# SOCIAL MEDIA AND HEALTH CARE: A SELECT STUDY IN INDIAN CONTEXT

**Thesis**

submitted in partial fulfillment of the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

by

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**MAY, 2022**

# DECLARATION

I hereby declare that the research synopsis entitled "SOCIAL MEDIA AND HEALTH CARE: A SELECT STUDY IN INDIAN CONTEXT" Which is being submitted to the **National Institute of Technology Karnataka, Surathkal** in fulfillment of the requirements for the award of the Degree of **Doctor of Philosophy in Management** is a *bonafide report of the research work carried out by me*. The material contained in this Thesis has not been submitted to any University or Institution for the award of any degree.

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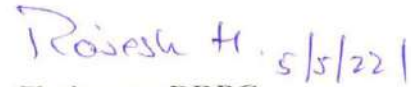School of Management

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# CERTIFICATE

This is to certify that the research thesis entitled "SOCIAL MEDIA AND HEALTH CARE: A SELECT STUDY IN INDIAN CONTEXT" submitted by Mr. JAYAN V (Register Number: 177130SM500) as the record of the research work carried out by him, is *accepted as the research thesis submission* in partial fulfillment of the requirements for the award of degree of Doctor of Philosophy.

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# DEDICATION

*This thesis is dedicated to my beloved parents, wife, child and well-wishers*

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## EXECUTIVE SUMMARY

Online social media plays a crucial role in every aspect of human life - from the betterment of humans to the distress of humans. The role of social media in the health care sector is one of the emerging research topics worldwide. Misinformation in social media has an adverse effect on the physical and mental health of people worldwide. This study mainly focuses on social media and its impact on the healthcare sector in India. The misinformation and fake news in social media affected many healthcare programs run by the government and it led to the loss of human life as well as more economic burden on the government as well as the public.

An extensive literature survey focusing on the impact of social media in healthcare worldwide and a mixed method study has been done in the Indian context. A case study on the COVID-19 pandemic was done using the Twitter data analysis. The information shared in social media will have an impact on human psychological behavior. The psychological behavior may be assessed with the help of the sentiments in the Twitter data. The more is the negative sentiment in a text, the more is the psychological impact on the reader.

A questionnaire based study also conducted among the IT professionals in India during the year 2020. The study is focused on the fake news and mental health of people and the role of social media. The respondents were IT professionals in India. The IT professionals are the people who are staying away from home and having more duration of working hours. The lockdown had made them sit at home and work. That will have some major impact on their psychological behavior. The data was collected online by sending the questionnaire through social media and other applications. Smart PLS SEM analysis was done to assess the research model.

A qualitative data analysis done from the data collected from the healthcare professionals through interview mode. The psychological behavioural changes due to the corona and the resulting misinformation in the social media were taken into consideration for the study.

Qualitative and Quantitative data analysis delivered information pertaining to health care and social media. The information obtained is then processed for modeling and creating policies for improving the healthcare sector in India.

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# LIST OF ABBREVIATION

| | |
|---|---|
| AEFI | Adverse Event Following Immunization |
| ANM | Auxilliary Nurse Midwife |
| ASHA | Accredited Health Activists |
| CMA | Canadian Medical Association |
| CR | Composite Reliability |
| DC | Developing Countries |
| EDA | Epidemic Disease Act |
| GAVI | Global Alliance for Vaccines and Immunization |
| GII | Government Information Integration |
| HCP | Health Care Professional |
| HDI | Human Development Index |
| HER | Electronic Healthcare Records |
| HHD | High Human Development |
| HIPA | Health Information For ALL |
| HIV/AIDS | Human Immunodeficiency Viruses/ Acquired Immunodeficiency Syndrome |
| HPW | Health Professional Worker |
| ICT | Information Communication Technology |
| ID | Identity |
| IHRA | International Human Rights Association |
| IIE | Information Integration and Exchange |
| IMHANS | The Institute of Mental Health and Neurosciences |
| IT | Information Technology |
| LHD | Low Human Development |
| MHD | Medium Human Development |
| MMR | Measles Mumps Rubella |
| MoHFA | Ministry of Health and Family Welfare |
| MR | Measles Rubella |
| NDMA | National Disaster Management Authority |
| NGO | Non-Governmental Organization |

| | |
|---|---|
| NHP | National Health Policy |
| NiV | Nipah Virus |
| NMBA | Nursing and Midwifery Board of Australia |
| NSR | Net Sentiment Rates |
| PSR | Planned Social Recognition |
| PTSD | Post Traumatic Stress Disorder |
| RV | Rotavirus |
| SDG | Sustainable Development Goals |
| SDMA | State Disaster Management Authority |
| SEM | Structural Equation Modeling |
| SM | Social Media |
| SMES | Social Media Engagement Behavior |
| SNS | Social Networking Sites |
| TNM | Telekom Networks Malawi |
| UK | United Kingdom |
| UNDP | United Nations Development Program |
| UNICEF | The United Nations International Children's Emergency Fund |
| VHHD | Very High Human Development |
| WHO | World Health Organization |

# CHAPTER 1

# INTRODUCTION

## 1.1. Introduction

The healthcare sector in India has improved in the past decade considerably. That has resulted in the improved rate of immunization, reduced infant mortality rate, life expectancy, healthcare spending, more number of primary healthcare centres, etc. The United Nations Development Program (UNDP) prepares human development reports which contain Human Development Index (HDI). The human development index is mainly based on three factors viz. longevity, educational attainment and Income per capita. It generally measures the state of development of a country (Tandon et al. 2000). The main indicators are life expectancy at birth, Expected years of schooling, mean years of schooling and Gross National Income (GNI) per capita. Inorder to end the poverty, improve the quality of life in all aspects everywhere and the protection of planet, 17 goals were adopted by all the member states in the year 2015. Good health and wellbeing is one of the sustainable development goals (SDG) set by the United Nations. The World Health Organization (WHO) is working towards achieving these goals along with the member nations. The human development index from the year 1990-2018 is given in Table. 1.1. India ranks 129 among 189 countries. Figure shows the HDI score is below the developing country's HDI. The position of the HDI of India is among the Medium Human Development Index (MHD).

Table 1. 1: Different human development Index values in India (Source: UNDP Development Program)

|  | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2018 |
|---|---|---|---|---|---|---|---|
| **Human Development Index** | 0.431 | 0.463 | 0.497 | 0.539 | 0.581 | 0.627 | 0.647* |
| **Health Expenditure (%GDP)** |  |  | 4 | 3.8 | 3.3 | 3.6 | 3.7 (2017) |
| **Life Expectancy Index** | 0.583 | 0.62 | 0.654 | 0.685 | 0.718 | 0.748 | 0.76 |
| **Infant Mortality Rate** | 88.5 | 77.9 | 66.7 | 55.7 | 45.3 | 35.3 | 32(2017) |

| Child Mortality Rate | 126 | 109.4 | 91.7 | 74.5 | 58.4 | 44.1 | 39.4(2017) |
|---|---|---|---|---|---|---|---|
| DPT Vaccination | 12 | 12 | 26 | 18 | 14 | 10 | 8 |
| Measles | 44 | 28 | 4 | 32 | 18 | 13 | 10 |

The immunization coverage is also less compared to world average but compared to previous years there is a significant improvement. The WHO immunization program has improved and is visible in the recent trends in the immunization rate. The status of India in DPT vaccination has improved in the recent period. Compared to other developing countries yet it requires further improvement to include more marginalized people

Measles vaccine was not part of the National Immunization program in India. It was introduced in the year 1999 as part of the immunization schedule (Gomber et al., 2011). India fared better in recent years. There was a MR vaccination campaign in India during 2018 by including the children below 15 years and above nine months. This program was conducted in a staged manner. The aim was to cover 95 percent of children with rigorous immunization campaigns. As per the Ministry of Health and Family Welfare (MoHFW) the target was to vaccinate 41 million children.

Infant mortality rate (IMR) is the child death rate till the child reaches the age of one at a specific year or a period. India is having the IMR in line with that of the developing countries and needs an improvement. As per the UNDP reports the current IMR of India is 34.3 per 1000 births. The study shows that the infant mortality rate in India is mainly due to the lack of maternal education and the gap between the pregnancy and the malnutrition among the adolescent mother. (Bhaumik, 2013)

The probability of a child dying under the age of five for a specific period or year is the child mortality rate. The rate of child death has halved during recent years and it is a significant achievement. Still India is trailing behind the world average.

*Internet Users*

Internet usage increased in India over time. With the introduction of new telecom policy and the technology development across the globe, the mobile internet and the services provided in the mobile phones had considerably increased. The exponential increase in the Internet users during the period 2005-2020 can be seen in the figure 1.1.
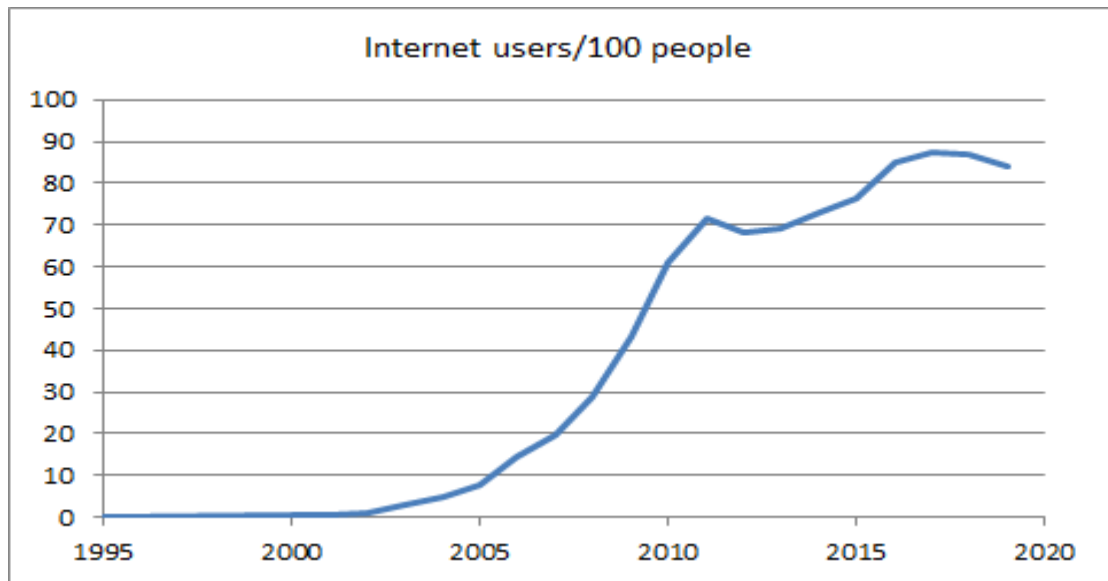


*Figure 1. 1: Internet Penetration Rate in India*

*(Data Source:*
*https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=IN&view=chart)*

