The Role of Social Media in Public Health Intelligence: Trends, Techniques, and Challenges

Dr. Bal Krishna Sharma

Professor
Department of Computer Sciences and Applications
Mandsaur University
Mandsaur
bksharma7426@gmail.com

Abstract—The social media development has transformed the landscape of surveillance and communication of health issues among the masses. This review explains how social media can be used in the area of public health intelligence, and it deals with disease outbreaks, risk communication, and even the assessment of public sentiment. It talks about emerging themes in social media surveillance in the area of public health, including pandemic surveillance, vaccination campaigns, and behavioral health interventions. Through the use of sophisticated analysis tools, researchers and decision-makers able to extract valuable information on large volumes of user-generated content to allow interventions and evidence-based decision-making to take place in a timely manner. Under the circumstances of the COVID-19 pandemic, social media came in quite handy in the manifestation of social opinion on preventive actions, as well as the dissemination of health-related information rapidly. However, there are challenges to its institutionalization in the health systems of the population. This discussion indicates the necessity to develop scaled, ethically controlled and AI-based models as well as to give a summary of the current trends, strategies and challenges. Online democracy on social media can enable equitable use of social media, enhance accountability, and resiliency of global health systems.

Keywords—*social media, public health intelligence, Health surveillance, Disease outbreak detection, Sentiment analysis.*

I. INTRODUCTION

The digital age has also brought out social media platforms as very important tools in real-time information exchange and engagement with the masses. Twitter, Facebook, Instagram, and Reddit, among others, are already valuable sources of data for daily monitoring and analysis of population health, thanks to billions of users who share health information every day. Since social media is extensively utilized, health and medical experts should use it to enhance public health in this simple, useful way. One survey published in 2018 found that 61% of social media usage among Americans increased from 5% in 2005 to at least one in 2008. Approximately 1.2 billion people used Facebook and Instagram each month in 2020. Furthermore, social media has been used by patients and medical professionals to encourage healthy lifestyles and coping mechanisms since more than ten years ago [1]. Social media has been widely used in the field of public health for a variety of objectives, such as subject recruitment, research subject communication, data collecting, data distribution, and social and behavioral observation. Consequently, social media has pushed studies on obesity, diabetes, cancer, HIV, and alcohol usage. At now, around 2.4 million Facebook users get health-related advertisements [2]. Additionally, the COVID-19 pandemic encouraged the dissemination of public health information via Twitter [3]. Health experts do not fully understand social media's role in public health, despite the fact that its usage is steadily growing globally. Evaluation of the most effective strategy to use it as a platform to promote health treatments is still ongoing (Figure 1).
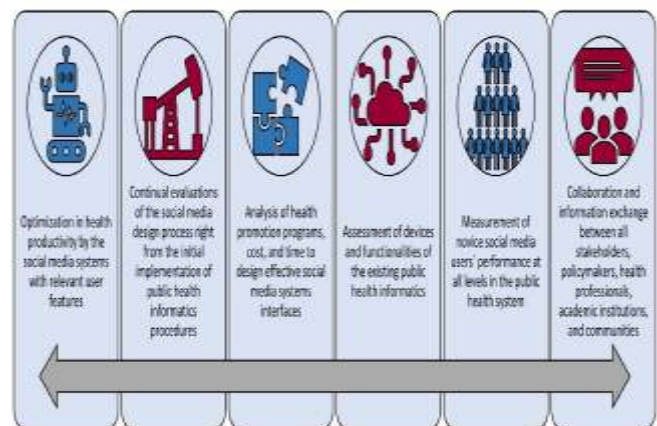

Fig. 1. Social media in public health informatics [4].

It has been stated how social media may be integrated with public health's fundamental tactics and activities to provide a strong foundation for public health informatics. Social media gives these health communication experts useful patient experience data that they may use to track public response to health issues. They also emphasize how such data may be used to create health policy. The most significant media outlets often check medical blogs, for instance. Thus, the purpose of this narrative review is to outline the contemporary applications of social media in public health. A potential answer has been the incorporation of AI [5], specifically ML and NLP. By using AI to automatically analyze massive volumes of unstructured social media data, can track health trends in real-time, identify new diseases as they emerge, and address public health problems. Analysing sentiment, trend identification, and recovering the relevant information by analysing millions of social media posts, AI-based technologies can identify valuable information. This method improves data processing and enables the public health officials to make better decisions by ensuring that they have a better understanding of population health [6]. Nevertheless, there are also problems with the application of AI to monitor the health of the population, namely, the question of data privacy, ethical issues, and bias that may arise in AI models. Although social media data is publicly available, it could be sensitive, and it is of utmost importance to guarantee privacy and anonymity.

