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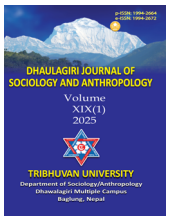

COVID-19 Pandemic and Media in Nepal: A Thematic Analysis of the Information and Infodemic at the First Wave of SARS-Cov-2

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Abstract

The infodemic of the COVID-19 pandemic throughout the globe has been reported as a new threat to the response to the pandemic, its state has not been adequately known in Nepal. This research aims to analyze the context and state of infodemic concerning the COVID-19 pandemic in Nepal, using the thematic analysis method. The news content published in Nepal during the first wave of COVID-19 pandemic has been used as data in this research. Two themes, six sub-themes, 21 code-groups, and 40 codes have been developed from the 80 pieces of sampled content. The samples of news and information were taken from purposively selected three media sources: Twitter (social media), ekantipur (print media), and online khabar (online media). The information considered for analysis was published throughout the week (08 March 2020 to 16 March 2020), within which the World Health Organization declared COVID-19 as a pandemic (11 March 2020). The results show media has disseminated some valuable information to make people aware of the pandemic, yet cases of infodemic have been notably high. Modification of the hospital's press notes, and misuse of the Coat of Arms of the World Health Organization (WHO), United Nations Children's Fund (UNICEF), and Government of Nepal - Ministry of Health and Population, were the most serious issues of infodemic, which misinformed even well-educated individuals. As there has been a complex information ecosystem characterized by information paradox and trust deficit, which has fundamentally altered peoples' understanding of and response to public health emergency and making people vulnerable to long-term health problems. These findings call for a policy priority to address the issue of infodemic and reduce infodemic-related threats, thereby advancing the health system governance in Nepal.

***Keywords*:** COVID-19; epidemic; health system; infodemic; media; Nepal; pandemic

Introduction

Access to authentic information is a critical component of public health management in the time of a pandemic. Media plays a powerful role in informing people and constructing public opinions on issues of local to global concerns. Taking the case of the Corona Virus Disease (COVID-19) pandemic, this paper analyzed the state of information and infodemic presented in local media in Nepal at the time of the COVID-19 pandemic. A new lethal infectious disease caused by the Novel Corona Virus 2 (SARS-CoV-2), which is named as the COVID-19 (World Health Organization 2020a), has been declared a pandemic on the 11th of March 2020. COVID-19 is probably the first disease in human history to reach the state of pandemic within a couple of months of its official recognition on December 31, 2019. The disease claimed multi-million lives, infected hundreds of millions of people, and dismantled every sphere of life on the earth for more than two years. Although the world is gradually returning to normal, the risk of COVID-19 or any other health crisis, however, remains.

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The trusted, accurate, simple, and widely shared risk information saves lives (United Nations, 2020) in any disaster and health emergencies. However, the globe experienced wide dissemination of false information during the pandemic that has undermined the people's health and challenged authorities in the prevention and cure of the disease. The problems of infodemic are not new; however, with the spread of COVID-19 pandemic on the one hand and easy access to media on the other, the volume and flow have risen rapidly. Consequently, the World Health Organization (2020b) called on technologists and researchers to design effective strategies and methods against misinformation and disinformation. Nevertheless, infodemic continued, indicating that fighting infodemic is not an easy task in the age of information and communication technology. The result has been that the infodemic has received research attention globally.

The issue of infodemic is global, with its variable influence over time, space, and incidents. Yang et al. (2021) studied infodemics by comparing the big data from Tweeter and Facebook and found divergence among the prevalence of popular low-credibility sources and suspicious videos. Pool et al. (2021) found 414 articles, with 84% published within 2020, containing six infodemic clusters (sub-themes) and 40 research nodes (codes) on the same. De Caro (2020) after analyzing over 600K tweets (January 10 to May 8, 2020) from over 600 million and found about 10% containing misinformation. In South Korea, over two-thirds of the studied adults have been exposed to misinformation such as gargling with saltwater, drinking alcohol, smoking, and taking antibiotics (Lee et al., 2020), and spraying saltwater in the mouth (Park, 2020) would prevent SARS-Cov-2 infection or cure it. Mehrpour and Sadeghi (2020), and Soltaninejad (2020) also identified a spike in cases of methanol poisoning in several countries, which is attributed to unfounded rumors that drinking or gargling alcohol could prevent infection from the virus or cure COVID-19. As the crisis was global and many countries suffered from an infodemic, the COVID-19 Infodemics Observatory (CIO, 2020) classified countries with different risk indices of infodemics. Nepal was categorized as a country having a low to medium level of infodemic risk with an Index value of 43.4% and a medium to high level of News Unreliability Index (50.0%); however, there was a lack of research in Nepal while initiating this research in 2020.

Infodemic and pandemic are the central concepts applied in this research. An infodemic is excessive much information, including false or misleading information, in digital and physical environments during a disease outbreak (World Health Organization, 2020c). The infodemic in this work is defined as - Information Disorder Syndrome (Infodisyndrome) - referring to misinformation (sharing of information without evaluating its truth), disinformation (making and sharing wrong information – with a vested interest such as to create fear and havoc or with an interest of increasing the reach-out of information), and malinformation (producing, or advertising wrong information). Infodemic causes either serious panic in public or encourages malpractices of curative health, resulting in erosion of public trust over the formal health system (Zarocostas, 2020; World Health Organization, 2020d) on the one hand and creating further health complications on the other. This warrants the need of conducting research in the field to design policies for its effective management.

At the first wave of COVID-19 pandemic, there were many uncertainties. Medical and laboratory scientists identified new information at each stage of clinical and laboratory examinations for COVID-19. They were losing confidence in disseminating the findings to non-scientific audiences, fearing miscommunication. However, those who lacked medical and virological knowledge were creating and disseminating information under pseudoscience or conspiring to spread false information. Consequently, a flood of research works in the infodemic emerged around the globe. The effect is that it has created a problem that people distinguish truth from the fake news, rather, believe in fake news that mingles well with real news, and becomes viral since it spreads faster than the real one (Vosoughi et al., 2018). Nevertheless, infodemic was not a prioritized research agenda for Nepal at the time.

The background information above introduced the concept and identified a research gap, particularly in the Nepali context, so this research was planned and has been completed accordingly. In the process, this research addressed the question: What type of information and infodemic has been disseminated through Nepali media in relation to the COVID-19 pandemic? What is the pattern of information and infodemic among the studied pieces of text? This study is expected to help authorities prepare to detect infodemics and deal with their immediate and long-term threats to facilitate the community to cope during public health crises such as the COVID-19 pandemic.