*Mobile phone subscriptions (per 100 people)*

The mobile phone usage increased in India when more service providers and the entry of low cost mobiles entered into the market. At the same time the call rates also reduced considerably. The exponential rise in the mobile subscriptions can be seen after 2005 in the figure 1.2. The common man started using mobile phones and technology like Android made communication and e-commerce more simple and entertaining.
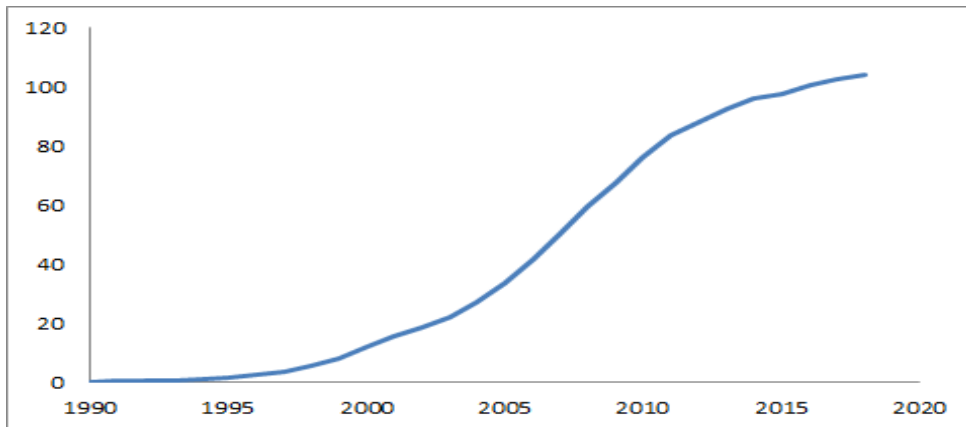
*Figure 1. 2: Mobile Subscriptions in India*

(Data Source: https://data.worldbank.org/indicator/IT.CEL.SETS.P2)

### *Cyber Crimes in India*

With the advance of ICT the crimes related ICT also increased considerably. The increase in the computing and the data give way for more improvement in e-Governance and the Government-Consumer communication improved much. This also led to the decrease in corruption in the society. But at the same time the data and information has been manipulated and used for agenda setting. There were many incidents during this period which have changed the world order to some extent. The increased rate of cyber crimes can be visible during the period 2012-2020 in figure 1.3.
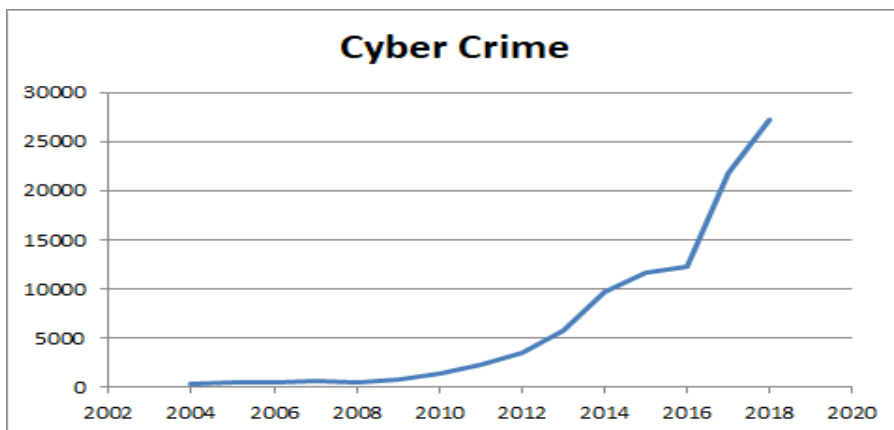


*Figure 1. 3: Cyber Crime in India*

### *Health Expenditure in India*

The digital divide in India has also affected the healthcare programs. Nowadays healthcare communications are done through social media for easy and immediate

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access to healthcare programs by the government (Makri, 2019). Healthcare expenditure has increased considerably in recent years. The increased cost of healthcare attracts the people towards the traditional medicines and thereby falling prey to the fake and dubious medicines. Sometimes that will affect the life of the patient. They are using social media for their publicity. Figure 1.4 shows the per capita health expenditure in India.
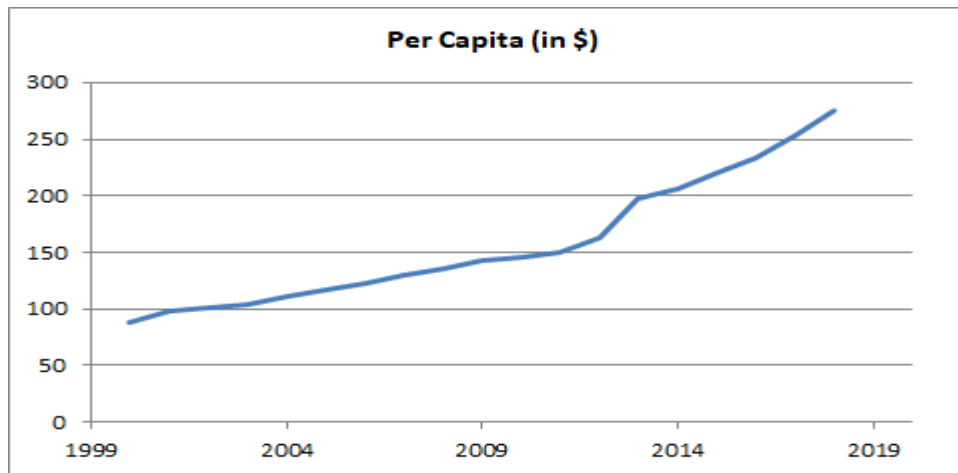


*Figure 1. 4: Per capita health expenditure in India*

## 1.2. Internet Technologies and Health Standards

The evolution of health care along with the evolution of Internet technologies was prominent in recent years. The rise in technology has given rise to the drastic changes in the healthcare programs also. The technology had changed the mode of delivery and execution of the healthcare programs. The involvement of the government and the healthcare workers were more compared with the involvement of the public in the earlier times (Thimbleby, 2013; Mitchell et al., 2019). Normally, the awareness programs are limited in the developed area with public transport or the places with more accessibility for the healthcare workers. The normal mode of communications was the radio, mass media and the public announcements. That scenario has been changed with the advent of technology. In the era of ICT, people are now more concerned with health and healthcare. That resulted in more investments in healthcare both by the government institutions and the private institutions (Kaufaman, 2010). Table 1.2 shows the evolution of Information technology and corresponding changes in healthcare.

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*Table 1. 2: The ICT evolution and healthcare*

| Evolution | 1993 | 2000 | 2008 | | 2012 | 2020 |
|---|---|---|---|---|---|---|
| **Web Standard** | Web 1.0 | WEB 2.0 | Web 3.0 | | Web 4.0 | Web 5.0 |
| **Definition** | Web 1.0 refers to the first stage in the World Wide Web, which was entirely made up of web pages connected by hyperlinks. Although the exact definition of Web 1.0 is a source of debate, it is generally believed to refer to the web when it was a set of static websites that were not yet providing interactive content. In Web 1.0, applications were also generally proprietary. | "Web 2.0 is the business revolution in the computer industry caused by the move to the internet as a platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them."[ O'Reilly 2005, p. 13] | A widely acceptable definition does not exist for Web 3.0. The key elements are the new programming languages, obtaining of contextual information, bigger and wider variety of sources and the ability to create and share all types of data[Bruwer et al., 2015] | Technology Under Development | Web 4.0 is a "Mobile Web" which is an alternate version of what we already have. Web needed to adapt to it's mobile surroundings. Web 4.0 connects all devices in the real and virtual world in real-time.[ Fleerackers et al., ] | Web 5.0 will be about the (emotional) interaction between humans and computers. The interaction will become a daily habit for a lot of people based on neurotechnology.[ Benito-Osorio et al. 2013] |
| **Type** | Web of Contents | Web of Communication | Web of Context | | Web of Things | Web of Thoughts |
| **Health Standards** | Health 1.0/ Medicine 1.0 | Health 2.0/ Medicine 2.0 | Health 3.0/ Medicine 3.0 | | Health 4.0/ Medicine 4.0 | Health 5.0/ Medicine 5.0 |

| E-Governance | Gov 1.0 | Gov 2.0 | Gov 3.0 | | Gov 4.0 | Gov 5.0 |
|---|---|---|---|---|---|---|
| **Interaction** | One Way | Two way | Two way with corrective measures | | Two way with corrective measures | Two way with corrective measures |
| **Data** | Personal Websites Blog and Social Profile SemiBlog | Haystack. | Personal Websites Blog and Social Profile SemiBlog | | Personal Websites Blog and Social Profile SemiBlog | Personal Websites Blog and Social Profile SemiBlog |
| **Users** | Millions of User | Billions of User | Trillions + of Users | | Trillions + of Users | Trillions + of Users |

The use of ICT along with healthcare proved to be the reasons for drastic changes in the healthcare sector. The continuous updation of the activities by the government and the NGOs made the effective distribution of healthcare among the citizens. The awareness also reaches almost all parts of the country even without reaching them individually by the healthcare workers. Social media and other Internet technologies made it possible to reach the information even without a physical contact.

## 1.3. Public Health Acts and Policies

The Government of India has introduced many health care acts and policies. The Epidemic disease act was introduced in the pre-independence period. The health acts and policies were aimed at the improvement of the healthcare system in all aspects. Provide the provision for ensuring healthcare to all sectors of the people with affordable cost. Protect the healthcare workers from all types of threats, providing better infrastructure and facilities. It takes care of the physical and mental health of all people including healthcare workers. Some of the major acts and policies that are helped to improve the healthcare system is given in Table 1.3

*Table 1. 3: Selected Policies and Acts in India*

| Sl. No | Act | Year | Purpose |
|---|---|---|---|
| 1 | The epidemic diseases Act (EDA) | 1897 | "An Act for better prevention of the spread of dangerous epidemic diseases" - Source: https://www.indiacode.nic.in/bitstream/123456789/2326/1/A1897_03.pdf |
| 2 | Essential Commodity Act | 1955 | It deals with the supply, production and commerce and trade |
| 3 | National Health Policy(NHP) | 1983 | The first health policy of India. Health for all by 2000 through the comprehensive PHC service |
| 4 | The Mental Health Act | 1987 | "An Act to consolidate and amend the law relating to the treatment and care of mentally ill persons, to make better provision with respect to their property and affairs and for matters connected therewith or incidental thereto" |
| 5 | National Health Policy(NHP) | 2002 | Inclusion of social policies, health services to larger groups, render good healthcare to the society and envisage unmet goals in health care. |
| 6 | National Disaster Management Act | 2005 | Formulation of National Disaster Management Authority(NDMA)and State Management Disaster Authority(SDMA) |
| 7 | Food Safety and Standards Act | 2006 | Establishing food safety and standards authority of India envisaged to ensure availability of safe food for the citizen of India |
| 8 | National Policy for Persons with Disabilities | 2006 | Recognizing people with disability as valuable and provide equal opportunity, protection of their rights and full participation in the society |
| 9 | National Vaccine Policy | 2011 | Strengthening the Universal Immunization program by strengthening the institutional framework, processes, evidence base and decision making. |
| 10 | National Food Security Act | 2013 | Ensuring adequate quantity of quality of food to citizen of India to live a life |

| | | | with dignity |
|---|---|---|---|
| 11 | Mission Indradhanush | 2014 | Aims to improve the immunization coverage to 90% |
| 12 | Public Health Bill | 2017 | Associated with the Prevention, control, management of epidemics, public health consequences of disasters, acts of bio terrorism or threats |
| 13 | National Health Policy(NHP) | 2017 | Added seven priority areas for improving the environment for health |
| 14 | The Epidemic Diseases (Amendment) Ordinance | 2020 | Prevention of violence against healthcare workers |
| 15 | National Policy for Rare Diseases | 2021 | National policy for to define and treatment of rare diseases |

## 1.4.  Social Media

Social media is described as "a group of Internet based applications that build on the ideological and technological foundations of web 2.0, and that allow the creation and exchange of user generated content" (Kaplan & Haelinein, 2010). In the initial phase of the Internet era viz. web 1.0, people used online information passively.  Social media and Web 2.0 improved the scenario and now the Internet is also used for participation and developing peer networks and group movements (Constantinides et al., 2008). The conversation or interaction that is occurring in all facets of life is shifting to social media to some extent (Bodendorf et al., 2010). As per Statista, one of the leading statistics companies on the Internet, there are 462 million active Internet users and the active social media users comes around 191 million in the year 2017. Social media has a variety of features which are attributing to different purposes of an individual user (Childs et al., 2012).