A. Structured of the Paper

This paper is as follows: Section II present social media trends in public health, and real-time monitoring using AI present in Section III. Section IV presents the benefits and harms, and Section V presents the challenges. Previous research on the topic is provided in Section VI. The study concludes with limitations, and findings are provided in Section VII.

II. SOCIAL MEDIA TRENDS IN PUBLIC HEALTH

The continuous systematic collection and data dissemination to public health professionals is closely related to data analysis and interpretation. Physicians and legislators in charge of preventing and regulating illness and harm are known as public health surveillance (PHS). Numerous studies conducted over the past 10 years have shown how social media data may be used by public health professionals to evaluate disease awareness and reactions to official health messaging, forecast sickness patterns, monitor emergency situations, and spot possible epidemics [7].

Fig. 2. Social media platform in public health surveillance

The general usage of social media sites such as (see Figure 2) Students' digital abilities are unaffected by Facebook and Instagram. However, a combination of research suggests that social media use in the classroom may affect students' perceptions of their degree of digital proficiency.

- **Instagram:** Instagram is widely used social media platform owned by Meta (formerly Facebook) that focuses on visual content, including photos, videos, and short-form clips. Launched in 2010, it has grown into one of the most popular apps for sharing moments, promoting brands, and engaging with audiences.
- **Facebook:** Founded in 2004, the well-known social media platform Facebook is now owned by Meta. It enables users to interact with their friends, relatives and business through posts, pictures, video clips and live feeds. Among the features, there are News Feed (personalized content) and Groups (community discussions), Pages (brands/public figures), and Messenger (personal messaging).
- **Twitter:** Twitter (now X) is a speedy social media platform on which individuals post brief posts (also known as tweets) of up to 280 characters. It was opened in 2006 and is popular in live news, trends, memes, and discussions. Among the features, there are retweets, hashtags, threads, and live audio chat [8].

A. Growing Use of Social Media in Public Health

Social media is a helpful instrument for improving public health when used properly since it is affordable, reaches a big audience, and may change people's behaviour to lead healthier lifestyles. In recent years, Social media, especially during the COVID-19 pandemic, has been a vital instrument for health communication [9]. Social media platforms may be used to increase the reach of medical experts' recommendations, empower individuals to learn more about their health concerns, and advance equity in a variety of healthcare environments. Additionally, Research has suggested that social media interventions might be beneficial and effective for minority groups, low-income neighbourhoods, and rural areas. Without a question, social media use is a growing trend that only alter in the years to come. Table I displays some recent advancements in public health and social media use.

TABLE I. CURRENT TRENDS IN THE USE OF SOCIAL MEDIA AND PUBLIC HEALTH [4].

Types	Current Trends	Innovation
Social Media	Health messages, health education, and health literacy.	Facebook, Instagram, WhatsApp, Twitter, YouTube, TikTok, Reddit, Snapchat, and blogs.
Public health research	Expanding readership, sharing public health research, establishing relationships with colleagues and knowledge users, and quickly growing reach [10].	LinkedIn disseminates studies on vaccines, chronic illnesses, and behavioral health using social media.
Crowdsourcing	Surgical techniques, creating out-of-hospital cardiopulmonary resuscitation systems, creating messaging about sexual health and using medical data annotations to teach algorithms for ML.	Developing a mammogram report that is patient-centered and improving research on cancer, and including youth in the creation of HIV services.
Artificial intelligence in public health	surveillance, diagnostics, machine learning tools, literature reviews, and health education programs.	Open-source clinical trials, collaborative research, LIT maps, and automatically identifying TB from chest X-rays.
Surveillance	Open-AI chatbots, data monitoring, statistics, and epidemiological data.	Electronic health records and COVID-19 dashboards.
Monitoring	Utilizing devices, apps, QR codes, and surveys.	Apps for tracking sleep patterns, blood sugar, and steps taken.
Policy	Public health safety, patient safety, HIPAA legislation, public opinion, and policymakers.	Protected health information and public health informatics.