Conceptualization and Status of Knowledge

Concept of Information and Infodemic in Relation to Epidemic and Pandemic

The concept of an infodemic can be understood as an overabundance of information, misinformation, and disinformation that impede the implementation of public health policies deemed appropriate during public health emergencies (Pool, Fathehi, & Akhlaghpour, 2021). Sometimes, it is defined as a tsunami of information — some accurate, some not —that spreads alongside a disease outbreak and makes it hard for people to find trustworthy sources and reliable guidance when they need it (World Health Organization, 2020e). Gradon et al., (2021) understood it as the spread of disinformation, misinformation and malinformation. The infodemic exacerbates the situation at large in times of emergency, and it has been particularly

severe during the COVID-19 pandemic, as rumors have amplified the negative impacts on population health (Open Access Government, 2020). However, infodemic is not a new occurrence at the time of COVID-19 pandemic. It has also been spread during the yellow fever, meningitis, and Ebola outbreaks, and during other environmental disasters as well, such as the Nepal earthquake of 2015, the East Asian Tsunami of 2001, and hurricanes such as Katrina and Mitch.

Epidemic and pandemic have numerical and spatial connotations so the characteristics of infodemic apply to both situations. Spatially, an epidemic is associated with a relatively small unit, but has high intensity, while a pandemic may affect wider places, such as the globe, and is less severe than an epidemic (World Health Organization, 2020f). The infodemic on the other, may lead an epidemic to the pandemic of information. It means that where the disease has not reached, the fear of disease through infodemic may have led to panic attacks in distant populations. Nevertheless, when the conditions are right, both epidemics and pandemic can potentially create a nightmare - the war of all against all, that promotes three types of epidemics at a time: of fear (of people), of moralization (of media), and of actions (the authorities), (Strong, 1990).

Although a pandemic is a global issue, local stakeholders such as media, key informants such as educated and conscious people, medical personnel, lab-scientist, policy makers of a country or province, even of local governments, can do a lot to protect their people. The pandemic gives them the opportunity to review their health, economic, and social systems, key resources, and critical infrastructure, and prepare or demonstrate scale-specific performance so the communities are resilient to future shocks and stress. On the other hand, the infodemic creates additional challenges for them to manage the pandemic, resulting in less viable strategies to respond to it.

Status of Knowledge on Infodemics to Epidemic and Pandemic

Modern communication system facilitates fast spread of information. However, giving people concrete, detailed, and accurate information, suggesting a list of prioritized actions to be done at different stages of the pandemic, or, if one is contacted with the disease, and providing such information from authentic sources or media, is a critical responsibility of the media. Nevertheless, studies on media reporting during the epidemic and pandemic often show something else. For example, Fischhoff (2011) reported newspaper making sensational headline on lethal infectious diseases but severely lacking effective communication such as inclusion of the voice of scientists and others to be honest about underlying uncertainties. It is a common communication crisis that media often focus on what may have seemed interesting, but not what is necessary for people to educate them and make appropriate decisions on public health issues. For example, during the H1N1 pandemic of 2009, Staniland and Smith (2013) found media as an unequivocal 'folk devil.' The speed of the spread of the news also meant that representatives of order – scientists, doctors, policymakers – could address the issue at an appropriate level and authority won this framing contest. Nevertheless, the same level of responses may not be guaranteed in the time of every epidemics of pandemic such as that was not observed in the time of Ebola in 2014 (Calnan et al., 2018) and in the case of COVID-19 as well.

Lin et al. (2014) studied the effect of socio-economic status (SES) and found that people with higher SES, higher news exposure, and higher levels of H1N1-related knowledge, as well as those who actively seek information, are less likely than their counterparts to adopt incorrect prevention behaviors. Husemann and Fischer (2015) analyzed the content of media coverage during the H1N1 pandemic (2009-2010) in Germany and found that media awareness played strong role in disseminating actual situation in the pandemic, hence, the changes in the number of infected people were associated with nearly identical changes in the number of newspaper articles, that helped authorities to make health messages effective. As Dingwall, et al. (2013) stated, media reporting can be distinguished through a fine line between preparedness and alarmism, so generating enough public concern to engage in self-protection against of provoking panic is crucial. This also suggests that the media's strategies for public health communication to prepare people for public health emergencies, and making the authorities accountable for their responsibilities, are important components of pandemic management.

The studies in infodemic during the COVID-19 pandemic are also emerged widely in the global context. For instance, Casero-Ripoll´es, (2020) claimed nearly half of the citizens surveyed encountered fake news related to origin, prevention, cures, diagnostic procedures, and protective measures of COVID-19. Gupta et al., (2022) identified altered individual perception and behavioral shift leading to irrational preventative actions and imminent threat to public safety and health in turn due to entertaining unauthentic information on COVID-19. Iran's Legal Medicine Organization stated that 796 people died from alcohol poisoning in the country as a result of rumors spread through social media that claimed alcohol cures COVID infections (Spring, 2020).

The review above demonstrated that studies on media in reference to various pandemic and epidemic have influenced social-economic and psychological state of people that has implicated into preparedness and response strategies to pandemic in turn. The dual roles of media have also been identified: the agents of spreading the infodemic and creating a panic situation to the most of the cases, followed by some demonstrating accountability towards the communities and disseminating appropriate and relatively correct information and facilitating people to prepare to deal with the crises. Despite having a flood

of research on infodemic at the time of the first wave of COVID-19 pandemic, works that represent Nepal's information are severely lacking. In this context, this research analyses the state of information and infodemic in Nepal at the first wave of COVID-19 pandemic to understand the state of infodemic in Nepal, using following conceptual framework.

Conceptual Framework

A conceptual framework (Figure 1) is developed below to demonstrate the role of media in the dissemination of information and infodemic during the COVID-19 pandemic. The framework presents an interplay among the elements of information and infodemic and identifies its policy implications. The elements, based on their hierarchies, range from code groups, sub theme, and theme, as well as the umbrella theme, which is the central objective of the research. The level of awareness of the diseases, preparedness, and practice, as well as associated outcomes (positive or negative), play a critical role in people's concern over information and infodemic communicated through media. There is a two-way interaction and a two-way intervention. People and the community can influence, and be affected by, such information, either positively or negatively. Cohesive community, strong economy, culture of healthy practice or adherence to the health directives, and sound development and practice of technology and systems (medical) may reduce the impact of infodemic. While the opposite situation may increase its influence, compromising people's right to correct information on the one hand and their right to be healthy on the other. The intervention side, as demonstrated in the figure, indicates one programmatic (infodemiological) knowledge, and another the intervention actions (implications).

