COVID-19 being accompanied by an "infodemic," which refers to the rapid spread of both accurate and inaccurate information during the pandemic. Their article emphasized the significant influence of social media in shaping public perception and understanding of the COVID-19 crisis.

Key points from the article included:

Infodemic Nature of COVID-19: The article discusses how the vast amount of information, both reliable and misleading, related to COVID-19 contributed to an infodemic. This information overload made it challenging for individuals to discern accurate information from false claims, leading to confusion and potential negative consequences for public health efforts.

Role of social media: Social media platforms played a pivotal role in the dissemination of information during the pandemic. They facilitated rapid sharing of news, updates, and opinions, but also became breeding grounds for rumors, conspiracy theories, and misinformation.

Spread of misinformation: The article highlights that false information related to COVID-19 gained traction on social media due to factors such as sensationalism, emotional appeal, and the echo chamber effect, where individuals are exposed to information that reinforces their existing beliefs.

Impact on public health: Misinformation on social media had real-world consequences, including the promotion of unproven treatments, downplaying the severity of the virus, and discouraging adherence to preventive measures. This could undermine public health efforts to control the spread of the virus.

To summarize, their article highlighted how social media played a central role in both disseminating information and spreading misinformation during the COVID-19

pandemic. It emphasized the necessity of accurate communication, health literacy, and collaboration with social media influencers to counteract the negative impacts of the infodemic and ensure that public health messages reach the intended audience.

Dash et al. in 2021, proposed a strategy to address the spread of misinformation (infodemic) related to COVID-19 in countries with limited resources. They proposed a three-level approach which suggested:

Micro-Level Interventions: These focus on individuals and communities. It suggests promoting media literacy and critical thinking skills among the population to help them identify and avoid misinformation. Additionally, engaging with community leaders and influencers to disseminate accurate information is recommended.

Meso-Level Interventions: This level involves working with institutions and organizations. The article proposes the development of partnerships between public health authorities, media outlets, and tech platforms to ensure the accurate and consistent dissemination of information. Fact-checking initiatives and guidelines for responsible reporting could be implemented.

Macro-Level Interventions: At the highest level, governments should establish clear communication strategies. This involves transparently sharing information, addressing public concerns, and countering misinformation through official channels. Collaborating with international organizations and other governments can provide additional resources and expertise.

Overall, the article emphasizes a multi-pronged approach to tackle the infodemic, recognizing the importance of tailored interventions at different levels of society and governance .

Abdul et al. (2021) explored the interconnectedness of the COVID-19 pandemic, the infodemic (proliferation of misinformation), and the resilience of the people in India. The viewpoint emphasized the multifaceted impact of the pandemic, including not only its health-related consequences but also the deluge of misinformation that exacerbates the challenges.

The article discusses how the infodemi$_4$c$_2$ has affected public perceptions and behavior during the pandemic, leading to confusion, anxiety, and potentially

harmful actions. It highlights that while the internet and social media have provided platforms for information dissemination, they have also become breeding grounds for rumors and false information. Their article underscores the importance of resilience in navigating these challenges, with individuals, communities, and healthcare systems adapting to the evolving situation. It also emphasizes the role of responsible journalism, accurate reporting, and media literacy in mitigating the negative effects of the infodemic and promoting informed decision-making among the public.

Bertinato et al. in 2021 set up an ad hoc Working Group on Scientific Literature Updates to screen pre-prints and peer-reviewed papers from arXiv, medRxiv, bioRxiv, and PubMed, providing real-time knowledge and empirical evidence to health workers from March to May 2020. The group screened a total of 4,568 pre-prints and 15,590 peer-reviewed papers, delivering daily summary reports of pre-print selection for ISS President activity within the National Scientific Technical Committee framework, and a weekly open-access publication (COVID Contents) highlighting peer-reviewed papers of interest for health professionals, with monitoring via a satisfaction questionnaire.

The authors devised strategies including the identification of reliable sources, communication training, collaboration with media, and engagement with the public to tackle the COVID-19 infodemic. They concluded that promoting health literacy through a cross-cutting approach represents a significant asset of Public Health Institutes and serves as a proven effective non-pharmacological intervention.

Alvarez-Galvez et al. in 2021, aimed to investigate the determinants of infodemics during disease outbreaks, utilizing both quantitative and qualitative methods. They identified five key determinants of infodemics: (1) information sources; (2) the structure and consensus within online communities; (3) communication channels (including mass media, social media, forums, and websites); (4) the content of messages (such as information quality and sensationalism); and (5) contextual factors (e.g., social consensus, health emergencies, and public opinion).

Additionally, they outlined various measures to combat misinformation during outbreaks. They noted that narratives and misleading content often induce fear, anxiety, and mistrust toward government and health institutions. Opinion polarization

and echo chamber effects further exacerbate misinformation, driven by the tendency for social media users to cluster with like-minded individuals and resist evidence-based knowledge and behavioral change.

The authors emphasized the significant potential of social media platforms in combating health misinformation by promoting educational content related to health and addressing common questions about transmission, symptoms, and prevention. However, they stressed the importance of proper coordination by specific programs and interventions from governments and health organizations to ensure effectiveness. They suggested increasing the visibility of evidence-based knowledge generated by health organizations and academia while actively identifying and addressing sources of misinformation.