B. Social Media for Surveillance and Monitoring

Social media for surveillance and monitoring. This category encompassed three themes: COVID-19 case estimate or identification, mental health, and public attitudes. In order to discover or anticipate COVID-19 instances, conventional surveillance research is conducted with the goal of suggesting methods to detect or forecast COVID-19 cases. Public attitudes and mental health are perspectives on public views and the pandemic's mental health repercussions[11]. Some of the most significant developments in digital public health surveillance are shown in Figure 3, including Google Flu Trends' introduction.
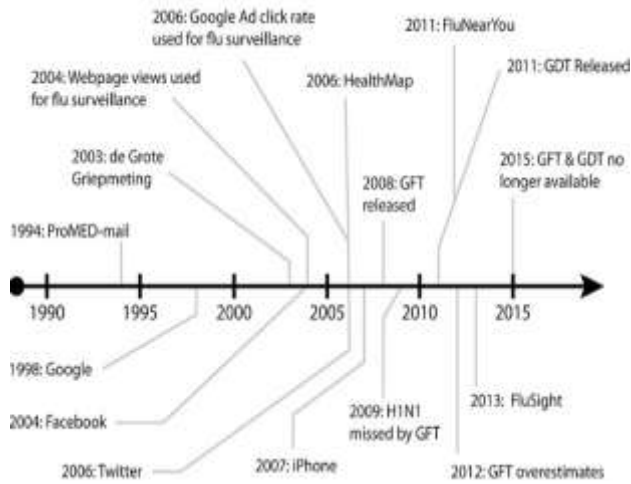
Fig. 3. Digital public health surveillance [12]

Public health monitoring serves as a watchdog to identify emerging public health issues and illness patterns, as well as to pinpoint potential areas for action. Furthermore, surveillance data may serve as benchmarks for assessing intervention methods aimed at reducing disease transmission in communities, as well as allowing health experts to establish goals and policies. Over the years, surveillance has undergone a number of changes, and it probably continues to do so. Recent advancements in data collecting technology have led to improvements in disease monitoring systems, such as increased internet availability and greater computer capacity. Digital disease surveillance is defined as the purposeful development of or use of systems intended to forecast or anticipate the frequency or prevalence of sickness using data from the internet [13]. In recent years, social media and internet-based search engines are gathering real-time data and trends for health outcomes, which has created intriguing new opportunities for improving illness monitoring.

III. AI Techniques in Real-Time Monitoring

Social media talks can be tracked to help AI identify warning signs of new health conditions, like the transmission of a contagious illness, the increase in mental health challenges, or changes in the social perception of health-related policies [14]. Real-time social media monitoring relies heavily on AI. ML and NLP tools have the capability to filter through the vast volumes of social media data, such as text, images, and videos, to find the information [6]. Specifically, NLP methods like sentiment analysis, keyword extraction, and topic modeling have come in handy in comprehending the sentiment of the people and determining the trending health-related topics.

- **Machine Learning Models:** To detect trends and predict future trends in health using social media data, ML algorithms are essential [15]. The posts made by social media can be divided into general conversation, health-related and disease-related groups by the supervised learning models. Unsupervised learning models, such as clustering methods, can detect unseen patterns in the data without having the labels [16]. Training these models on historical data can improve their ability to predict future health issues.
- **Deep Learning Models:** Deep learning networks such as recurrent neural networks (RNNs) and deep convolutional neural networks (CNNs) have shown substantial predictions because they detect complex patterns in large data sets [17][18].
- **Natural Language Processing (NLP):** A prominent method of assessing text information on social media is Natural Language Processing (NLP). This is able to help determine emerging health hazards and societal sentiments. In addition, named entity recognition (NER) can identify specific data, including references to diseases, treatments, or health policies, and this enhances the specificity of the research.

IV. Benefits and Harms of Health in Social Media

The proliferation of Social media platforms has a significant impact on people's well-being globally, both favourably and unfavourably. The ambivalence of social media was revealed by the COVID-19 epidemic, but there is mounting evidence that it is present in a variety of other health crises, including those involving mental health, healthcare delivery, and health promotion and prevention Table II.