Tackling the infodemic requires a systematic approach. The strategy of adopting a systematic approach itself is a science of infodemiology that develops evidence-based intervention strategies against the infodemic. An evidence-based intervention strategy consists of preparation,

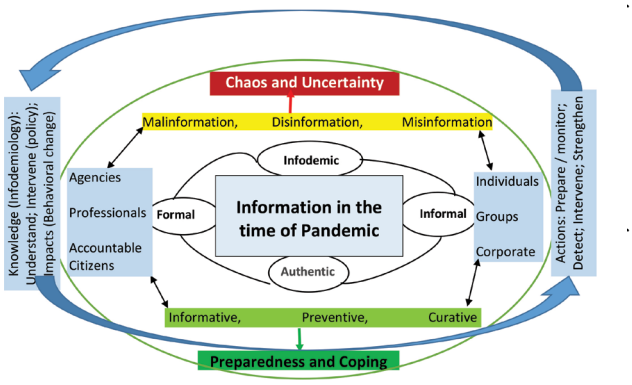

Figure 1:
Conceptual framework on flow of information and corresponding implications to social life at the time of COVID-19 pandemic

The framework presented in Figure 1 is detailed, and a single paper may not be sufficient to analyze each of its components adequately. For instance, in the context of the pandemic, both formal and informal sources disseminate information. The information, if it is authentic, it is informative, preventive, and curative. Infodemic, on the other hand, may challenge agencies, professionals, and conscious or accountable citizens to successfully perform their responsibilities, and make people believe that they are disseminating only authentic information, to the degree of truth they believe. This sort of information assists communities in preparing for and coping with crises. On the other hand, there are individuals, groups, or even corporate and institutional entities that have a vested interest, who often overlook their social responsibility and instead feel comfortable while panicking others. Therefore, the central focus of this research is to analyze the state of information and infodemic spread in Nepal in relation to the COVID-19 pandemic. To reach the conclusion through the presented framework, this research adopted the following methods of data collection, analysis, and interpretation.

Research Methods

Research Design Data Collection

This research is descriptive and explanatory. The study employed a qualitative interpretation of the media content for meaning-making. This method, in the context of the study of infodemic, is a new effort made in Nepali context, as far as the author identified the scientific literature, at the time when the research was designed. The information collected from the text was first coded, which was then clustered into a number of code groups, sub-themes, themes, and the umbrella theme (research questions), leading to the central thesis. The researcher was inspired to conduct this research in response to the World Health Organization's calls for addressing pandemic-related misinformation and disinformation. That means, this paper contributes a bit in creating discourse and presenting Nepal's landscape to the wider audience and document the incident of infodemic in the formal literature for future reference. The finding may also help to generalize the infodemic situation and alert authorities to address it in any future crises.

Data Collection Methods

The data were collected online, retrieved at a specified point in time and location, and via a specified internet service provider. It is reported here because the level and types of contents available (display/access) can differ by these elements. Kathmandu (Lalitpur – 2, Sanepa) was the strategic location used during the online search where the research activities took place. The internet service provider was Classic-Tech. Therefore, the findings may vary with similar studies if data were used from different locations, and under the service of different service providers. The

media contents included were those which focused on Nepal and Nepali (including information about Nepali abroad and covered by selected Nepali media) within the defined date, i.e., 08-16 March, 2020. The date (week) to collect data was purposively sampled since the WHO declared COVID-19 a pandemic in the middle of the week, i.e., the 11th of March 2020.

The data collected were both primary and secondary, although most of the qualitative data were primary, as expressed by the individuals through social media (Twitter) and secondary (analytical) as published in news media. In the context of qualitative thematic content analysis, the truthfulness of the message of media content was verified by comparing the message of formal sources.

Three types of data sources: the Tweeter that represented the 'social media', ekantipur.com (having the largest number of visitors among the Nepali newspapers with print version) represented the 'print media' (although only the online version is used because of being accessible from work-place at the time of lockdown, and it was not available in print version during the lockdown), and online khabar.com (the online media having the largest visitors in all the online version of news portals of Nepal), represented the 'online media.'

The Tweeter data of the sampled date were searched and archived using the search criteria: Theme – 'WHO Declared COVID-19 as a Pandemic on that week, i.e., the 11th of March, 2020'; **#tag used for search:** #ncov19 OR #COVID19 OR #CoronaOutbreak OR #CoronaVirus (all included); **language:** English; **date:** until:2020-03-16 since:2020-03-08; **Date of search:** 17/03/2020. **People/ respondent:** From any One; **Location:** Near You (Kathmandu), Search Data (Pandemics) (08/03/2020 to 16/03/2020AD: 25/11/2076 - 03/12/2076BS). The archived data also record the Number of Replies, Re-tweets, and Likes to assess their outreach (dissemination).

Search Criteria applied for the online news media archive were

For the search in the news portal, the same search criteria were used and all the achieved data were stored and considered to be the universal number (N). In the news media, 89 article posts on ekantipur.com and 68 articles on onlinekhabar.com appeared relevant during the search. From the universal N, samples were purposively selected using the criteria of inclusion / exclusion mentioned above.

The tweets often have a single or a few messages while many analytical articles in news media have multiple messages within a single piece of writing. The information and data on news media and social media may also overlap. Therefore, from the total of 157 articles and 84 tweets (N=241), the texts of about a third (80) posts (relevant piece of information) were chosen after thoroughly reviewing them. These selected pieces of writing have been coded, followed by clustering into code groups, sub-themes, and themes. The themes have been narrated for meaning making (manually).

Method of Analysis

As stated above, the texts of the sampled posts were analyzed using the thematic analysis. These themes have been used as the sub-headings in the analysis section below. The final objective of the research was met after grounding the multiple-umbrella themes (clusters of sub-themes, code-groups and codes) into a theory or thesis statement, i.e., the title of this paper. As required to verify the authenticity of information shared through social media and news media, the message was compared with the information disseminated by formal agencies. The objective of qualitative interpretation of the thematic content is to explore and construct meaning by systematically transforming a large amount of text into a highly organized and concise summary of codes, sub-themes and themes as key results, so has been performed accordingly.