Social media can play an important role in the health care sector. The proliferation of Internet and the Information Communication Technology (ICT) development enhanced the usage of social media by the general public (Bernhardt et al., 2014). The use of social media is common across all age categories and professionals around the world (George

et al., 2013). The Health Care Professionals(HCP) will benefit from the social media usage by using it as a tool to share information, to improve and debate on health care policy and practice issues, to promote health practices and behaviors, to interact with public and educate students, patients, caregivers and peers (Fogelson et al., 2013; Moorhead et al., 2013).

## 1.5. Exploitation of healthcare through Social Media

Taking unfair advantage is generally understood as exploitation in a moral sense (Arneson, 1981). The unfair advantage does not necessarily be harming, coercing or benefit unequally from exchange of something. Exploitation is unusually self-interested and advantage seeking behavior when a transaction occurs between vulnerable groups and or individuals. Sometimes the unfair advantage may not be affected soon after the exchange (Ruth, 1992). The Internet is a media where the damage caused by fake news is affected either soon or it will affect the individual or the whole society gradually (Wilson et al, 2020). Recent trends show that social media can be used by the government by promoting its policies and programs and reaching the mass population very easily without much cost and time. On the contrary there is some area where the social media is misused for the personal benefits or for the benefits of some systems or organization which adversely affects the government programs (Steffens et al., 2020) especially in the health sector where the government programs get stalled by promoting some negative sentiments against the government health programs like vaccination (Burki, 2019). The anti-vaccine campaign in social media has affected the vaccination program by WHO to curb the diseases across the world. Even the developed countries are affected by this. The fake health information shared in the social media affected even the lives of the people. Some of the vaccine preventable diseases like Diphtheria which is eradicated completely, appeared again in the Kerala state (Lucky et al., 2017). The herd immunity is found to be in trouble due to the vaccine hesitancy under some religious beliefs and anti-vaccine campaign.

The information content shared in the media by misquoting with the experts in particular fields will have a distant impact on health care programs and also on the health conditions of the public (The Times of India, 2018). The misinformation gets

communicated through the social media with a great pace and will damage the reputation of people, organization and the system within no time. There may be many factors behind this: the alternate system gets benefited by degrading one system, the uneducated people get convinced about information and they forward it to his well-wishers, health is one of the major concern now a days and there will be financial and sentimental factors behind forwarding such kind of messages. The social media interaction and effort needed for the engagements are given figure 1.5.
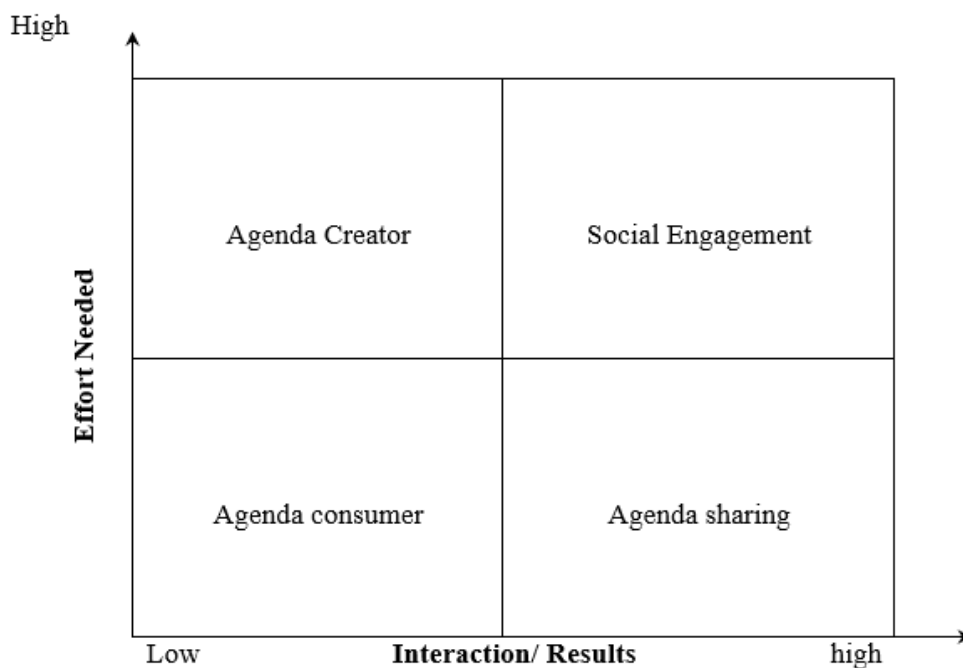


Figure 1.5: The social media interaction and the efforts needed for the engagements

## 1.6.  Social Media and Healthcare

The use of social media will improve health outcomes, professional network development, awareness of news and discoveries, patient motivation and the communities with health information for better use of health care facilities (George et al., 2013). Physicians can share cases, ideas, discuss challenges in case management, manage referrals, disseminate their research, market themselves, and provide health advocacy (Chretian et al., 2013). Social media supports health management activities, Knowledge creation, Knowledge preparation, usage, preservation and maintenance in

the health information system (Phosaard et al., 2011). Social media have influenced almost every field of life including healthcare (O'keefe et al., 2011).

However, social media problems are many fold. For example, the individual rely on the information gathered from the social media for their daily business practices like recruiting, sales and marketing (Sinclaire et al., 2011) and are concerned with the quality of information as there is no means to understand the quality attributes and the means to measure the quality that is limited. This has raised questions on the genuinity and the quality of the user generated content in social media (Baeza-Yates, 2009). The anonymity of the people won't be a barrier in the trust in social media. The consumers will be believed in the opinion of other consumers anywhere around the world. The opinion leaders are treated as independent, credible and loyal to other consumers (Weiman, 1994). As per Article 19 of the universal declaration of human rights:

> "*Everyone has the right to freedom of expression and opinion; this right includes freedom to hold opinions without interference and to seek, receive, and impart information and ideas through any media regardless of frontiers.*"

This right prevents the authorities from taking legal action against a citizen involved in the hindrance of the government practices like vaccination programs. But global Internet freedom has been in decline in gradual ways and shows a negative trajectory (Kelly et al., 2013). According to the data released by Facebook in its biannual government reports, India is one of the leading countries in censoring social media content. This is as per the request for content removal obtained between June and December 2014.

There are several negative effects on social media which include privacy issues (Davison et al., 2016), information overload and Internet fraud. Social media can have negative effects on users and the society. Social media played a crucial role in significant political events like Arab Spring Revolution, widespread trends in society and it also paved the way for the decline of print news media (Von Muhlen et al., 2012). These movements through the Internet generate a need for regulatory frameworks for social media among the government bodies.

The social media content can be categorized into four groups, viz its level of information, entertainment, remunerative and relational content. There are three types of social media

engagement behavior (SMEB) in the social media content, viz. positively valenced, neutral and negatively valenced (Dolan et al., 2015). The delivery of these varying contents will gratify the consumer intention in the social media usage. This will result in various social media engagement behavior. SMEB can be effectively used for the analysis of people using social media for a particular purpose (Katz et al., 1962). Uses and Gratification theory (Jay & Denis, 1969) may be applied for the purpose of media sharing, interaction and information seeking. This theory focuses on what people do with the media rather than what the media does on people. The misinformation content shared in the health sector affected heavily all around the world. This will make all the health care programs by the government a futile effort. Social media may add to the negative impact on the health care programs along with the religious beliefs. This was visible in the immunization program held in Kerala state where the immunization rate was very in particular community dominated locations (The Indian Express, 2017). The impact of these activities may not be visible immediately. It will affect the herd immunity and the disease will emanate from the people not vaccinated and affect the vaccinated people also.

This research shall address issues pertaining to Content risk (Ventola, 2014) and regulatory requirements in the Indian Context. Health information being liable to security and sharing of such content will violate the protection of privacy of an individual.

## 1.7. Misinformation and Mental Health

When we are addressing the health communications and the impact of misinformation and fake news in the healthcare programs, we need to address the secondary impact of the misinformation on an individual in the long term. The COVID like situation had created uncertainty in the life of people from the weaker sections. The children, disabled and the people depending on the daily wages for livelihood had been affected heavily. The government is finding it difficult to manage the primary impact and they find it difficult to address the secondary impacts like mental health (Su et al., 2021). Even after almost two years of the emergence of the coronavirus, scientists, healthcare professionals and the government were finding it difficult to manage the situation.

Especially, due to the high transmissivity rate of the disease (Fani et al., 2019; Wilder-Smith et al., 2020). A reliable and authentic health communication can reduce the mental stress of the people suffering from the trauma of the miscommunication (Okan et al., 2020).

## 1.8. Research Background and Justification

Social media has emerged as a key facilitator of efficient and timely information exchange medium (Mairs et al., 2013). Millions of messages are being created, got commented and disseminated by active social media users in a day (Sarah, 2017). There is abundant data in social media and every post may not be equally valuable, important or informative. The challenge in analysis of the social media data is its worthiness. So it will be better to concentrate on the patterns with the anomalous information spreading in the vast and noisy social media data (Schreck et al., 2013). Social network platforms are used to gather large collections of information in different domains and can be used for different applications, viz. Google search can be used to track disease rates (Carneiro, 2009). There are some other messages which are relatively smaller in size which are sarcasm that are harder to assess even by a human user (Diakopoulos, 2010). One of the largest social media networking services, Facebook is facing criticism on how its newsfeed algorithm is designed and which is disseminating misinformation on a large scale (Porghomi et al., 2017).

Misinformation is the inaccurate information that is already discredited. When information is gone viral and found inaccurate at a later stage, it is difficult to block it from spreading further. The correction may not reach all the recipients of the information. This particular misinformation will reach bloggers and wiki creators and the information delivered as reliable one in different platforms. It is very difficult to prevent the spread of misinformation because of the large variety of online social media websites (Gu et al., 2018; Nguyen et al., 2012). Social media can be used as personalized health care by turning face-to-face lifestyle intervention to an Internet based intervention (McTigue, et al. 2009). It is also possible to have emotional support and the information starting between patients of similar conditions (Swan, 2009).