TABLE II. Benefits and Harms of Social Media for Health [19]

Categories	Benefits	Harms
All uses	• Direct access to the most recent data, information, proof, and expert opinion from regional, national, and worldwide sources • Visual information and instruction may be more compelling and successful when presented through images, films, and graphics. • SMP algorithms for popups, suggestions, and searches can make it easier to find pertinent content. • Promotes community and lessens isolation on a personal and professional level.	• The rapid dissemination of false information, fake news, distorted data, or ignorant viewpoints • It is difficult to discern between reliable and faulty data when information is unreliable or falsely sourced • A decrease in memory, critical thinking, and creativity can result from information overload, often known as "cognitive overload." • Polarization brought on by SMP algorithms that direct users into "echo chambers," or preference bubbles
Health promotion and prevention	• Information and suggestions on fitness, diet, and other healthful practices that are supported by evidence. • Availability of chat rooms, wellness groups, and other peer support resources • Evaluation of the advantages and disadvantages of recent advancements in healthy living and illness prevention	• The aggressive promotion of alcohol, e-cigarettes, and tobacco products, frequently aimed at children • Deceptive and dangerous advertising of baby formula, pharmaceutical or herbal treatments, and other products • Sponsored material and paid influencers pose as unbiased evaluations to trick customers.
Healthcare provision	• Provides users, including those in remote locations, instant access to up-to-date diagnosis and treatment information. • Promotes connections between healthcare organizations and providers as well as between patients and providers. • Facilitates the discussion of the consequences and validity of new advances in healthcare amongst professional and lay groups.	• Testimonials and unsubstantiated claims promote risky, expensive, ineffective, or untested alternative therapies. • Anecdotal evidence or faulty information might cause self-diagnosis, which can postpone necessary, life-saving treatment. • Time-consuming for providers

Pandemics and other health emergencies	• Rapid local to worldwide notifications of illness epidemics and other medical crises • Encourages candid discussions about advantages, expenses, and potential solutions. • Direct access to guidelines, regulations, procedures, and resources from the government • Recognizing rumors, false information, and conspiracies in order to modify communication tactics	• The quick dissemination of false information erodes confidence in public health measures. • Attention and resources are diverted by the active promotion of hazardous, untested, or useless solutions. • Violence, intimidation, or threats directed toward public servants or medical professionals • Riots or panic brought on by rumors or conspiracies
Mental health	• Positive mental health and wellbeing are enhanced when SM encounters are uplifting and encouraging. • Assistance via need-specific organizations (such as those for addiction, Alzheimer's, and suicide prevention) • Promotes interpersonal relationships, community readiness, and fortitude in the face of social and psychological challenges. • Establishes links for international viewpoints on certain focused mental health interventions	• Negative attitudes, physical image, or self-esteem that cause social disengagement and isolation • Suicide, self-harm, anxiety disorders, and depression, particularly in young people, women, and girls • Message boards, chat rooms, and websites that promote suicide and suicide pacts • Behavioral transmission via lethal challenge competitions, such as consuming laundry detergent pods

V. CHALLENGES TO USING SOCIAL MEDIA FOR HEALTH

The fact that anyone may publish anything about anything on the internet is one of its main issues. This has been a problem for a long time. Some internet content can have diverse viewpoints and varies based on regional and cultural aspects; this empowers individuals to become experts in their own right and (intentionally or unintentionally) spreads misinformation. One of the difficulties of the digital age is finding solutions to these conflict-causing scenarios. Another is figuring out how to keep users' information safe as they share it [20].

A. Social Media and Mental Health

A tiny percentage of college students use social media excessively or compulsively, despite the fact that the majority of them use it without any issues. 19.9% of college students in India who use social media report having issues with it [21]. The frequent use of social media by teenagers gives them many opportunities to participate in risky behaviours, join dubious communities, and communicate with strangers without parental supervision, so parents, legislators, and researchers are naturally interested in learning more about how this affects their mental health [22].

B. Public Health Emergencies and Social Media

Emergencies related to public health burden people and communities. It is difficult to spread official infectious disease public health information because people usually learn about it via social contacts, via social media or in-person interactions, which can result in bias and misunderstanding. Asians were socially shamed during China's 2002–2003 SARS outbreak because they were afraid of contracting the disease. The UN secretary-general has declared the COVID-19 rumors to be a worldwide danger [23].

C. Subjecting Ethical Issue

It is important to respect patients' right to autonomy by providing them with accurate and current health information so that they may make educated decisions about their care. As healthcare providers, doctors should always think about the right thing to do while speaking or publishing content on social media in order to engage with patients directly or offer information. It is important to keep the norms and ethical issues in mind while employing social media. Another important problem is information that may have an impact on someone's religious issues, norms, or beliefs.