The initial step in thematic analysis is to read and re-read the text or the content and identify / generate ideas that an informant (a piece of text) expressed, by dividing the text into parts or meaningful units (codes, code groups, sub-themes and themes). In this process, two themes, six sub-themes, 21 code-groups and 40 codes have been developed from the 80 pieces of sampled content. These raw texts have also been interpreted to generate meanings from the contents. From those meaningful parts, stories the thesis statements have been developed.

Thematic analysis offers researchers the flexibility to identify, analyze, and report the patterns of codes to construct themes (Braun & Clarke, 2006). Therefore, it emphasizes the organization and rich description of the set; however, it is partly weak in rigorous analysis. In this context, the researcher has constantly questioned each stage of analysis and refined the meaning by asking own-self whether I am satisfied with the meaning I developed from the data and information others have published / shared? If the meaning "fits" to answer the research question: what sort of information and infodemic Nepali media has disseminated during the period of pandemic? The researcher also tried to find if the meaning constructed was valid to the theory and conceptual framework adopted by this research, and if that was consistent with or contradicted by empirical observations? In this sense, the process of analysis had been a flexible and reflexive action of working and re-working until the researcher was satisfied with the explanations and arguments developed and the concluding statement made. The overall results of this process are presented hereunder.

Analysis and Discussion

Media Content on Providing Information on the COVID-19 Pandemic

Media shared a variety of information in relation to

the COVID-19 pandemic, both correct (as of the time) and incorrect. Of the total 80 pieces of text content analyzed, about a third has positive information, and the text of about 15 pieces of information were contextualized here, because the rest of the other had repetitive/overlapping message. These pieces of information are intended to spread the positive message, with the intention of building awareness and preparing people for preventive and curative medicine.

Stories of China, Europe and the US

Among the information shared, many messages collectively stated rapid transmission of the SARS-Cov-2. In particular, these sources highlighted messages, which have been summarized under four code-groups, namely Rapid Global Spread, Monitoring of Real-Time Pandemic Statistics, Overwhelm Challenges the Healthcare System of the advanced countries are facing, and Precautionary International measures adopted / awareness built at the international level. Most of the information covered were trustworthy (Table 1).

Table 1:

Stories of China, Europe and the US from Information Perspective

The media informed people about the fast spread of the SARS-Cov-2 because of its transmission from asymptomatic person as well. They also sourced other references to inform people, in specific, information such as: *COVID-19 can spread even before people show symptoms: Study - NEW YORK: With COVID-19 outbreak killing over 5,400 people globally, researchers have identified how quickly the novel coronavirus can spread and that the time between cases in a chain of transmission*. The messages in Table 1 also warned people to adopt precautionary measures everywhere since no one knows the source of infection because it can be transmitted from an asymptomatic individual as well. The information was highly reliable as it has been scientifically proven. Before the knowledge, it became possible that COVID-19 reached the state of pandemic within two months of its official identification. This also challenged the authorities to control the spread of the virus.

Some of the media conveyed the information of the authorities and agencies correctly and responsibly to increase awareness of the COVID-19 pandemic. The Tweet#17 contributed to build *#Awareness [by sharing the] guidelines for #elderly care homes in a context of #Coronavirus Disease (COVID-19) provided by @ HelpAge International.* [The message further says*] Stay*

Table 1

Theme	Sub-Theme	Code-group	Meaning developed	Sources	Reliability Status
Media and Information	Stories of China, Europe and the US	Rapid Global Spread	SARS-CoV-2 transmitted rapidly from Wuhan to Europe, US, and developing nations (164k+ cases, 6.4k deaths globally at the time), causing health emergencies	eKantipur World, Online Khabar, @BBCWorld, @nytimes	Reliable - WHO verified data
		Real-Time Pandemic Statistics	Tracking of infection rates across 146+ countries, death toll (~3.9% mortality rate), recovery data, and critical care requirements	eKantipur World, Online Khabar, @ rajunepal	Reliable - Official health data
		Healthcare System Overwhelm	Hospital collapse in China (81k cases), Italy (24k cases), and in the US	eKantipur News, @ RepublicaNepal	Reliable - Government health data
		International Precautionary Awareness	People expressing concerns about pandemic despite geographical distance	@BBCWorld	Reliable - Preventive concern
Stories from Developing World, SAARC and Nepal	Stories of Developing World	Developing countries experienced gradual transmission	Slow virus entry into least developed countries including the SAARC countries where there exist weak healthcare system and infrastructure	eKantipur Pradesh-5, Online Khabar	Reliable - Development context accurate
	Stories of SAARC and Nepal	Activation of SAARC for collective response to the pandemic	SAARC initiation for collective response mechanisms	@Khabarhub_Eng, @ bihaninepal	Reliable - Observable cooperation
	Stories of Nepal	Spiritual Response	Prayers for affected individuals, collective hope considering severe lack in health system governance and infrastructure	eKantipur, Pradesh-5, @thehimalayan	Reliable - Cultural response pattern
		New Normal for Adaptation	Learning to live with constant fear and anxiety, behavioral adaptation to pandemic conditions	@broken_bad	Reliable - Adaptation process

safe. Don't worry, ... follow all these new behaviors for ... a few months to prevent rapid spread of the virus. This message was shared from abroad, which has also been shared in Nepal as well. The message intended to protect front-line medical personnel, with the message -safety first, of both the care givers and care seekers such as elderly, who are sensitive to the disease. It has also provided a few curative options and strategies to be taken while handling the infected or other care seekers, inside the attached guideline. The message was developed and disseminated by a formal care-giving institution, i.e., *@HelpAge International*, so it was reliable and trust-worthy, as of the research findings of the time. This was a good example that easy access to information and communication technology helped spread positive information and created awareness on COVID-19 pandemic. The ekantipur and online khabar have also summarized 'dos' and 'don'ts' at the time of COVID-19, as a part of awareness building.

Ekantipur and online khabar continually shared real-time statistics about COVID-19 that the disease has already travelled across 146+ countries, with a mortality rate of about 4%, followed by over 10% of critical care requirement. Similar information was also shared by Tweet#38, with an alarming mortality rate of *7% in closed cases and 10% serious/critical in active cases (sort of scary rates).* These data have been seen as quite serious because of the notably high death rate of COVID-19 infection. The intention of this Tweet, seemed to warn people to be careful and adopt safety measures by showing them the fear of death. The Tweet also urged authorities to be prepared to manage the high threat of the COVID-19. The other interpretation of the Tweet can be like that true or correct information also has paradoxical outcomes (informative or infodemic) in relation to risk perception. On the one hand, higher risk perception encourages people to adopt protective measures; on the other, it may provoke stress and anxiety, making people hopeless.