The health information found in social media and other online sources lacks quality and reliability (Moorhead, 2013). Authors of such online resources may sometimes be unknown or with limited information, sometimes they are not referenced, incomplete or informal (Pirraglia, et al., 2012). The information without adequate evidence may not be reliable and accurate. The interpretation of the information without adequate data by a person without much subject knowledge also is a cause of misinformation. Social media tends to emphasize the stories which are pertaining to individual patient stories rather than collective medical knowledge. The interactive nature of social media will emphasize such issues and make it viral. This will create a hidden conflict of interest which a user is incapable of interpreting. The posting of misinformation in social media will affect the reputations of Health Care Professionals, students and the concerned institutions. A person can post information in a public network and this will be available for anyone and can be used for any other purpose (Peck, 2014).

The participation in social media is open in nature and anyone can convey their suggestions and opinions by accessing the Internet. In the era of Information Technology, the public heavily depends on the Internet for the support or opinion or expert knowledge about health matters (Kata, 2012). Due to this the health messages, misinformation in social media and other fake news reports spread across the globe rapidly and more efficiently (Betsch et al., 2012). Social media plays a vital role in understanding the content generated by the user (Cooke et al., 2008). Studies on social media networks reveals that the major role is played by influential people in molding attitudes and information dissemination (Tsang et al., 2005). These influencing people are "Standing responsible for the trends, public opinions and product recommendation" (Keller & Berry 2003). Studies on social media trends found that 78% of consumers trusted peer recommendation in social media and about 14% trusts the advertisements (Qualman, 2010). This has proved that social media can influence the citizens for mass movements by coordinating people online (Howard & Parks, 2012). People who are contacting multiple sources of 'infection' will be adapting to a behavior (Centola, 2010). Social media platforms provide the people to participate, access protest plans locally and globally (Morstatter et al., 2013). Social media played a vital role in many adverse impacts on the health care sector.

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The social media platforms are also initiated with some measures to fight the misinformation. The COVID-19 has seen the emergence of Infodemics which have affected the healthcare sector very badly. It also made people sicker. The science was not properly translated to people's understanding during those days (Hartley et al., 2020). The misinformation is in different forms in social media. The hoaxes, parodies, propaganda, clickbait are forms of misinformation in social media (Collins et al., 2020; Collins et al., 2020). WHO had started a myth buster link in their website, mainstream media started their own link to fight misinformation and other media had their means to fight misinformation using Artificial Intelligence and other algorithms (Pennycook et al., 2019).

## 1.9. Conclusion

The research background and the importance of social media in the healthcare sector and the possible threats which are affecting the healthcare sector and the lives of the patient motivated by the misinformation and fake news in the social media and the traditional media. Chapter 2 discusses the review of literature and some of the international initiatives in curbing the misinformation. Based on that, we identified some research gaps. That is followed by the research objectives and Research question. Chapter 3 is dealing with the research methodology. It discusses the addressing issues and its related variables. Chapter 4 is dealing with the qualitative analysis which includes the qualitative Interview and the content analysis from the social media during the distress period. The Metaphor analysis is also done in this section to identify the factors that affect the mental health due to the health communication in the social media. Chapter 5 discusses the Quantitative analysis of the data collected from the IT professionals on the onset of COVID 19 across the globe. An interview based study was conducted among the healthcare professionals during the deadly pandemic and assessed the impact of pandemic and the misinformation in the social media. Chapter 6 is dealing with the theoretical and practical implications of the study and the triangulation of the qualitative and the quantitative method study. Chapter 7 discusses conclusions and the future work.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1 Introduction

The previous section discussed about the background of the study which necessitate the research on the social media in healthcare and its impact on healthcare. Various social, cultural, technological and psychological aspects are discussed to address the importance of this study and its relevance in the current scenario.

## 2.2 Theoretical Background

### General Strain Theory

According to Agnew and White (1992), the causes of strain in the individual are due to the failure to achieve positively valued goals; loss of positive-valued stimuli; and presentation of negative stimuli. They also claimed that these causes are dependent on the situation in which the individual suffers. This is derived from strain theory, which states that society is placing pressure on people to attain socially acceptable expectations even if they lack the ability to do so leading to strain among individuals (Merton, 1938). Jang (2007) indicated that women experience strains related to physical health, interpersonal relationships, and job strain (El Khamali et al., 2018) which are likely to trigger depression and anxiety and are less likely to lead to deviant coping behaviors. Likewise, when the theory of general strain is applied to adolescents, apart from family conflict, violent and property delinquency, examination-related strain predicts violence and status offending (Moon & Morash, 2017; Wang et al., 2020).

This theory may be crucial in the outbreak of a pandemic, i.e. due to the presence of the Covid-19, staff, and individuals employed in organizations and shops are vulnerable to sudden amplification of stressors. This was also indicated in Campedelli et al. (2020) research paper and can be applied to the current Indian scenario.

### Socio-emotional Selectivity Theory

It refers to the changes in the motivation level of the person with respect to lifespan (Carstensen et al., 1999). It means that as the person ages he/she becomes increasingly selective with regards to the investment of their time, effort and other resources such as change also bring about a shift in the motivation and cognitive processing of an individual" (Carstensen et al., 1999). This theory suggests that knowledge-

seeking/acquisition and emotional regulation determine and inspire social interaction in a person's life (Psychologenie & Buzzle, 2020). The main assertion of this theory is that the motivational changes are closely associated with age, social preferences, and social network composition and are perceived to be beneficial for well-being and social adjustment (Löckenhoff & Carstensen, 2004).

In the early stage of childhood, time is unlimited and individuals process future-oriented knowledge acquisition, namely gaining new experiences, meeting new people, forming, and career planning that is future-oriented (Psychologenie & Buzzle, 2020). When a person grows older, time is limited, new experiences, and friendships begin to decline, and relationships with parents, family members, marital partners, and close friends that are fulfilling and supportive will be retained, and the rest of them will be discarded (Psychologenie & Buzzle, 2020).

Older people will communicate more frequently with family and close friends than younger. The frequency of communication with weak ties (i.e., coworkers and acquaintances) might be lower for them (Chan, 2015). In a study, the authors have identified that utility, multimodal connectedness, and higher perceived risks of weak-tie support network preference can actually be the predictor and could cause stress (Wright et al., 2010; Chan, 2015). Another study revealed that age was the predictor of online dating concluding that as individuals grow older, their tendency to switch modalities and date offline rises (Hallam et al., 2019).

### *Media Richness Theory*

It is a framework used to describe the effective use of communication medium ability to match the richness of the information sent over it (Ishii et al., 2019). Prior literature have used this theory in the context of online discussion form (Balaji & Chakrabarti, 2010), e-book readings (Arndt, 2012), etc. The authors have concluded that perceived richness, media content, compatibility, and convenience influence student participation and interaction, and learning (Balaji & Chakrabarti, 2010; Arndt, 2012). The other work that used the media richness theory was on public relations practitioners' perception over social media platforms (Michel et al., 2016). The authors have concluded that the

components for mass and traditional media platforms are not the same because social media demonstrated unique medium characteristics (Michel et al., 2016).

Merton (1938) indicated that innovation arises when there is a need for a particular technology and offers an inadequate opportunity to address such needs through established institutionalized means. These technologies can be both good and bad when it comes to the person. For example, prior literature has shown that the social network has an effect on innovation through learning, problem-solving, and creating new ideas (Kolleck, 2013; Abrahamson & Rosenkopf, 1997). This can be linked by fostering connectedness with others, sharing activities and news, and keeping in touch with old and new friends (Davey, 2016). However, in some situations, social networking can have an impact on the health and personal life of an individual (Davey, 2016; Pai & Alathur, 2020). The Internet facilitates social support through computer-mediated support groups (Wright et al., 2010; High & Buehler, 2019).

*The unified theory of acceptance and use of technology (UTAT)*

The unified theory of acceptance and use of technology (UTAT) model contributes to the exploration of technology acceptance and usage. Self-efficacy, habits, satisfaction, trust and perceived risk are some of the several variables that complement the UTAT model. There are some behavioural intentions for using ICT system (Alalwan et al., 2017; Chao 2019; Kabra et al., 2017).

## 2.3 Social Media, Healthcare and Misinformation

Sharing of Information about the outbreak of health hazards to the public by health care professionals through social media will be an effective way of communication. It will enable the public to access the reliable information from the experts. So the media supports the self-management of the health conditions to improve the psychological health (Lin & Kishore, 2021). The patient information sharing needs to get consent from the patient and it should also follow some guidelines and policies under disclosure of personal information in the public domain. Social media plays an important role in disseminating updates on patient care; introducing new doctors and information on pre- and post- operative care (Ventola, 2014).

*Social media in health care*

Social media also plays a crucial role in the training of HCPs. Social media can be used for sharing the training materials and the videos of the training are also made available through social media platforms. This will also provide an option for the immediate feedback for the trainers on the training materials and videos. This will improve the effectiveness of the training and training quality. (Peck, 2014)

Social media can be used as a medium to share information to the public on the availability of operation facilities, availability of doctors and medicines. It also helps to handle emergency situations like emergency situations and informs the news media, Red Cross and the centers for disease control. Social media is becoming an essential part of the health care sector. There should be some guidelines and procedures for effectively utilizing the medium and administrators for preparing those guidelines and procedures. (Lambert et al., 2012)

*Social Media and Disaster*

Social media can be used in healthcare sector for improving professional networking, education, promotion of organizational activities, patient care and conducting public healthcare programs (Chauhan et al., 2012; Muhlen et al., 2012). Social media provides a platform for sharing information, to engage with patients and public, interact with students, colleagues, patients and healthcare professionals (Bernherdt et al., 2014; Fogelson et al., 2013). Effective disaster management relies on the complex set of interrelated activities which are knowledge intensive and time sensitive (Othman, 2011). Social media tools are giving the users the benefit of sharing information, promoting events and the government agencies can interact with public easily (Alryalat, 2017).

The negative behavior on the social media accounts by an individual will spoil the reputation of an organization and give negative publicity which will affect the government programs (Helm et al., 2010; Krasnova et al., 2019; Zyle et al., 2009; Viswanath et al., 2015) One of the information resource in the era of internet is social media (Imran et al. 2015). It provided the information of both victims and the relief operators to coordinate after disaster. Social media plays the role of rapid information propagation agent during the emergency situations. Disaster management consists of

four phases: Mitigation, Preparedness, response and recovery (Achora et al., 2016). Rate of communication would increase in the response phase of the disaster (Abedin, 2014).

Twitter has become a strategic communication tool during disaster events around the globe (Lee, 2014). As per institutional theory, the institutions actively conform to the social media and may indirectly take control of the user generated content and the social media behavior of the user (Falls, 2013). Analyzing tweets, retweets and mentions are the normal practice of the studies in the case of Twitter (Mendoza, 2010; Simon, 2014; Crooks, 2013). The power of non-institutional and digital volunteers is more dominant comparing to the institutional tweets (babak et al., 2017). The study also states that the postings are informative rather than directive for the affected communities. The information posted from the non-institutional and individual accounts were sometimes unreliable and may result in rumors (Popoola, 2013). Social media is effective in spreading baseless rumors which can propagate chaos in the affected areas (Mendoza, 2010). If there is no communication from the official sources, the anxiety among people in the affected areas and others may shoot up and rumors get spread through the media and that will affect the people in the disaster site (Yates, 2011; Popoola, 2013). Use of social media by institutions or organizations may improve their services, public participation and transparency in action (Rosenberger, 2016).