D. Legal Requirements for Social Media Use in the Health Sector

In developing fields, guidelines aid in bridging practices and directing learners. Student disciplinary actions have been taken by medical schools due to inappropriate internet posts. Recommendations for responsible social media usage, safeguarding patient privacy, and upholding professionalism are provided by the AMA, ACGME, and ACP-FSMB. There has been some improvement in areas like as ethics, secrecy, and professional relationships, but establishing clear boundaries between personal and work-related activities online and reaching a general agreement on acceptable conduct remain difficult challenges [24].

VI. LITERATURE REVIEW

This section provides a comprehensive review of the literature on the Role of Social Media in Public Health Intelligence, summarized overview presented in Table III.

Gao *et al.* (2025) introduce an innovative framework leveraging cooperative learning algorithms combined with intelligence of social things (IoST) data to enhance mental health issue detection. The proposed approach is more accurate in prediction, as it uses multimodal user data in social platforms, wearable devices, and IoT sensors, and predictive accuracy measures are high, and the random forest-based model is higher when compared to benchmarks, where the accuracy measured 88% and the area under the curve (ROC-AUC) for the receiver's operational characteristics was 0.90. The use of central characteristics, such as social homophily and real-time behavioral indicators, is of much help in enhancing detection rates. Ethical issues, such as the privacy of data and minimization of bias, are thoroughly considered, which guarantees a scalable and user-friendly solution. The results highlight the possibility of revolutionizing mental health interventions using the IoST-driven cooperative algorithm to have timely, accurate, and ethical detection systems [25].

Kashmar *et al.* (2025) carried out a scoping review to examine the application of social media data with AI-based EWS to determine the advantages, issues and considerations that should be made to develop such systems. This review has evaluated different studies that have used machine learning models to analyze social media data to conduct surveillance of public health. The results demonstrate the potential of social media data to improve the accuracy, efficiency, and responsiveness of EWS, enabling earlier detection of disease outbreaks and facilitating timely health-related actions for the population. The review has important implications for the

integration of social media data in AI-based EWS that can be used by practitioners, researchers, and policymakers to design and implement effective systems of public health surveillance [26].

Chen *et al.* (2024) defined hotspots in public opinion and topics on a per-stage basis by LDA. also performed sentiment analysis at each of the stages and analyzed the features of the sentiment movement of netizens and the development of the population opinion. The findings indicate that the new coronavirus outbreak originally caused very negative feelings among the population, but effective governance practices reduced these feelings and had a positive impact on the mood of the population [27].

Kumar *et al.* (2024) The paper examine the social media conversation about X (Twitter) to interpret social opinion and demand on healthcare supply side issues, including the scarcity of testing kits and oxygen masks and hospital bed capacity, during the pandemic. filtered through a total of 3.9 million tweets to gather health informatics by searching through the most relevant opinionated key phrases and using sophisticated natural language processing (NLP) to narrow the results. These tweets are analyzed in order to examine the word trends and sentiments. The identified sentiments were then grouped into ten various categories through the K-means clustering algorithm that identified top-ten healthcare Guidelines help link practices and direct learners in new areas. Students have been disciplined by the medical schools because of their unprofessional posts on the internet. The AMA, ACGME, and ACP-FSMB offer minimum guidelines on how to be cautious in the use of social media, patient privacy, and professionalism. Regardless of these attempts, online professional boundaries are still difficult, and there is still no agreement on how to act appropriately, although there are signs of improvement on ethics, confidentiality and professional interactions to meet the needs of supply. The results highlight the importance of social media as an instrument of collecting prompt and useful information on healthcare supply chain logistics, providing essential

information on the response measures in the case of health crises [28].

Abisado et al. (2024) This dataset was used by several ML models that trained and tested on it, which reached an accuracy of 81% when using the dataset to train and test the models on multilabel classification, indicating that the dataset can be used to intelligently monitor diseases. The paper demonstrates the value of multilingual datasets in solving community health problems within linguistically diverse areas and emphasizes the necessity of further studies in low-resource language processing [29].

Alebaba et al. (2023) seeks to find UGC trends for user interaction and create association rules using UGC data. Using support and confidence levels, the Apriori technique was used to assess the frequency of UGC data, including like, link click, share, and remark. Based on UGC data, 16 association rules were produced, according to the outcome. One with 60%, three with 50%, three with 40%, three with 30%, and five with 100%. May infer that, aside from market basket transactions, the Apriori method may be applied to identify patterns of user behaviour on social media platforms related to public health [30].