Both online khabar and ekantipur, as well as Tweets regularly shared the COVID-19 situation across China, Europe and the US, with the Tweets being more alarming as #74 stated - in Italy: *After #China, #Italy now quarantines 1/4th of national population - ... . Will lockdown stop the spread of #CoronavirusOutbreak? What lesson for the rest of the world?* Tweet#82 also shares the situation in Italy referring to the BBC News: *Italy death toll soars amid travel ban No. of dead soared to 350+ in Italy*. These tweets asked some prominent questions about controlling the spread of COVID-19 infection so that the people of places where the virus has not yet reached can stay safe. However, making efforts to be safe from the virus has been like that a soldier is struggling to be safe at battle field. The Tweet#75 also updated the virus situation, particularly in Italy, US and China: • *Italy quarantines a quarter of population to combat coronavirus.* • *Cruise ship hit by virus to dock in Oakland. ... China turns to propaganda to right image in virus "war."* Tweet#81 on the other, shared the COVID-19 status at the US as of the 9th March 2020: *#Coronavirus infected crosses 500 on the USA.* Similarly, Tweet#48 presented information on spread, infection, deaths and recovered data as of the 13th March 2020: *Corona Virus status: 5 AM March 13 Infected: 134,521 Death: 4,970 (3.7%) Recovered: 68,927 (51.2%) Active cases. 60,624 (45.1%) Death in China: 3,169 (63.8%) Death out of China: 1,801 (36.2%) #coronavirus*. These data have been well summarized and updated by both ekantipur and online khabar on a daily basis. The data on recovery rate gave some hope, although the number of deaths was soaring even in advanced countries. These stories cumulatively demonstrated that the COVID-19 pandemic has been a serious challenge to manage even for well-developed health governance systems, so it may hit developing countries even more. The economic effects of COVID-19 in news media, however, came notably late, at least not much during the week of data collection.

Stories from the Developing World

There were several cases of the dissemination of misleading information from so-called religious leaders in developing countries. However, there also were some exceptions that Tweet#23 shared *Buddhist nuns taking part in ritual prayers thinking of those affected by #coronavirus worldwide, at Bouddhanath Stupa, in Kathmandu. The prayers amidst fear yet ... pray for the end of the COVID-19 pandemic earliest.* This news was well covered in ekantipur also. Although this sort of spiritual effort may not cure the infected and end the pandemic, however, people may get some eternal peace and psychological well-being by doing so. This is an unproven science, yet it is expected that this positively impacts human immunity, also by reducing the level of stress and anxiety. The human nature in general is that whenever humans fail to deal with the crisis, he/she surrenders to God, begging for the betterment (Pandey, 2004; Pandey, 2008). The governments' response strategies and overall capacity and mechanisms of the health systems of developing countries, like Nepal, are simply ineffective and inefficient; the situation made people hopeless and helpless, compelling them to surrender to God, with the hope for life.

The poor health information management system in developing countries is also reported by Tweet#35: *among 47 LDCs, so far 25 active cases of #COVID19 has been reported, but ... actual number could be much higher .....* This message suspected that the COVID-19 has already reached the poor communities that lacked strong public health management systems. On the one hand, people have the tendency to hide health issues until they becomes acute (Pandey, 2004). Both news media ekantipur and online khabar focused on a slow spread of the virus into the least developed countries including the SAARC nations. Nevertheless, a low level of commuting, some sort of cultural contexts of socialization practices in SAARC countries such as a low level of face-to-face

interactions among individuals, culturally discouraged physical contacts between persons, might have somehow contributed to the slow spread of the virus. However, limited healthcare infrastructure and screening (tracking-tracing) might have also caused authorities to evaluate it falsely. Also, even if it was tracked and tested, there was no standard treatment for COVID-19, so people were not intended to have a test unless they had severe symptoms, and authorities were forced to do so.

Stories of South Asia and Nepal

After China, Europe, and the US, COVID-19 entered South Asia. Tweet#73 reported the spread of COVID-19 in all eight South Asian countries, with India having the highest number of cases. Nepali people are also worried about Nepali citizens abroad, as some media shared news of COVID-19 infections among them. For example, Tweet#69 and 70 reported: *Nepali students in Australia tested positive for coronavirus.* During the pandemic, it was a major concern for families, communities, and the government that their members abroad were infected. Similarly, ekantipur (K3) published news about 74 Nepalis in quarantine in Portugal. Such reports caused panic at home because they could do little against COVID-19, especially with bans on international and domestic travel. Travel restrictions, visa issues, travel costs, and concerns related to COVID-19 itself were additional challenges. At that time, Tweet#67 announced the first COVID-19 death in India, indicating the virus had reached South Asia: *1st death in India from #coronavirus.* Soon after, Tweet#32 shared information from India's Ministry of Health and Family Welfare that reported *a second death in New Delhi, the capital*. These developments seriously worried Nepal, as the country shares open borders with India from three sides, and cross-border movement is frequent. Furthermore, the spread of COVID-19 led to an influx of returning migrants on both sides. Consequently, neither India nor Nepal has been able to control the virus spread on their own, as seen after the first wave.

The scenario of the COVID-19 pandemic in developing countries and South Asia during the first wave was slow. As a result, the media had quite a lot of information about the developing countries and South Asia, including Nepal. Regarding the tweets analyzed above, media have adequately covered the scenarios of developed countries, followed by those of developing countries. Access to this sort of information has been possible due to the highly advanced information technology. The information also helped other countries and gave a time to prepare to tackle COVID-19. Nevertheless, not all the information is accessible to all and dissemination of these authentic information may be distorted on the way of diffusion (people to people, media to media), which eventually constructed a completely different meaning, even might have delivered wrong messages. Furthermore, building awareness through the dissemination of accurate information was not the only story; there was a flood of information, and over half of it was incorrect, i.e., an infodemic, which is analyzed in detail below.