Data collected from the social media are valuable after the events like natural calamity and terror attacks. This data can be used for the development of actionable information (Gao, 2011; Avvenuti, 2016). The quality of social media contents varies depending on the user which can have facts and lies. The disinformation can spread within a short time and create negative perception or opinions among people. Social media is also used by some group of people for cybercrime, terrorist activities, negative psychological consequences and cyber bullying (Yogesh, 2018). Local governments or organizations usually lack the information communication strategies and guidelines for communication to handle emergency situations (Hiltz, 2014).

The information from the online communication during disasters will enable the local governments to take necessary steps to cater the needs of victims (Terpstra, 2012). Usage of taxonomies with predefined disaster communication categories can identify the

specific issues for certain disaster (Olteanu, 2015; Shaw et al., 2013). Tweets are used as a tool for damage assessment during natural calamities (Kryvasheyeu, 2016). The time series analysis shows that when the crisis is severe, the communication becomes less in the affected areas (Spence, 2015). Government should strategically select the information from the social media to meet the citizen's requirement to reduce the information mismatch and also the government should advertise themselves on social media regarding the people's responsibilities (Lingzi, 2018).

In disaster management scenario, the critical factors are timeliness response and action (Sword, 2016). The increasing natural calamities had necessitated the better planning to avoid chaos. The availability of several relief organizations, the limited capacity of expert manpower, dealing the relief and other rescue materials, transportation facilities and the perishable materials may lead to the uncontrolled chaos. These need a sensitivity analysis and solve the problem in time efficient manner (Kamyabniya, 2018).

Social media proved to be a strong platform for changing the political structures. The political content in the social media changed the opinion of one in five users on the political issues (Duggan, 2016). It is emerged as the rapid information flowing platform for sharing and consuming the political content (Starbird, 2012; Kapoor, 2017). The political news content sharing and its negative consequences are growing in social media (Shiau, 2017).

Even though the world countries are committed to the immunization targets and agenda set by WHO, they are facing decreased rates of vaccination. Governments tried all means to spread the positive aspects of vaccination but there is a sharp decrease in the vaccination rates. Social media plays a vital role in the reduced rate of vaccination. There is a need for developing analytics tools to identify the misleading false information propagators on the Internet (Marta et al., 2015). Nowadays the Internet has become too popular and it disseminates large amounts of information to the common mass within no time. This has created the anti-vaccination agents to propagate their views much more easily. So the health workers and Health Care Professionals need to be well updated to face the doubts that the patients have. They need to be updated with the scientific evidence from the data available to counter the questions of the parents who were

vaccine hesitant. The HCP thus should be enthusiastic and committed (Tafuri et al., 2014). The comments used by both pro- and anti-vaccination propagators are risk related and causation words. There are fewer positive emotion words compared to control comments. Anti-vaccination comments are greater analytical thinking with low authenticity. They refer more to body and health whereas pro-vaccination comments in social media are more authentic (Kate et al., 2016).

Mitigating the vaccination safety concern is an important factor. If the government and health ministry fails in this aspect, then the vaccination program will get affected. Because of the social media 'virality' (Adam, 2012) nature, the defects in the vaccination program get communicated around the globe within no time. This will affect the immunization program badly. The personal stories about negative consequences in the anti-vaccination web pages created some impacts in vaccination programs on a large scale. We need well- coordinated, innovative and evidence based pro-vaccine interventions. The interdisciplinary approach to bring new expertise can alleviate the vaccine acceptance challenges (Eve et al., 2017).

The vaccination program faces resistance from the anti-vaccination faction because of the emotions and deep root beliefs which leads to blind denial. They propagate misleading information, myths, prejudices, and frauds. There are potentially biased pharmaceutical industries which are involved in research and development of vaccines. The vaccination process is having success as well as disasters and failures like contaminated vaccines and unsuccessful campaigns (Arthur, 2007). Considering both aspects, the achievement of the vaccination program needs collaborative discussion among all stakeholders like industry, academics, government institutions, organizations, journals and public. The open and scientific debate based on comparison and discussing ideas would sterile controversies (Nicola et al., 2017).

The communicator should be well informed and the communication of risk (Danielle et al., 2004) should be based on accurate data. Big data can be utilized for capturing, storing and analyzing the data item of each patient in capturing precision medicine. The information needs to be presented in such a manner that the patient should be understandable. The HCP should be good communicators. They also can make use of

new technological advancements like chat or messages. Listening is also an important aspect to have a fruitful two-way communication (Holt et al., 2016). Health communication acts as an emerging area where health education is replacing behavior and social change (Susan et al., 2015). The distrust on vaccination and the interactive nature of social media made health workers face arguments and concerns from the parents in different regions and with different cultural backgrounds. In order to achieve better relationships with audiences, the organizations need to change their communication strategy "from getting attention to giving attention" (Chaffrey et al., 2008). The two-way nature that sets social media apart from traditional media also presents opportunities. Public health organizations can monitor these media to find out people's health concerns and interests, as well as to find out "what has been pushed out to them", Rimal (2011) says. He believes that social networks can be used to change people's behavior, for example, in selecting the right sunscreen for children based on both evidence-based recommendations and on "what other mums are using". Providing evidence-based health information and messages to the public through social media looks simple but the challenge is in listening and prompts in responding to questions and rumors (Ben, 2011).

### *Nipah and Misinformation*

Healthcare sector in India needs to have an improved health infrastructure to cater the higher public expenditure on health and provision should be available for affordable health care. It can be made possible by providing insurance coverage, good quality subsidized public health facilities (Pandey et al. 2018). There is financial constraint on the treatment, control and care for the epidemic affected population. The population should be protected from direct out of pocket spending on epidemics (Aimable Mbituyumuremyi et al. 2018). Future policies must consider different challenges posed by big data as a resource for potential benefits. The public trust and confidence should be taken in to account in the big data usage (Efty Vayena et al. 2018).

The travel recommendation of WHO does not followed by many of the world countries on the eruption of epidemics. There should be some more care in the disseminating information to travelers to access the travel regulations before they arrive at another

country's border (Wendy Rhymer et al. 2017). There is a need for standardized biological behavioral surveillance which can understand the behaviors and practices which will be helpful in prevention and risk mitigation of pandemic threat (Maureen Miller et al. 2017).

Common people rely on the newspaper to access the factual information, opinion and analysis. They can influence the readers by understanding the issues of the reader. Normally the reader may go through entire article or may skip the article depending on the news value or a reader's interest. The news articles must be presented systematically to grab the attention of a reader (Alice Marwick et al. 2017). The main idea of the news headline is to catch the attention of the reader and make him to dwell in to the detailed news (Kuiken J et al. 2017). Internet ecosystem makes use of current media ecosystem to propagate ideas and set the agendas with manipulated news. Extreme right groups utilize the social media, journalists and bloggers to spread their contents (Caroline Jack 2017). Social media like Facebook is used by the inauthentic account holders to steer the opinion of public with inaccurate information. This will be spreading in other social media platform also by sharing the content. In rural population it will get exaggerated by word of mouth. Even if it is rectified in the source, the information shared earlier not gets updated as it is crossed its boundaries (Neuman W. R et al. 1992). Currently the main issues that are posed by the social media are lack of information quality, damage of professional image, breaching the patient privacy, legal issues and professional-personal boundary violation (Lambert A 2016; Peck J et al. 2014).

Practice theory says, lack of scientific and technological information accessibility is attributed to the lack of contact between scientist and public interaction. The technical progress should be in tandem with the public needs (Nicholas Petryszak 1977). Any kinds of manipulated information with the negative sentiments get communicated faster through social media. This can influence the sentiments of people and even cause revolt and change in power (Mackenbach JP 2012).

Due to many factors, health inequalities arise in the society and it may lead to unpredictable impact on the health condition of the population (Ahmad et al. 2018). There are many health inequalities arising from social dimensions based on income,

social class, deprivation, caste, ethnicity and geography. The health inequality among people based on said factors may affect the health condition of majority population (Shaw M et al. 2005). The country like India is having rich diversity which can have possibility of higher inequalities. The life of an individual itself is at stake under this condition (Gerry McCartney et al. 2015; Richard Humphries 2015). So the theories of health inequalities come in to play in identification of problems, because theories will explain appropriate measures to tackle the problem. Health inequalities can be tackled with policy recommendation to reduce them (Rod Ward 2013).

The country like India which is heavily affected with insufficient infrastructure and manpower in health sector paves the way for the health inequality. The doctor population ratio is 0.62:1000 against the WHO standard of 1:1000 (Press Trust of India 2017). This will heighten the public expenditure on health which in turn affects the welfare activities of government (Facebook 2018). Understanding the causes and the resulting mechanisms is an important factor if we are taking required actions to eradicate the injustice. The policy in UK and other world countries proves that how the economic condition and the life of people contribute to the health inequalities (Bruce R et al. 2011). The health inequality is grown with power and income inequalities. Normally this inequality is caused mainly by the actions of rich and powerful. Health inequality cannot be eliminated or reduced without concentrating on structural factors (Abdus et al., 2018).

Successive UK government has been tried the integration of social culture and social care as a policy goal for 40 years. But the overall progress was limited and has gap due to cultural differences, way of implementation, funding and different regulatory bodies to assess the individual organization rather than overall system (Luarn et al., 2015). There are many socio technical issues in implementing the health informatics. Technology acceptance and innovation models can contribute to the improving of health care sector (Salathé et al., 2013).

Despite all the advantages of the social media in all facets of life, Social media is also becoming a medium for spreading all kinds of misinformation which is affecting the well beings of the society and also the individual. The social media can also be used for terrorist activities during the time of disaster (Wolfsfeld et al. 2000). Social media is

used for the information dissemination, announcing government programs, communicating and receiving feedback from the public for improving the governance and the effective medium for disaster alerts (Woodward et al., 2000; Muhlen et al., 2012). When considering the human behavior and healthcare, people are more concerned with the health conditions. Any misinformation can make the human mind restless. Normally health care news comes with more of negative sentiments (Bhan et al., 2016). This creates more negative impact on the human behavior (Black et al., 1980). The health behaviors can be improved by delivering health information message via social media platform (Whitehead, 1988).

### *COVID-19 and Misinformation*

The Corona Virus infection in China which was reported from Wuhan on December 31, 2019 was a deadly disease which took the lives of about one million people and more than 30 million people infected with the coronavirus as on September 25, 2020. The World Health Organization (WHO) started a link in their website named "Myth Busters" to tackle such issues. Whenever the search for coronavirus comes in a social media platform, the users will get a link to the "Myth Busters" on the WHO official website. Self-appointed experts, people work from anecdotes, or making wild claims to get traffic or notoriety (Margolis, 2020) during this distress.