Dutta et al. in January 2022, proposed a research framework to investigate how citizens' trust in government and social media impacts their willingness to adhere to COVID-19 preventive measures. They also examined the role of health infodemics in shaping perceptions and relationships among various factors influencing individuals' readiness to follow these measures in Taiwan. Their findings revealed that citizens' trust in social media, along with their attitudes, perceived benefits, personal innovativeness, and peer influences, positively influenced their readiness to adhere to preventive measures. However, the relationship between citizens' trust in the government and their readiness to follow these measures was not found to be statistically significant. The authors suggested that governments should focus on creating engaging, well-informed, and evidence-based content to enhance citizens' health literacy and combat the spread of misinformation.

Wan et al. (2022) focused on using data-driven approaches to analyze the phenomenon of the COVID-19 "infodemic." An infodemic refers to the rapid and widespread dissemination of both accurate and inaccurate information during a health crisis. Their article employs data analytics to understand the patterns, sources, and impact of information shared during the COVID-19 pandemic. The authors acknowledged that alongside the COVID-19 pandemic, there was an influx of information and misinformation related to the virus. This infodemic had implications for public health responses and individuals' understanding of the crisis. They emphasized the use of data analytics to study the infodemic. By analyzing large

volumes of data from various sources, such as social media, news articles, and online discussions, researchers can identify trends, themes, and patterns in the spread of information. The authors discussed the creation of visual maps or networks that illustrate how information flows through online platforms. These maps revealed influential users, common narratives, and the connections between different pieces of information. At the same time, acknowledged challenges in data analytics, including the vast volume of information, the need for accurate data labeling, and the dynamic nature of online discussions. Their work emphasized the role of data analytics in understanding the patterns, sources, and impact of information during the COVID-19 pandemic. By leveraging data- driven approaches, researchers can identify misinformation, map information flows, monitor public sentiment, and inform risk communication strategies. This enables more effective management of the infodemic's effects on public health and society.

Guptar et al. (2022) focused on understanding the patterns of the COVID-19 "infodemic," referring to the rapid spread of false information during the pandemic, and proposed a systematic and pragmatic approach to mitigate the impact of fake news. The study aims to identify common themes and trends in the spread of misinformation related to COVID-19 and to provide strategies to counteract its negative effects.

Their research involved a systematic analysis of fake news stories related to COVID-19 across various sources, including social media platforms, news websites, and online discussions. The study categorized the misinformation into themes, such as false treatments, conspiracy theories, and inaccurate statistics. The findings revealed that misinformation often exploits people's fears and pre- existing beliefs, resulting in the rapid dissemination of false information. To curb the spread of fake news, the study proposed a multi-pronged approach that includes enhancing media literacy among the public, promoting fact-checking by media organizations, and implementing stricter policies by social media platforms to identify and remove false content promptly. Their work highlighted the importance of collaborative efforts among various stakeholders, including media, technology companies, and the public, to effectively combat the infodemic and ensure accurate information prevails during health crises.

Cotter et al. (Mar 2022) conducted a thematic analysis of official English-language documents issued by Facebook, Twitter, and YouTube pertaining to fact-checking, with a specific focus on documents addressing COVID-19 misinformation. Their search yielded various materials including blog posts, press releases, policy documents, and help pages, all representing a subset of a larger collection of documents concerning misinformation and fact-checking on the platforms in general. Through qualitative coding of these 60 documents via an iterative process, they examined how the platforms responded to the COVID-19 infodemic and how they positioned themselves rhetorically in this context. Additionally, they conducted a retrospective case study of the viral video Plandemic, which contained false claims about COVID-19 and public health officials, to assess how the platforms applied their policies and practices in practice.

Their analysis revealed that all platforms had integrated fact-checking into their content moderation infrastructure, treating it as a specialized area within their policies and practices. The platforms described a dual response to COVID-19 misinformation: verifying information and limiting the visibility of false or inaccurate content. However, they observed that the platforms prioritized limiting the visibility of potentially false and inaccurate information over adjudicating the veracity of claims, expecting users to discern truth independently.

During the early stages of the pandemic, Facebook, Twitter, and YouTube primarily focused on managing the visibility of COVID-19 misinformation on their platforms through vaguely described policies and practices characterized by subjectivity. This focus on limiting visibility diverted attention from the desired outcome of fact-checking: an informed global public, particularly crucial during a pandemic.

The findings suggested potential actions for platforms to shift efforts from regulating the visibility of misinformation towards fostering informedness and promoting fact-based discourse. They proposed that platforms allocate resources not only to verify the truthfulness of content but also to enhance users' media and digital literacies through interventions within platform interfaces.

Wan et al. in June 2022, analyzed the linguistic characteristics of COVID-19 myths and misinformation proliferating on the internet, gathering approximately 8000 false

headlines and 5000 true headlines. Their findings revealed significant differences between the two categories of statements. Myths tended to have longer sentence lengths, while facts exhibited longer average word lengths. This indicated an inverse relationship between sentence length and word length distributions for false and true statements. True information tended to employ longer words and shorter sentences, reflecting a more concise structure in lexical semantics. Conversely, false information utilized longer sentences with shorter words, resulting in a more elaborate packaging of information.