Media and infodemic in the time of COVID-19 Pandemic in Nepal

Although notable number of social media posts were informative to the COVID-19 pandemic, many other posts in those sources, as well as in-print and online media globally have severely exaggerated information and promoted infodemic. Consequently, the WHO was compelled to raise its concern about the infodemic and formed a task force to monitor, tackle, and control the infodemic during the COVID-19 pandemic (Basnet, 2020). The infodemic has negatively affected the campaign meant to control the COVID-19 pandemic. Pool et al. (2021) identified COVID as the topic that received the highest attention since 1993. Social media had been the major medium of misinformation and fake news, followed by gray literature. The social media companies have also made efforts to remove unauthentic information about the pandemic from their platforms, although their efforts have not been very successful. World Health Organization (2020d), too, in collaboration with digital platforms, including Google, TikTok, WhatsApp, and YouTube, urges consumers to consume COVID-19 related information only from official and scientific sources. Nepal has also been victimized by such an infodemic that has seriously compromised individuals' right to correct information required to be safe during the pandemic. In this context, this paper analyzed infodemic from the perspectives of informative, preventive, and curative medicine below.

Infodemic from Informative Perspective

The infodemic, which includes the production and distribution of inappropriate information and the manipulation of authentic data, was a serious problem during the first wave of COVID-19. It was observed that the hospital's authentic information, disseminated through 'press notices' (Bharatpur Hospital, Nepal), was edited and misused with advanced technologies, then posted on social media to create hoaxes and fear among the public (Kantipur Reporter, 2020a). On March 12, 2020, Bharatpur Hospital released a press notice informing the public that the hospital was making various efforts in response to the COVID-19 pandemic, including an awareness campaign, increased isolation beds, and testing of two samples, both of which were negative. However, the information about the 'negative' results was edited to say 'positive' and posted on social media, which caused panic. As a result, the hospital had to re-issue the press notice and demanded early action against those involved in spreading misinformation.

Table 2: Infodemic from Informative and Infodemic Perspectives

Theme	Sub-Theme	Code-group	Definition / Meaning developed	Sources & Evidence	Reliability Status
Informative Content	Informative / Preventive Curative Perspective	Emergency Prevention Protocols	Travel bans, quarantine protocols, educational institutions closures (56+ nations), social distancing (Namaste over handshakes), hygiene campaigns	eKantipur News, Online Khabar, @ ghanshyamk, @ UNICEFROSA	Reliable - WHO endorsed
		Social Distancing	Symbolic representation through spaced text "s o c i a l d i s t a n c i n g" to reinforce message	@Khabarhub_Eng	Reliable - Creative messaging
		Fear-Driven Irrational Behavior	Panic buying, hoarding, patients fleeing hospitals, carefree attitudes despite warnings, construction of apocalyptic interpretations	eKantipur News, Online Khabar, @darsanik1, @ broken_bad	Reliable - Observable behaviors
		COVID-19 Stigma and Social Discrimination	Social exclusion of COVID positive individuals, discrimination against front-line workers, community ostracization	eKantipur News, Online Khabar	Reliable - Social phenomenon
		Hyper immunity Overconfidence	Overconfidence in personal immunity leading to negligence in following safety guidelines	Online Khabar	Partially Reliable - Behavioral observation
		Asymptomatic Transmission Anxiety	Main source of fear regarding quick global spread and transmission from symptom-free individuals	@Khabarhub_Eng	Reliable - Medical concern
Media and information Manipulation	Media and Infordemic	Medical Document Falsification	Edited hospital reports showing false positive results, tampered test documents, fabricated medical certificates leading to public panic	eKantipur News, Online Khabar	Documented Misinformation
		Authorities' Symbol Misuse	Unauthorized use of WHO, UNICEF, Nepal government's logos to legitimize false information and create fake authoritative documents	eKantipur News, Online Khabar	Documented Misinformation
		Satirical Content Mixed with Myths	Humorous COVID-related posts combined with dangerous myths about UV exposure killing virus, mosquito transmission theories	eKantipur News, Online Khabar	Mixed Reliability - Humor vs. harmful myths
False Cure Information and Medical Misinformation	Media and information Manipulation	Political False Cure Promotion	Politicians and local officials spreading unverified information	eKantipur Vaccine, Online Khabar, @Shweta7770	Unreliable - Political misinformation
		Folk Remedy and Myths about Traditional / Aayurvedic Medicine	Promotion of hot water consumption, steam inhalation, Ayurvedic herbs, UV exposure as COVID-19 cures	eKantipur News, Online Khabar	Unreliable - Unproven remedies
		Antibiotic and Vaccine Confusion	Misinformation about pneumonia vaccines providing COVID-19 immunity, inappropriate antibiotic recommendations	eKantipur Vaccine, Online Khabar	Unreliable - Medical misinformation
		Seasonal Transmission Myths	Unproven claims that summer season might reduce COVID-19 transmission rates	Online Khabar	Unreliable - Unsubstantiated claim

The infodemic has created a pandemic of misinformation, as the Coats of Arms of the Governments of Nepal, as well as those of the WHO and UNICEF, have been misused to spread unauthentic information. For instance, Tweet#72 shared photographs of fake news that was manipulated and stated the UNICEF as the source, by misusing its Coat of Arms. The UNICEF had to

publicly urged people not to misuse its 'Coat of Arms' and manipulate the information sensitive to COVID-19. These sorts of phenomena have been a global problem and have rapidly increased during the first wave of the pandemic. The infodemic can bring severe psychological and other health crises to people who cannot assess the authenticity of the information they receive. However, the infodemic has been disseminated even by some government authorities and responsible persons. The ekantipur has collected and listed several myths related to COVID-19, which were trending on the internet (Kantipur Reporter, 2020b). In this context, traditional media, rather than social media, seemed to be maintaining accountability in the case of not spreading disinformation and misinformation, although they were also presenting the news as alarming, as it was across the globe, promoting the flood of information.

Some of the infodemic have been interpreted as 'fun post' and were not very bad at all and they created and spread meme. For example, Tweet#21 satires to the misleading information and states: *World working towards vaccine for Corona Virus, And then I see " Corona Shant ho" "Corona ja"!! ... #CoronaKoDhona.* It has been seen in a video widely shared in Nepal through social media that: a pastor of a church was saying *"Corona Shant ho" "Corona ja"!!* meaning stop / calm-down corona, go away corona, and many innocent people were attending the church service. As this act has been spreading wrong messages, the authorities abducted the pastor for his misleading act. Such incidents of spreading infodemic were not limited to a few 'religious leaders' or a few religions, but were acted out by individuals who present themselves as representatives of a particular religion. Some of them have to be detained by the Government authorities to control their acts.