The blame game was in full swing between the superpowers like Russia, China and the United States (Brian, 1993). Mass media are acting as the 'fear-blur' and short circuits the actual events and brings the fear factor at the forefront. COVID-19 was also created in a situation where communalism and racism was brought in front by masking the actual scenario of the epidemic spread (Nick, 2019; Akash et al., 2020). The tweets in the social media in India utilized to target one particular community rather than the disease. The hash tags appeared as "#CoronaJihad" when many people attended the Tablighi Jamaat function held at New Delhi, India contracted with COVID-19(Dunwoody et al., 2020).

The impact of the epidemic may worsen the situation by intensifying the fear and increase in the risk perception. Epidemics are naturally emotion laden and the news report with emotion laden reporting may affect the mental health of the reader and also the people affected (Dunwoody et al., 2020; Yusuf et al., 2015). The emotion laden news

reporting increases the fear but may not educate about the epidemics (Eagleton Institute, 2014). The reporting style depends on the emotion attributed to the risk, i.e. the severity and its portrayal of the health risk in news coverage. The two threat components that influence the risk are perceived severity and the perceived vulnerability. Former is concerned with the seriousness or magnitude and the latter is concerned with the likelihood of the risk impact (Witte et al., 2000; Keer et al., 2010).

The factual reporting itself elicits emotional response and it is not solely attributed to the journalists reporting the news. That is beyond the control of the individual journalist. The audience response is also a subjective matter. The person well aware of the risk may not be affected much compared to the case of an individual naïve to the risk (Zikmund-Fisher et al., 2010). Sensational news which is evoking sensory and emotional arousal can induce increased risk perception (Grabe et al., 2003). Exemplification in news stories may strongly influence the audience perception (Zillmann, 2006). The examples can be anecdotal evidence in news stories. The emotion evoking health news reporting may be expected to influence the behavioural response to the health contents (Smith et al., 2008). The stigmatization and discrimination of victims in treatment may arouse fear among the reader (Yusuf et al., 2015).

Studies show that the emotion-laden reporting and the fear depend on the vulnerability also. If the emotion laden reporting of the news is from another far flung country, then the response in an individual is less (Celine et al., 2019). Health professionals and scholars have reservations on the boosting hearsay and the misleading medical and scientific information (Wilson et al., 2013). The fear mongering is also used for political gain by utilizing the capital expenditure. The narrative of fear mongering is escalated in the mind of the public and justifies the implementation cost of the public expenditure for political gain. This may be otherwise done by educating the people and providing awareness to them without much loss to the public money in the long term.

The psychological impact of quarantine among the people affected and suspected to be affected will be huge in some cases. Social media has many versions of isolation and quarantine. The people feared to be in an isolation ward and expected to spend time in isolation for a specified period may not disclose the disease (Barry, 2004). The disease

like COVID-19 imposes the quarantine for the people identified as the potential carriers of the disease or have contact with the infected individual (Miles et al., 2015; Jeong et al., 2016; Lee et al., 2005; Wester et al., 2019).

Fear mongering in media and public health campaigns use scaring tactics to enforce behavioural changes in the user. The fear mongering in the form of warnings and images in food materials, drugs, tobacco, etc. may not work normally. The studies show that fear mongering along with emotional messages may bring behavioral changes. The fear mongering combined with a message of hope influences the people in behavioral change (Dillard et al., 2017; Gerjo et al., 2018; Kok et al., 2016; Robin et al., 2019).

The novel CoronaVirus(nCoV) that emerged in China has also brought viral misinformation in the social media and other media in cyberspace. The virality of misinformation and the rumors in social media is much faster than the spread of nCoV. The social media filled with the fear mongering posts on discrimination, racism and other hate contents (Depoux et al., 2020).

### *Role of ICT in Distress Time*

Technology proved to be an essential factor during COVID-19 especially people facing social isolation and social distancing. Technology enables people to work, learn, communicate, and entertain for the social, emotional, and spiritual well-being (Goldschmidt, 2020). During a crisis, the media must take some responsible actions to mitigate the stress and anxiety among the people already affected by the trauma due to the epidemic. People rely on their smartphones to get emotional relief which in turn will result in the overuse of smartphones especially during the distress situations (Brand et al, 2019) like COVID where people are confined to their home due to lockdown. The overuse of social media to get information about the COVID-19 had increased the stress and anxiety further (Elhai et al., 2020). People are mostly depending on the online resources, especially social media for the information about COVID-19 as they are locked down inside their home (Hernández-García et al., 2020). The quarantine and social distancing had already created anxiety and negative emotions among health workers (Gao et al. 2020; Wang et al., 2020). The sessions with the corona recovered people to interact with the common man will reduce the stress and anxiety to some extent

(Bilal et al., 2020). The novel virus can have varying information as the infection progresses. This will have new personal care as well as the rejection of previous ones which will in turn lose faith in health care due to the inconsistent health communication. It may result in the emergence of misinformation (Rubinelli et al., 2020).

*Misinformation during Distress*

Prejudices exist among the health worker on the epidemiological factors, vector reservoirs, risk factors, treatment strategies, and the false news spreading on social media platforms. (Giri et al. 2020) World Health Organization (WHO) has been instrumental in fighting the Infodemics and the misinformation during the COVID-19. The social media information will be spreading like a virus in different applications and that will be changing their form by editing or adding or deleting the contents by the users creating more rumor and panic. The WHO in collaboration with the social media application tried to control the spread of misinformation and rumors about the epidemics. (Zarocostas, 2020) Shivani et al. (2020) suggest that the use of social media and news in the first hour of the morning should be avoided to reduce stress and anxiety. The articles published and the information available on the Internet about COVID-19 will be sometimes too hard to comprehend by normal people. So the readability of health communication must be improved to curb the epidemic. (Szmuda et al., 2020) There is a need for information ethics to fight the epidemics and the healthcare community needs to become a ready resource for information management during the epidemics. (Datta et al., 2020)

*Infodemics and Health care*

There is a term 'infodemics', which refers to the mass spreading of misinformation or fake news through social media or other outlets, that came along with the epidemics. Such misinformation spread during the COVID-19 had created panic as well as Xenophobia in addition to disrupting the management of pandemic by health authorities and the government (Centers for Disease Control and Prevention, 2020; Yuen et al., 2020). There are many rumor detection methods which solely depend on the linguistics aspects and neglecting the temporal dynamics and propagation patterns. (Wu et al., 2020) The pandemic has resulted in racial attacks and Xenophobia around the globe.

The misinformation spread in the social media added fuel to such acts. (Huang et al. 2020) The social media is not moderated which is resulting in large messages which are unable to discriminate based on their reliability. Health workers should be extra cautious when interpreting health information and preparing social media articles (WHO, 2020; Tsui et al., 2020). Social media can be used as an agent for analyzing the information communicated to tackle the epidemics. It can predict the spread of pathogens by analyzing the keywords used in the communication (Lu et al., 2020). The state of uncertainty due to the novelty of the virus combined with social distancing, masking the faces made people more insecure. The disconnection between the researchers and indigenous communities, people with disabilities, the low socio-economic status will be the most affected by the misinformation (Tucci et al., 2017; Vieira et al., 2020).

In addition to the social media data 'infodemics', privacy and data protection is also under threat during the COVID-19. The researchers and data scientists may use health data as secondary data resources. The government is using the geo-locations and the media data of a patient to understand the patient's movement and the spread of the virus in order to maintain the social distancing and surveillance of the infected people. This may further lead to discrimination and stigmatization. There is a breach of fundamental rights and freedom of data rights of an individual (Servick, 2020; Delcker et al., 2020; Jelinek, 2020; Malgieri, 2020). People will have an increased tendency to know the progress of epidemics when it is prevalent. This can heighten the distress and anxiety especially when the rumor and the misinformation are spreading in the media (Garfin et al., 2020; Yao, 2020).

 There are studies related to medical impacts of the diffusion of viral diseases. The after-effects of the distress are the behavioral aspects that were not studied in large, especially in the developing and the under-developed countries. The psychological dimensions of such impacts need to be studied to intervene in the psychological wellbeing (Casagrande et al., 2020; Comtesse et al., 2019). Disease Knowledge and awareness are the prime factors of the response to preventive behavior along with the risk perception. Social media related factors have an impact on such behavior (Karasneh et al., 2020). There is a need for mental health interventions at different levels, viz. The general population,

healthcare workers, and the vulnerable population should also be time-limited and culturally sensitive (Rajkumar, 2020). The fear and anxiety-related effects of the pandemic will affect one's behavior in the community. A study by Roy et al. (2020) during the COVID-19 pandemic in India shows that 80 percent of the respondents needed perceived mental healthcare. Though isolation prevents the spread of a pandemic, the separation from the family, friends, and other social engagement will cause anxiety and depression during the pandemic (Zhou et al., 2020). The excessive use of gaming during the pandemic lockdown will result in excessive engagement behavior. There will be an increased public health burden due to the gaming disorder (Balhara et al., 2020). Research should be conducted to implement newer methods of communications to focus on the impacts of the pandemic among healthcare workers and patients (Grover et al., 2020).

*Mitigation of Misinformation*

The media should limit the reporting of the pandemic to the information shared by the health experts and the authorized government authorities. Other than that the media should also promote the precautionary measures followed to mitigate the spread of the pandemic. Public health professionals should take initiatives to counter the misinformation in the media. In addition to that, the government should brief the epidemic updates regularly to mitigate the doubts and fear among the public (Basch et al., 2020). Health authorities can intervene in the health strategies by incorporating the local and international heroes to fight the misinformation spreading in the media (Atlani-Duault et al., 2020). A lay public may always look for a close contact for clarifying the misinformation in the social media. Sometimes they may not be capable of giving accurate information (Limaye et al., 2020).

A considerable proportion of healthcare workers experienced mood and stress variations during the pandemic outbreak. Thus a timely intervention needed to mitigate the vulnerability of the healthcare workers towards mental health (Pappa et al., 2020). This suggests better working conditions and the facilities during the COVID-like situations by providing sufficient medical protective equipment, providing adequate rest, and the recovery programs to achieve psychological wellbeing (Zhang et al., 2020). There is a

need for a psychosocial intervention and prevention model with the support of the government, healthcare authorities, and other stakeholders by incorporating Internet services (Dubey et al., 2020). In the current context, the analytics strategies needed to prepare and respond to the pandemic at the national and global levels (Ransing et al., 2020). Health care professionals should find some extra time in involving the special correspondence in the media coverage during the pandemic to ensure more accurate information (Basch et al., 2020). There are many technologies in intervening in the disease by covering clinical and cultural difficulties (Kumar et al., 2020).

*Metaphors, healthcare and Mental Health*

There are considerable amount of literature discussing the many diseases which are really affected the people physically and mentally. The major diseases that used metaphor research are cancer (Semino et al., 2017; Gibbs & Franks, 2002), Cardiac diseases (Boylstein et al., 2007), diabetes (Goering, 2015; Sinnenberg et al., 2018), etc. Most of the communications by government and public figures depicted health care workers with war and military metaphors (Jain, 2020). Though the medicine is associated with the cure and healing, the public and professional discourse contain lot of war and military metaphors (Annas, 1995; Fuks, 2009). The COVID-19 reporting was also not spared war metaphors in the social media, mass media and the speeches by the political leaders. At the same time hate speech in the social media spreads much faster than the corona virus infection (Perrigo, 2020). There was use of corona Jihad (holy war) to target a particular community in India (Sasitha, 2020). The use of metaphors in medical research and patient care will be capable of creating despair or hope. The use of metaphors of war in medicine is ironic and unnecessary (Jing-Schmidt & Peng, 2017).