Although the substantial efforts made to employ social media as a public health intelligence tool, there are some gaps that are yet to be addressed (Table III). Most current research concentrates on sentiment, topic modeling, outbreak, and user engagement, but little is combined between multilingual, multimodal, and real-time data stream and a single surveillance system. In addition, even though ethical issues like privacy and bias are addressed, there are still no clear practical implementation guidelines and valid strength across different populations. Existing studies too are wanting in terms of translating social media knowledge into workable, functioning decision support frameworks to the governmental health organizations. These deficiencies indicate the necessity of a more detailed, scalable, and ethically controlled AI-based models that are likely to contribute to real-time intelligence regarding the health state of humans.

TABLE III. SUMMARY OF LITERATURE STUDY ON SOCIAL MEDIA IN PUBLIC HEALTH INTELLIGENCE

Author	Objective / Focus	Methods / Data Used	Outcome	Public Health Intelligence
Gao et al. (2025)	Detection of mental health issues using IoST-enabled cooperative learning frameworks.	Multimodal data from social media, wearable devices, IoT sensors; Random Forest, cooperative learning algorithms.	Achieved 88% accuracy and 0.90 ROC-AUC; features like social homophily improved detection; ethical concerns (privacy, bias) addressed.	Demonstrates how IoST-driven AI can provide timely and accurate mental health surveillance in a scalable and ethical manner.
Kashmar et al. (2025)	Review of integrating AI-based Early Warning Systems (EWS) with social media data for public health surveillance.	Scoping study of social media networks for ML-based EWS.	Social media enhances accuracy, efficiency, and rapid detection of outbreaks; supports earlier interventions.	Provides guidelines for integrating social media into AI-driven EWS, assisting researchers and policymakers in building robust surveillance systems.
Chen et al. (2024)	Evaluation of the changes in public opinion during COVID-19.	LDA topic modeling; sentiment analysis across different pandemic stages.	Public initially expressed strong negative emotions; effective governance reduced negativity over time.	Shows how social media sentiment trends can inform government communication and public emotion management.
Kumar et al. (2024)	Understanding healthcare supply-chain challenges via social media discourse.	Analysis of 3.9M tweets; NLP techniques; keyphrase extraction; K-means clustering (10 categories).	Identified key healthcare needs (oxygen, beds, kits); social media provides actionable insights for crisis logistics.	Demonstrates real-time social media mining for healthcare resource planning during pandemics.
Abisado et al. (2024)	Intelligent disease surveillance using multilingual social media datasets.	Machine learning models for multilabel classification across low-resource languages.	Achieved 81% accuracy; multilingual datasets crucial for diverse regions.	Highlights importance of linguistic diversity in social media-driven disease surveillance systems.
Alebaba et al. (2023)	Discovering engagement patterns in public health UGC data.	Apriori association rule mining; analysis of likes, comments, clicks, shares.	Generated 16 association rules; five with 100% confidence; patterns reveal strong UGC engagement dynamics.	Demonstrates potential of association rule mining to understand public engagement with health communication online.

VII. CONCLUSION AND FUTURE WORK

The incorporation of social media in public health intelligence has essentially changed the way health data is gathered, analyzed, and acted upon. Social networks. Real-time monitoring has been proven to benefit from social media platforms like Instagram, Facebook, and Twitter, for analysis of public sentiment, health education, and emergency communication. The review has suggested issues of disinformation, privacy, ethics, and representativeness and has given up-to-date trends, benefits and challenges. Literature reviews were gathered in order to exemplify the applications, such as sentiment analysis, monitoring healthcare supply chains, and detecting epidemics. The incorporation of multilingual, multimodal, and real-time information into coherent structures still has gaps, even though social media is infinitely promising to enhance the health systems of the people. The future research should focus on scalable, ethically guided, and AI-driven models in order to build responsive, resilient, and egalitarian public health intelligence. Nevertheless, Social media's promise in the field of public health is constrained by many significant issues, including misinformation, privacy concerns, the reliability of the data, and ethical concerns. Future studies must strive to establish uniform regimes of social media application in the health of the populace, where much attention is paid to the fight against fake news by applying sophisticated AI and NLP algorithms.

REFERENCES

[1] Y. Zhang, B. Cao, Y. Wang, T.-Q. Peng, and X. Wang, "When Public Health Research Meets Social Media: Knowledge Mapping From 2000 to 2018," *J. Med. Internet Res.*, vol. 22, no. 8, Aug. 2020, doi: 10.2196/17582.