Sometimes, the meme contains powerful information to make people aware of the issue. However, not all memes were self-interpreted. In other words, not all people understand memes in the right way, or get the message the creator wanted to deliver. Tweet #27 shared a photo of a face mask that was secured with a padlock. This has conveyed the scarcity of face masks and sanitizer for common people and the Personal Protective Equipment (PPE) for the medical workers. The shortage of face masks has been severe due to their high demand on the one hand and disruptions in production and the supply chain caused by COVID-19-induced lockdowns and travel bans. Such memes have not been limited only to the padlocking of face masks, but many memes have been created and shared on social media, conveying the message of alternatives to face masks, as bad as using the undergarments as masks, to making one's own mask from pieces of cotton cloths, wet tissue, and so on. These sorts of memes have been disseminated by both social media and media extensively. Although these memes have partly spread awareness of the need and importance of face masks, although the masks suggested were not able to prevent the spread of the virus, they also represented an infodemic because they risked spreading the wrong message on the one hand and a flood of information on the other.

Artificial shortage of medical and other consumables, created by black marketers, has also been a major issue during COVID-19. Tweet#79 raised the concern about the black-marketing of medical supplies and general consumables, as seen during COVID-19, as rumors or hoaxes created by black marketers. The Tweet is seemingly worrying about the economic impacts of COVID-19, so it shared the information referring to the Asian Development Bank's estimation that Nepal would see economic damage of about 40 billion rupees. Therefore, the Tweet further urged to be careful towards economy as well, not only to the COVID-19 and associated health problems. It is true that without a functioning economy, we cannot effectively deal with COVID-19; nevertheless, public health cannot be compromised for economic gain. The news media mostly covered the news of black-marketing and disturbed supply chain on medical supplies and consumables, while social media created/spread various types of memes, highlighting the shortage of supply.

Some people have been showing a carefree lifestyle even during COVID-19; consequently, it is becoming severe and diffused faster. Some have perceived that COVID-19 can only infect the elderly and people with existing health problems such as asthma, blood sugar, or hypertension, or other heart / lung-related complications. However, it is the individual's immune system, which is complex and may vary person to person, but we do not know how it fights against COVID-19, so risk prevails for everyone. Sometimes, as hyper-immunity can also be fatal, everyone should be careful to COVID-19 infections. Furthermore, a person with better immunity but carrying the COVID-19 virus may infect other sensitive people at the household, workplace, or in the community and open areas; therefore, prevention becomes an important strategy. Nevertheless, as this information was not communicated well to the general public and people were taking different medicinal herbs and vitamins unnecessarily, in the name of immunity booster, and having their side effects. Every sort of media has covered such information.

Infodemic from Preventive Perspective

Stupidity prevails everywhere. Humans do not act only rationally and socially. They often exhibit abnormal or stupid behaviors such as drinking too much alcohol (as they said sanitizer with above 70% of alcohol kills the virus), or disinfectants such as Dettol (anti-septic solution), Detergent Soap or Chlorine (which are to disinfect the surface or the cloths), but have been applied to disinfect human body, including for internal use. Drinking, bathing or sprinkling chlorine water in the body, all have been malpractices observed, which have fatal consequences in human bodies. Excessive use of alcohol, tobacco, and smoking may have ruined their lungs, hearts, livers, and kidneys. In such a situation, the COVID-19 infection

increases the severity in the patient. Similarly, antiseptic solutions, detergents, or chlorine are not to be used in human bodies, even externally, except for a specific purpose. Nevertheless, infodemic encouraged humans to use them, even for internal purposes. Furthermore, although sesame oil is not much bad for the human body, it is not a cure for COVID-19. However, it has been spread on social media that a body massage with sesame oil can prevent COVID-19 infection. These incidents demonstrate an infodemic encouraging the misuse of different solvents, leading people to suffer from other health consequences. The news media have largely covered this type of information.

Some media texts have revealed that UV rays are capable of killing the SARS-CoV-2 virus and have suggested drying items that were in contact with infected persons in the sun. However, that is not possible simply from sun-rays for a short time, although lab-based disinfection (that is for equipment) through heat and UV is possible, yet it is costly as well. The people also have a misconception that if they did not have symptoms such as fever, headache, or others, they feel that they are not infected yet. However, if they have been exposed to the risk, they might have been infected since evidence showed not all the SARS-CoV-2 infected demonstrate the symptoms and those asymptomatic can also spread the virus. This sort of issue has been one of the biggest and serious challenges to managing COVID-19 effectively.

Some netizens have claimed that COVID-19 can also spread through a mosquito bite. However, that has not been reported as a mode of COVID-19 transmission; rather, the reported modes are saliva, nose-mucus, or droplets released from the infected person, or the surface and things that are contaminated by the virus while the infected person uses them. The physical and direct contact with an infected person, such as shaking hands, hugging, or kissing, has a very high level of risk of transmission. In the first wave of SARS-CoV-2, it has also been suspected to be transmitted from domesticated animals. However, that has not been true at all, although occasional cases of transmission of SARS-CoV-2 to animals from humans have been reported.

Widely spread wrong information on the transmission of COVID-19 led to discrimination, stigma, and trauma to people of different communities. For instance, global hate over Chinese people and Chinese goods by labeling them as 'COVID-19 carrier,' and hate to Chinese food and culture, have been observed excessively. There might be many reasons for politicians and businesspeople to hate the Chinese authorities and economy; however, for the general people, it is the infodemic related to COVID-19 infection. In Nepal, many obstacles in the transportation of consumable goods have been seen later, either due to the misinformation or the vested interest of black marketers. Consumable vegetable and fruit items brought from other locations have been disposed of (probably in the interest of local middlemen to hike the price of local products) rampantly. Nevertheless, the blame has been laid on COVID-19. Specifically, the consumables packaged at distant locations, the vegetables and fruits that travelled hundreds of miles for several days, without being touched by humans, would not carry the virus. At the delivery port, local workers and sellers handling the product may infect the packaging if they are infected. Even if those products were handled by an infected person at the place of origin, the virus would not be active after several days of travel *en route* to the destination. However, this common sense has not been communicated well to the general public. Rather, by spreading the infodemic, whatever the reasons, such goods have been disposed and destroyed in many locations. The news media covered plenty of incidents of hate, and the supply blockage.