The COVID-19 got much coverage in all the media forms especially in the social media. The war is unpleasant, boring and requires more masculinity and patience. Similarly the "Medicine is war" is one of the metaphor to consider doctors to be like soldiers in the war. They are in long hours of stressed hospital life and finding difficult to cope up with the work and the family life (Hodgkin, 1985). World Health Organization (WHO) declared 'war' against many diseases like tuberculosis, cancer, AIDS, diabetes, and obesity. That 'war' resulted in the invention of many drugs and vaccines to control the

diseases which are considered to be deadlier (World Health Organization, 2015) in the past.

The meaning of metaphora in Greek is "to carry over" i.e transferring from one domain to another domain. Metaphor is used in natural language to convey opinion. The effect of conveying the opinion is another factor where metaphor comes in to play. Emotional statements are often conveyed metaphorically to create an impact on the targeted population (Xu et al., 2012). Opinion mining and metaphor analysis are the most studied topics in the field of Natural Language Processing (NLP). Automatic detection and comprehending the metaphor in a corpus is now a frontier of research (Gagliano et al., 2016). Metaphors can shape the perceptions of the social policy by a government (Landau et al., 2010). There can be culture specific and universal metaphors. Using the metaphors in the scientific literature, it may sometimes leads to ambiguity. It should blend source and target to get more impact (Holyoak & Stamenković, 2018). Source, target and interlinking are the three domains of a metaphor. In a metaphor 'fight cancer', the 'fight ' is the source domain, 'cancer ' is the target domain and mental representations of 'fight' and 'cancer ' are the associations or interlinking. They will have a structure (Lake et al., 2015). Metaphor has practical implications in developing scientific theories, frame complex policy issues, solving complex issues in classrooms and evaluate the health conditions. It is moreover an inter-disciplinary topic which takes hue from psychology, linguistics, philosophy, computer science and neuroscience (Kuhn, 1993; Shon 1993).

The use of military or war metaphors in the healthcare sector will be helpful in raising the concerns of the impact of the health issues and brings in the attention of public and the media. Military metaphors may also aid in awareness about the disease and also for fund raising (Lane et al., 2013). Metaphors conceptualize the experiences that will have potentials and impacts the thoughts and actions (Lakoff & Johnson, 2003). When we use war or military metaphor in healthcare, we represent physician as a general. It will make them more authoritarian. So the relationship between a patient and doctor will be considered as the general-soldier relation. In Chinese metaphor, the person who heals a disease is treated as parent, technician, teacher, fighter, or captain of a ship (Nie, 1996)

and similarly the general as a person with military ethics, wisdom, sincerity, humaneness, courage, and strictness (Tzu, 1963). Considering war and military are co-existing with the human life for long, the metaphor related with it will stay here for long (Nie et al., 2016).

The use military or war metaphors enable the government and other policy makers to concentrate on control at the centre and effectively sacrifice people and their rights. They can control the massive expenditure that is required for the epidemic containment (Annas, 1995; Ross, 1986). The military metaphor has become a common factor in the diseases emerged in the last two decades (Gradmann, 2000; Sontag, 1989). The usage of metaphors for disease reporting has many versions. The impact of the metaphors will give anxiety or hope among the patients or in-laws depending on the type of metaphors used. The news reporting will give another version to increase their news value. Media people will be forced to give such catchy metaphors to make the user to read the newspaper content without concerning the mental agony of the reader. The political and other government authorities will make use of the situation to make the people stressed or anxious to get the political mileage (Wallis & Nerlich, 2005).

Though the military or war metaphors used in the clinical and medical research are useful, they also have many drawbacks. They give more emphasis on the biological and physical aspects of the disease but they totally ignore the psychological, spiritual, communal and social dimensions of the disease. This can undermine the narratives of the illness of a patient by an experienced healer. So this will hinder the caring of the patient by the medical professional. This emphasizes the importance of metaphors with peace, healing and co-existence (Omer et al., 2013; Malm, 2016). The reliance on metaphors like 'fight to the death', 'survivor', 'battle for life' will alter the perception of an individual about a disease and that will lead to the over treatment and mental trauma (Hoffman et al, 2009). A person who is identified as 'survivor' of a disease will experience a variety of psychological changes affecting his quality of life and anxiety of being affected again in the future , depression and so on (Byme et al., 2002). Doctors and social workers are promoting the positive attitude and they are used the survivors for fund raising. They survivors had given little room for expressing their fear, shock

and sadness during their interviews. It also gives a preconception that the cancer patients who are fighting only get cured and others let die. Still there are some cancers which are not curable. So the patients and the in-laws get to think that the person had done sin to get such an illness. This will be more shocking for the patient as well as his in-laws (McCartney, 2014; Diamond, 1999; Rost et al., 2012).

In palliative care, there is an acceptance from a patient that certain symptoms cannot be completely cured. A patient can reduce the overall severity of a disease by Acceptance and Commitment Therapy(ACT) model of psychotherapy. It is applicable to palliative care (Bolmsjo, 2016). When considering the war metaphors like 'killing', 'fighting', 'attacking' are all diametrically opposite to the ACT. So it is reasonable to have reasonable and dignified language for palliative care. There the anxiety and depression are reduced by providing relief from physical symptoms (Bolmsjo, 2016; Trachsel, 2016).

## 2.4 International initiatives pertaining to Social Media and Health Service delivery

The studies conducted on the effects of social media worldwide shows that there are benefits concerned with patients and health care providers. In contrast, the health care system faces serious issues on basic aspects of health care services (Alma et al., 2015). The terms searched most are related to a particular disease affected to a person or his close aide (Fox et al., 2015). The main concern of patients in using social media is its privacy and unreliability of the information (Marjolijin, 2013). HIPAA (Health Insurance Portability and Accountability Act of 1996) is legislation by the United States to provide data privacy and security provision for protecting medical information. It got much more importance in recent years with the increased data theft caused by cyber-attacks and ransomware attacks on health insurers and providers. Canadian Medical Association (CMA) monitors the trends on health care and publishes future practice in social media to help inform physicians to give knowledge about the emerging social media and health information technology in Canada. They believe that social media is prone to different professional and legal risks and uncertain about the benefits of the new medium of communication (CMA Policy, 2011).

The Nursing and Midwifery Board of Australia (NMBA) made it clear that it is the fundamental responsibility of nurses and midwives to make use of best available evidence and uphold their code of ethics and code of conduct when providing advice on immunization. If they fail to uphold the Standards and evidence and give false or misleading evidence could face prosecution by the Australian Health Practitioner Regulation Agency (Megan, 2017). The anti-vaccination groups employ different communication tactics to deal with opponents by deleting the critical comments in media channels like blogs, they complain about scientists and critical writers and may threaten to take legal actions for publishing pro-vaccine material (Kata, 2012). It became difficult to differentiate between professional and amateur content for information seekers (Cooke et al., 2008) due to the vast acceptance of online channels. California enacted an inoculation law in 2005 after the outbreak of measles originated in Disneyland. The health officials clarified that the outbreak was due to the high number of unvaccinated children (Soumya, 2017). As per the law SB 277, the parents are prevented from citing religious or other personal beliefs to get out of vaccinating their children. So the children need to get doctors' not to be exempt from the vaccination.

In India, the Union Government has approved the National Data Sharing and Accessibility Policy in the year 2012. As per this policy, the government will make available all the sharable data to the public under the government custody. It includes all the data under the responsibility of organizations and institutions of all States and Union Territories in India. This policy is implemented in line with the tenth principle of Rio De Janeiro declaration on Environment and Development of the United Nations and the section 4(2) of Right to Information act, 2005. The data access is classified into Open access, Registered access and restricted access.

The Ministry of Health and Family Welfare (MoHFW), Government of India had introduced uniform standards for the creation and maintenance of the electronic healthcare records (EHR) in 2016. It details on the recommendation of the interoperability and standards, standards for clinical informatics, data ownership, and privacy and security aspects. There are many upgrades from the previous one by incorporating the improved technology. As per National Health policy 2015 three major

goals included to ensure the right of health of all citizens, i) reduce child mortality rate, ii) improve maternal health, iii) prevent HIV/AIDS and other diseases like Malaria and Tuberculosis. Challenges and gaps faced by the healthcare sector in India can be analyzed by making use of four pillars viz. Accessibility, Acceptability, Affordability and Availability. There are many factors which are acting as hindrance to Universal Health care. The Internet has become a major source of fetching information and it also acts as a medium for propagating the false propaganda by many groups against the healthcare programs.

## 2.5 Research Gap

Indian IT act and Information security is limited to some extent in taking actions against the social media content spreading anti-vaccine posts or tweets. This will come under the purview of freedom of speech and expression under article 19(1)(a). The Information Technology act, 2000 contains several provisions which will apply to mitigate hate campaigns on the Internet. It is predominantly addressed in section 66-A (Unconstitutional now) and section 69. The social media content against health sector programs like vaccination may not have immediate effect on the people, but there will be adverse consequences in the future which will affect the wellbeing of a citizen and add to extra burden on the government (Vandana et al., 2018). Countries like India with a huge number of people are not yet provided with basic amenities like education, health care, IT infrastructure, etc. The combination of the misinformation through social media and word of mouth will have greater reach than any other traditional communication in influencing the public opinion (Burkhardt, 2017). Now the government is setting up the IT infrastructure all over the country, and setting up a national framework by including multiple stakeholder health workers, NGOs, Internet service providers, law enforcement agencies and government (Inna et al., 2015). When organizations post a message in social media and retweeted, there is a possibility of distorting the message and misinterpreting it. This will send wrong information and affect the credibility of the organization (O'Reilly, 1978; Svalastog et al., 2014). A continuous monitoring is needed for the same to counter the rumors spread in the social media. When it comes to public health, information must be accurate, in time and reliable. There should be a government

mechanism to counter the misinformation that is affecting the programs organized by the government (Sinemus et al., 2007). The government can make use of social media and NGOs or other social activist groups to curb the negative remarks on social media by educating the people with scientific evidence (Sinemus, 2007). Now the mechanisms to do these activities are less effective. This might result in many additional burdens on the government by extending the health care programs and putting additional effort to overcome the negative impacts.

The health care system in India has no roots on its culture and tradition. The culture and traditions of Indian rural population are reluctant to accept the western medicines. The rural population in India is still the strict followers of superstitions and some traditions (Worthington et al., 2011). These are deep rooted in their daily activities. If any new program is introduced in this sector the people must be convinced about the whereabouts of the programs and it will take a long time to bring them to the track. The culture and social factors must be understood and the medication should be followed based on their tradition. The HCPs should be well aware of the cultural aspects of a rural population. It may vary depending on religion, caste and ethnicity. The Internet is the most vulnerable medium in the form of social media which will affect healthcare programs. The hate mongers of modern medicine will make use of these cultural, religious and social beliefs to spread rumors among the vulnerable group of people (Pelčić et al., 2016; Ruijs et al., 2012). They can spread heartedness towards a system of medicine in an easier way by using social media. It affected the immunization program in the year 2017 in Kerala. They made use of a wide range of publicity through public gathering, videos shared in social media like Facebook and WhatsApp. The videos are still available on YouTube and the articles can be found in different blogs. Even the HCP are hurt during the immunization program by the anti-vaccination campaigners (McKay et al., 2020; Vento et al., 2020). This made the government invest more on the awareness program.