The language used in myths frequently featured verbs like "fighting" or "curing" COVID-19, suggesting a strong desire to exert control over the virus. In contrast, factual statements tended to employ more neutral verbs such as "generate," "neutralize," or "differentiate." Furthermore, factual statements incorporated more positive words like "involve" or "bode," while myths often conveyed strong sentiments or framed patients as victims using words like "hit," "cause," "affect," or "impact." Additionally, true information more commonly referred to SARS-CoV-2, whereas myths were typically limited to terms like COVID-19 or emphasized it more strongly as a "pandemic."

6.3 Additional review of scientific and non-scientific literature:

Several events across the world that occurred as a negative consequence of the infodemic were identified-

- Obsessive reading of content related to COVID-19 led to somatic complaints amongst numerous individuals from all age groups. These included difficulty in breathing, irritation in the throat, insomnia, lethargy, loss of taste, and depression. A panic reaction from the people was expected, but the response to exaggerated mortality rates and epidemic spread manifested in the form of anger, blaming, and violence against those infected.
- SARSCoV-2 has much lower mutation rates than the hepatitis C virus or influenza. Viral mutations are an expected phenomenon but mutations of SARS-CoV-2 were presented in an exaggerated sense in order to instill havoc and fear.

- The disease was framed as 'deadly', while the actual mortality rate was only 1.8 to 4% which is much lower than other chronic diseases such as tuberculosis.

3.2.1 Real-world events:

Message - concentrated alcohol can kill the novel coronavirus.

Consequence: Methanol poisoning leads to the deaths of more than 700 people and blindness in 6000 people in Iran and other developing countries.

Message: Vitamin C is a miracle cure for the novel coronavirus.

Consequence: The sales of over-the-counter vitamin C tablets skyrocketed. People sought to hoard the tablets.

Message: 5G towers could spread the coronavirus.

Consequence: Numerous 5G cell phone towers were destroyed in Europe.

Message: *COVID-19 was manufactured in a Chinese bio-laboratory.* Consequence: A general hatred and racism was observed against China amongst citizens from the rest of the countries.

Message: '*Coronavirus was found in horses.*' Consequence: Several horses were irrationally killed. It also led to domestic criminal cases.

Message: Masks and face coverings are not effective in preventing the spread of COVID-19.

Consequence: Anti-mask factions came into the picture promoting resilience

Message: Convalescent plasma is unable to provide clinical benefit in COVID- 19 patients.

Consequence: Drastic drop in usage of convalescent plasma in several countries leading to higher mortality.

A rumor about the possible lockdown of Lombardy (a region in northern Italy) without official confirmation from the Italian Prime Minister resulted in overcrowding in trains and airports, which ironically facilitated the spread of contagion.

3.2.2 Events associated with political figures:

- Saad Omer, director of the Yale Institute for Global Health, stated that 'Governments want to
- be perceived as being in control and are too quick to provide false reassurance. Governments rarely make policy decisions solely on the basis of empirical evidence; political interest is key, and the two are frequently at odds.
- Conservatives are more likely to share false stories (Guess, Nagler, and Tucker 2019)
- The media ecosystem was found to be asymmetrical, consisting of tightly integrated right-wing media while the rest of the media spectrum was not separated in the center and left-wing media
  (Benkler, Faris, and Roberts 2018).
- Although only 20% of the misinformation messages were shared by politicians, celebrities, and other public figures, it accounted for about 70% of the total social media engagement against SARS-CoV-2 led to the consumption of cleaning solutions by some citizens in Georgia.
- Accusation of countries using the virus as a bioweapon.

6.3.3 Events in India:

- Suicidal cases have been described due to the fear of disease or as a measure to protect the community members from infection.
- People are reluctant to visit physicians for treatment of any other ailments as well.
- Patients suffering from chronic diseases other than COVID-19 were unable to access the required medical care and some lost their lives.
- Populations in rural areas do not allow people from the urban areas to enter their villages, labelling the infection of 'urban origin.'
- Patients with kidney failure, in some parts of India, were denied lifesaving dialysis
- Chemotherapy of cancer patients was delayed in the absence of laboratory reports.
- The fear due to the virus worsened the health of patients with other systemic conditions such as diabetes and stress, particularly those in the elderly age

group. One confounding factor could be the generation of excessive stress and fear. Consequently, the mortality rate of individuals in this age group increased and the blame was laid on the pandemic (while it was the infodemic at work).

- False cures for COVID-19 such as smoking, cocaine, or even cow urine were suggested.

3.2.4 Conspiracy theories:

- COVID-19 was engineered, not naturally occurring; masks can make people sick
- Plandemic - "a shadowy cabal of elites is using a global crisis as a cover to profiteer and entrench their power" (Newton, 2020)
- COVID-19 vaccines contain nanobots that will monitor us from the inside
- Masks contain tracking devices used for surveillance Masks contain or herald the 'mark of the beasts'