Some of the government activities have also fueled the infodemic related to imports since it restricted the imports of some of the consumables from the countries affected by COVID-19 (Choudhary, 2020) despite the considerable distance and time taken to import the consumables. Contrary to this fact, imports have continued from India, the adjoining neighbor, from where goods arrive in a short time and distance and have a higher risk of packaging being contaminated by the virus. The more serious side of this part is that being linked to India with open borders and having high cross-border commuting, smuggling of goods and consumables have been continued, which has increased the risk of spreading the COVID-19 pandemic. In other words, imports from India carried a higher risk than those from other countries in the precautionary context; however, neither the government's policy towards imports from India at the time of the pandemic had been changed, nor had this part of the story received adequate media attention. The media seriously compromised its role of preventing public health crises.

Infodemic from Curative Perspective

The politicians and local government officials have also disseminated misleading information, although such information has been interpreted as 'preparing people psychologically.' The claims such as Ayurvedic medicinal herbs and spices (such as turmeric, garlic, Gurjo (guduchi or giloy/ *Tinospora cordifolia*), guava leaves, Jethi Madhu (*Licorice*), Pipla (Piper Longum or Long Piper), Zinger, Black-piper), can treat COVID-19 patients, have been claimed at high. Although these items have several medicinal properties and have been used in Ayurvedic medicines, they are available in almost every kitchen of Nepali households, and are particularly used to treat cold and seasonal allergic reactions and seasonal flu. However, they are not scientifically proven to be recognized as a medicine against COVID-19. These sorts of claims by government authorities were part of the irresponsible acts of officials. At the time, there was no prescribed medicine to treat COVID-19; the only available treatment was for the symptoms, but without scientific evidence of their

benefits. On the contrary, as people consumed these non-prescribed medicinal herbs for quite a long time and in excessive amounts, in the name of boosting immunity, medical practitioners later identified that many of them have developed liver and renal complications.

Some people also claimed that drinking plenty of hot water kills the coronavirus. However, the fact is that SARS-CoV-2 is reported to be active for more than an hour at 65 °C. Therefore, drinking hot water or any other liquid may create other burning-related issues in the temperature-sensitive mouth and throat. Furthermore, the water does not travel through the respiratory tract where SARS-CoV-2 virus colonizes. Therefore, there is no way that hot water can wash away the virus. The mouthwash is also occasionally reported to be beneficial; however, its effectiveness has not been scientifically proven. In these contexts, the flood of infodemic had been a serious issue during the first wave of COVID-19 pandemic.

Antibiotics, although often suggested to treat COVID-19, do not work in the case of COVID-19 infection since it is not caused by bacteria but by a virus. However, if a person is suffering from bacterial infestation at the same time, the use of antibiotics may reduce the effect of the existing health problem and help the body fight against COVID-19. Similarly, the vaccine of pneumonia has also been suggested to use against COVID-19. Although such a vaccine may facilitate the respiratory system, depending on the situation of the patient, it is not the COVID-19 vaccine. Use of steam and other solvents to open the upper respiratory tract (nasal congestion) can be beneficial to facilitate respiration and maintain oxygen saturation rate in blood through facilitating lung function adequately. However, as they are not a treatment for COVID-19, promoting such things was misleading and worsened the condition of patients. In general, all the treatments for COVID-19 were, at the time, related to the treatment of the symptoms and pre-existing health conditions (facilitate the body to fight against COVID-19 itself), not against the SARS-CoV-2 virus. However, infodemic has been in the way that world got dozens of ways to treat the COVID-19.

Human adaptation to temperature has some limitations, so do the pathogens. Some people were expecting that the summer season might reduce COVID-19 transmission. However, that was not true, as the countries of the southern hemisphere, such as Australia and the tropical country of Brazil, had already experienced a severe scenario of the COVID-19 pandemic. Therefore, contrary to the speculations, it shall be understood that SARS-CoV-2 transmission has nothing to do with weather, although it may affect people sensitive to cold or those having various types of pre-existing health issues.

Conclusions

This research analyzed the media content from the perspective of the infodemic during the COVID-19 pandemic. In this information age, many people have easy access to information from various sources. However, the media have disseminated not only authentic but also unauthentic information during the COVID-19 pandemic. The infodemic, specifically, has created a havoc and panic situation during a health emergency since people receive the infodemic quickly, and once they get it, it becomes a big challenge to correct with authentic information. Consequently, the problem of infodemic has been a global problem during the COVID-19 pandemic, with higher effects in developing countries such as Nepal.

The infodemic during the first wave of COVID-19 was caused by different reasons. Some of the misinformation was related to the lack of scientific knowledge at the time, while others were intentionally flawed. The COVID-19 had puzzled the medical and laboratory scientists because all investigations have been conducted during the rush hours and new facts or conflicting findings were emerging one after another. However, individuals were spreading the message without knowing their authenticity. Some of the others had a vested interest in being viral (attention seeking), making fun by constructing the landscape of fear through the extremization of the incident. Among others, manipulating the hospital's notes and misuse of the Coat of Arms of the WHO and UNICEF were serious crimes. The infodemic during the first wave of the COVID-19 pandemic, hence, seriously violated the people's right to proper information, and affected people psychologically since wrong information made people sicker than the disease itself. The authorities' responses to infodemic, however, have been little and ineffective. The findings of this research further showed that news media demonstrated relatively better accountability in terms of spreading false information or manipulating data and information, which was high in social media. However, news media had also been the source of infodemic, from the perspective of flood of information. In this context, considering the importance of media's accountability towards the general public, this research suggests policies and practical interventions towards addressing the infodemic.

Declaration

Ethics Approval and Consent to Participate

Not applicable. This research uses secondary data (publicly available published content) therefore, it does not directly or indirectly use human subject and has not been the subject of ethical clearance. However, the author is trained and certified for ethical conduct of research. The author declares that all the necessary procedures have been followed to maintain high level of ethics in research process.

Consent for Publication

Not applicable

Availability of Data and Materials

Data are stored safely. Further research work from other sets of data is in progress. Therefore, data will be made available in special request, with reliable logic.

Competing interests

The author(s) declared no competing interests with respect to the research, financial/non-financial, including authorship, and/or publication of this article.

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Use of AI

No generative use of AI for analysis and writing of the manuscript was practiced. Nevertheless, limited AI (Open AI) was used to explore literature and resources, which then researcher reached to the original sources to review and borrowed ideas as required. The literature from where ideas and information was borrowed was acknowledged by citing the source.

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