[2] T. S. Tseng and G. Gonzalez, "Social media and types with their current applications in public health and healthcare," in *Effective Use of Social Media in Public Health*, Elsevier, 2023, pp. 3–22. doi: 10.1016/B978-0-323-95630-7.00007-X.

[3] A. Fuentes and J. V. Peterson, "Social media and public perception as core aspect of public health: The cautionary case of @realdonaldtrump and COVID-19," *PLoS One*, vol. 16, no. 5, May 2021, doi: 10.1371/journal.pone.0251179.

[4] A. T. Awan, A. D. Gonzalez, and M. Sharma, "A Neoteric Approach toward Social Media in Public Health Informatics: A Narrative Review of Current Trends and Future Directions," *Information*, vol. 15, no. 5, May 2024, doi: 10.3390/info15050276.

[5] Y. Macha and S. K. Pulichikkunnu, "A Data-Driven Framework for Medical Insurance Cost Prediction Using Efficient AI Approaches," *IJRAR- Int. J. Res. Anal. Rev.*, vol. 11, no. 4, pp. 887–893, 2024.

[6] V. S. Niranjan and A. K. Prasad, "Harnessing AI for Real-Time Public Health Monitoring: Analyzing Social Media Data for Emerging Health Trends," *Int. J. Adv. Res. Sci. Technol.*, vol. 12, no. 10, pp. 852–857, 2022.

[7] M. J. Aramburu, R. Berlanga, and I. Lanza, "Social Media Multidimensional Analysis for Intelligent Health Surveillance," *Int. J. Environ. Res. Public Health*, vol. 17, no. 7, Mar. 2020, doi: 10.3390/ijerph17072289.

[8] M. Perifanou, K. Tzafilkou, and A. A. Economides, "The Role of Instagram, Facebook, and YouTube Frequency of Use in University Students' Digital Skills Components," *Educ. Sci.*, vol. 11, no. 12, Nov. 2021, doi: 10.3390/educsci11120766.

[9] A. Jha, L. Lin, and E. Savoia, "The Use of Social Media by State Health Departments in the US: Analyzing Health Communication Through Facebook," *J. Community Health*, vol. 41, no. 1, pp. 174–179, Feb. 2016, doi: 10.1007/s10900-015-0083-4.

[10] M. Sharma, "Innovative uses of social media in public health and future applications," in *Effective Use of Social Media in Public Health*, Elsevier, 2023, pp. 341–349. doi: 10.1016/B978-0-323-95630-7.00011-1.

[11] S. P. Kalava, "Digital Transformation in the COVID Era: Evolution, Impact, and Future Pathways," *Int. J. Sci. Res.*, vol. 12, no. 4, pp. 1958–1961, Apr. 2023, doi: 10.21275/SR24910090954.

[12] A. E. Aiello, A. Renson, and P. N. Zivich, "Social Media– and Internet-Based Disease Surveillance for Public Health," *Annu. Rev. Public Health*, vol. 41, no. 1, pp. 101–118, Apr. 2020, doi: 10.1146/annurev-publhealth-040119-094402.

[13] H. A. Park, H. Jung, J. On, S. K. Park, and H. Kang, "Digital Epidemiology: Use of Digital Data Collected for Non-epidemiological Purposes in Epidemiological Studies," *Healthc. Inform. Res.*, vol. 24, no. 4, 2018, doi: 10.4258/hir.2018.24.4.253.

[14] R. Dattangire, R. Vaidya, D. Biradar, and A. Joon, "Exploring the Tangible Impact of Artificial Intelligence and Machine Learning: Bridging the Gap between Hype and Reality," in *2024 1st International Conference on Advanced Computing and Emerging Technologies (ACET)*, IEEE, Aug. 2024, pp. 1–6. doi: 10.1109/ACET61898.2024.10730334.

[15] N. Prajapati, "The Role of Machine Learning in Big Data Analytics: Tools, Techniques, and Applications," *ESP J. Eng. Technol. Adv.*, vol. 5, no. 2, pp. 16–22, 2025, doi: 10.56472/25832646/JETA-V5I2P103.

[16] R. Q. Majumder, "Machine Learning for Predictive Analytics: Trends and Future Directions," *Int. J. Innov. Sci. Res. Technol.*, vol. 10, no. 4, pp. 3557–3564, May 2025, doi: 10.38124/ijisrt/25apr1899.

[17] S. Thangavel, "Deep Learning for Predictive Analytics in Environmental and Social Sciences," in *Edible Electronics for Smart Technology Solutions*, IGI Global, 2024, pp. 415–444. doi: 10.4018/979-8-3693-5573-2.ch017.

[18] R. P. Mahajan, "Optimizing Pneumonia Identification in Chest X-Rays Using Deep Learning Pre-Trained Architecture for Image Reconstruction in Medical Imaging," *Int. J. Adv. Res. Sci. Commun. Technol.*, pp. 52–63, Apr. 2025, doi: 10.48175/IJARSCT-24808.

[19] Z. Jafar *et al.*, "Social media for public health: Reaping the benefits, mitigating the harms," *Heal. Promot. Perspect.*, vol. 13, no. 2, pp. 105–112, Jul. 2023, doi: 10.34172/hpp.2023.13.

[20] S. Kanchan and A. Gaidhane, "Social Media Role and Its Impact on Public Health: A Narrative Review," *Cureus*, vol. 15, no. 1, Jan. 2023, doi: 10.7759/cureus.33737.

[21] J. Joseph *et al.*, "Prevalence of internet addiction among college students in the Indian setting: a systematic review and meta-analysis," *Gen. Psychiatry*, vol. 34, no. 4, Aug. 2021, doi: 10.1136/gpsych-2021-100496.

[22] P. M. Valkenburg, A. Meier, and I. Beyens, "Social media use and its impact on adolescent mental health: An umbrella review of the evidence," *Curr. Opin. Psychol.*, vol. 44, pp. 58–68, Apr. 2022, doi: 10.1016/j.copsyc.2021.08.017.

[23] M. S. Islam *et al.*, "COVID-19–Related Infodemic and Its Impact on Public Health: A Global Social Media Analysis," *Am. J. Trop. Med. Hyg.*, vol. 103, no. 4, pp. 1621–1629, Oct. 2020, doi: 10.4269/ajtmh.20-0812.

[24] L. A. Thompson *et al.*, "The Intersection of Online Social Networking with Medical Professionalism," *J. Gen. Intern. Med.*, vol. 23, no. 7, pp. 954–957, Jul. 2008, doi: 10.1007/s11606-008-0538-8.

[25] F. Gao, H. Dhumras, G. Thakur, X. Xue, and Y.-J. Yang, "Leveraging Cooperative Learning Algorithms for Early Detection of Mental Health Issues Using Intelligence of Social Things Data," *IEEE Trans. Comput. Soc. Syst.*, pp. 1–9, 2025, doi: 10.1109/TCSS.2025.3609251.

[26] N. Kashmar *et al.*, "Enhancing Epidemic Early Warning Systems with Social Media Data," in *2025 International Conference on Control, Automation, and Instrumentation (IC2AI)*, IEEE, Feb. 2025, pp. 1–5. doi: 10.1109/IC2AI62984.2025.10932178.

[27] J. Chen *et al.*, "Analysis of Chinese Mainland Public Sentiment to the Novel Coronavirus Outbreak on Social Media," in *2024 5th International Conference on Big Data & Artificial Intelligence & Software Engineering (ICBASE)*, IEEE, Sep. 2024, pp. 925–933. doi: 10.1109/ICBASE63199.2024.10762740.

[28] V. V. Kumar, A. Sahoo, R. Kumar, and N. Loyd, "Public Healthcare Informatics for COVID-19 from Social Media Data," in *2024 46th Annual International Conference of the IEEE*

Engineering in Medicine and Biology Society (EMBC), IEEE, Jul. 2024, pp. 1–4. doi: 10.1109/EMBC53108.2024.10782707.

[29] M. B. Abisado *et al.*, "RespiratoryPH: Empowering Low-Resourced Languages Through Multilingual and Multi-Labeled Social Media Dataset Towards Intelligent Public Health Disease Surveillance," in *2024 IEEE International Conference on Progress in Informatics and Computing (PIC)*, IEEE, Dec. 2024, pp. 1–6. doi: 10.1109/PIC62406.2024.10892651.

[30] D. B. Alebaba, S. Sura, N. M. Tuah, and S. Lee, "Social Media User Engagement for Promoting Public Health: Pattern Analysis Using Apriori Approach," in *2023 IEEE International Conference on Artificial Intelligence in Engineering and Technology (IICAIET)*, IEEE, Sep. 2023, pp. 272–276. doi: 10.1109/IICAIET59451.2023.10291674.