The spread of fake news in different online news portals is another area of concern (Hartley et al., 2020). Sometimes the mainstream media also brings up this news from some other source depending on its 'virality' and the inefficient proof editing. This will be an added advantage for the haters to spread the news as an authentic source. In the

era of the Internet, it is easier to create fake IDs and spread hate content in multitudes and make the fake news authentic in the mind of the common public(Naeem et al., 2020; Peters et al., 2020).

There should be an efficient mechanism to curb the fake news and reports spreading in social media. Internet regulation is needed to limit the sharing and the awareness programs should be given through the Internet or other communication media. There should be a mechanism to improve the communication gap between government and public, HCPs and public and HCPs and Government (Peters et al., 2020). This will improve the effective implementation of government programs. The communication must be aided by the guidelines and the policies as it is concerned with the health information and should be fool proof and secure. Information exchange must be supported with evidence and authenticity and responsibility by HCPs (Grech, 2017; Pennycook at al., 2019).

Based on the study the following research gaps are identified in the context of India healthcare and social media.

> **Research Gap 1**: The relevance of social media intervention in healthcare is inevitable and the impact of misinformation has affected the healthcare sector. Not much research is done in this area in Indian healthcare sector to study the impact of misinformation in the healthcare sector.
>
> **Research Gap 2**: Though the government and the researchers are aware about the misinformation affecting the healthcare programs in India, the study to curb such acts are limited in Indian context.
>
> **Research Gap 3**: The secondary impact of misinformation during the distress is a much concern in healthcare. Much attention is not paid towards that and there is a need of study in that aspect in Indian healthcare
>
> **Research Gap 4**: The need of awareness among healthcare professionals, higher government officials and citizens in sharing the unverified information in the social media is a necessity in the distress period. The study is required to have a policy in information sharing in the social media during distress

**2.6 Conclusion**

Extensive literature survey has been carried out to identify the gaps in the healthcare and social media in the Indian context to suggest policies and framework for tackling the gaps identified. In the context of multiple setbacks in the healthcare programs in India during the period of study, the research on the social media and its impact on the healthcare sector is unavoidable especially when the social media is one of the major information sharing medium. The challenges faced in the healthcare programs can be alleviated with the support of social media and at the same time there should be a solution to tackle the challenges faced from the social media in the healthcare sector in the form of fake news and misinformation. The study explores different aspects of the misinformation and fake news and its impact on the healthcare sector.

# CHAPTER 3

# RESEARCH DESIGN

## 3.1    Introduction

Chapter 2 discussed about the theoretical and empirical aspects of this study. All those aspects will guide us for the further research on the topic social media and healthcare in the Indian context. In chapter 3, we discusses about the research question in section 3.2 followed by research objectives in section 3.3. Section 3.4 discusses about the conceptual framework of the study followed by research design. Finally the chapter concludes with the justification for the study in section 3.6.

## 3.2    Research Question

How to improve the social media environment in India for better health care?

## 3.3    Research Objectives

Based on the research question, the following research objectives were draw up for the study of data, collection of data and analysis of data. The importance of the social media in the healthcare sector will be assessed in this study.

a.   To identify the characteristics of social media content that influences the health care sector in India.

b.   To analyze the problematic contents in social media with the help of case studies in Indian context.

c.   To develop a framework to improve social media environment for better health care in India

These research objectives will guide for the collection of data from the subjects by going through many process and technologies to evolve some conclusions on the research thesis. The intervention of social media in healthcare will be assessed to some extent and will be able recommend some policies for the betterment of healthcare sector in India.

## 3.4    Addressing Issues: Technology, Governance and Society

With increased population and the emergence of new diseases and increased expenditure on health made it the importance of effective mechanisms to address the issues of

misinformation sharing in social media. Department of Electronics and Information Technology approved a Framework and guidelines for use of social media for government organizations (Meity, 2010). There must be similar guidelines for the NGOs also to tackle the sharing of misinformation. There should be strong Internet governance practices and social awareness to have best practices of social media usage. The advent of Internet technologies not only enhanced productivity but also saved expenditure incurred by the government in all the sectors including health (Dash, 2020). There won't be any visible impact immediately due to misinformation. But in the future it will be a burden on the government and also on each member of the society (Pulido et al., 2020). The research model for this research is given in the figure 3.1.
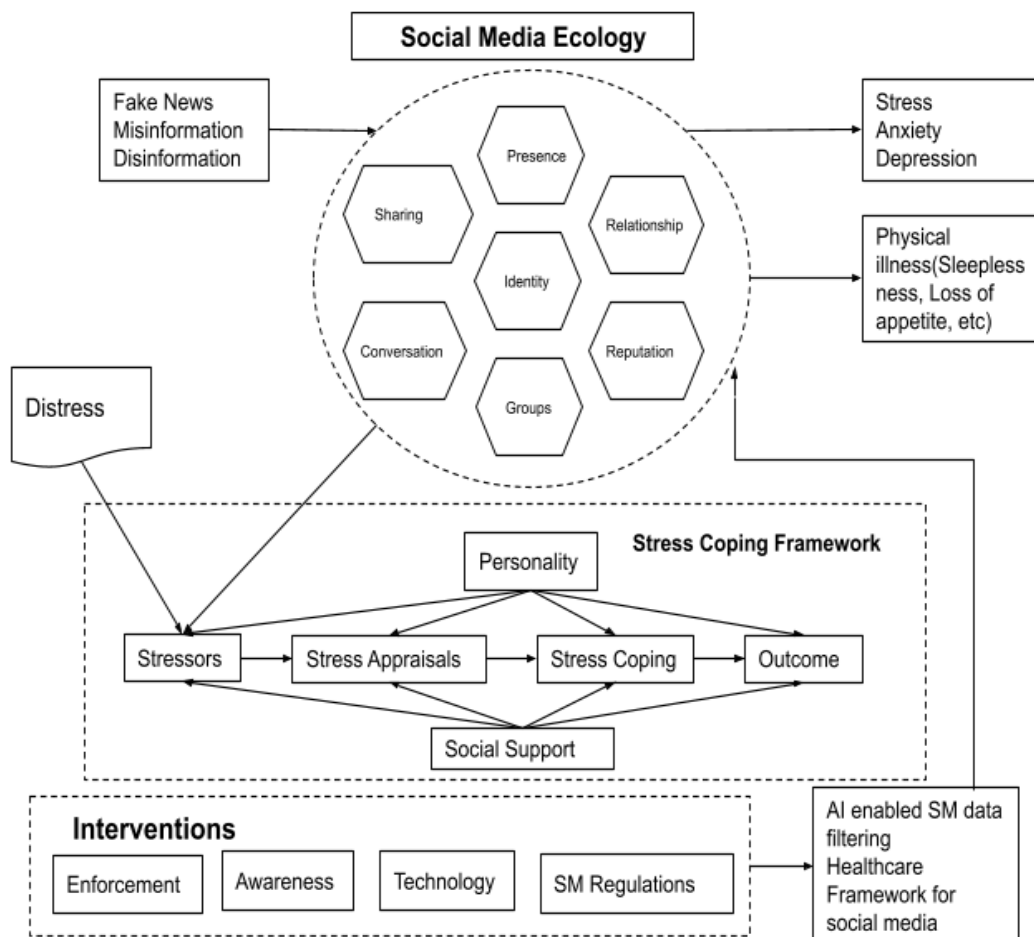


*Figure 3. 1: Research Model for the Study*

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*Social Media Ecology*

The social media ecology has been widened with the improvement in the ICT and the evolution of new social media platforms. At present, the SNS interactions have been based on the convenience and the framework of the application. Many applications have evolved during this period and some applications like Orkut, Google chat, etc were shut down due to the change in the technology platforms. Some applications have their own peculiarities and they are surviving with more users. The use of the SNS in business applications has made game changing revolutions in this area (Duffy et al, 2017; Mattoni, 2017). Accordingly the social media ecology nourished and found its own components to boost the business and other social interactions (Zhao et al., 2016). The honeycomb model for the social media framework has seven blocks (Silva et al., 2020). They are:

- Sharing – "The extent to which users exchange, distribute and receive information." Information sharing generally has motivation by an individual and there will be a behavioural instinct also. Technology like SNS platforms will enable an easier way of information sharing. Any projects associated with the information sharing are a failure just because of the hesitancy to share the information by an individual. When there is an agenda, there will be motivation. So people will not hesitate to share the information (Bălău et al., 2017; Akhavan et al., 2005).

- Presence – "The extent to which users know if others are available." The presence of an individual in a social gathering is a kind of behaviour for the social interaction and for enhancing their interaction. Social media is also a virtual social environment which is enabling the individual to interact with the peer group members. The contribution in the physical interaction is much less than the virtual interaction. It may be due to the introverted nature of the people present there. But in a virtual environment the interaction will be much better (Cridle, 1971; Jung, 2011; Lombard, 1997).

- Relationships – "The extent to which users relate to each other." The relationships take longer to establish in the real world because of the time taken for understanding the likes and dislikes of an individual through enquiry. The progress of conversation will be slow and the enquiry will also be a challenge without knowing their

background. In the cyber world, the SNS provides all the preliminary details of an individual and their likes and dislikes. So one can understand their affinity and start conversation accordingly. That can be initiated at any point of time without a physical barrier (Sbarra et al., 2018; Pieh et al., 2020; Alistair, 2018).

- Identity – "The extent to which users reveal themselves.". Knowing and experiencing oneself will improve positive self-esteem and psychological well-being. The cultural identity is closely related with the personal identity. The person with a positive self-esteem will be contributing to the cultural well-being of the society. So the identity of a person reveals the activities that he is involved in the physical and cyber world. Cultural identity sometimes masks personal identity due to the norms in the society. But that may be unmasked in the cyber world as there are no definite norms when someone joins a group based on his innate desires (Usborne et al., 2010; Alessandri et al., 2021; Bas et al., 2019).

- Conversations – "The extent to which users communicate with each other." Social media conversations are mainly active and passive in nature. The active conversation includes the discussions through the comment boxes and passive will be just expressing their views with images and emojis. Active conversations will improve the learning and thinking abilities. The conversations in the specific groups will be socially and culturally positioned. The conversational strategies with the interactive videos and other methods will increase the learning and thinking capacity and it will be helpful in information dissemination (Boyd, 2014; Wolfe et al., 2010).

- Reputation – "The extent to which users know the social standing of others and content." Reputation of a firm or individual lies in the way the image of the firm or individual is portrayed in the listeners mind. There are many parameters that decide the reputation. The way the individual/firm projects by self and their outcomes. The online media is used by the firms or individuals to expedite their reachability by portraying the positive values to improve the business activity. Reputation is a long term goal that is achieved based on the works by an individual or firm. That can be built up gradually and need effort to maintain the reputation (Mailath, 2001; Veh et al., 2019; Dewett et al., 2004).

- Groups – "The extent to which users are ordered or form communities. Teams or people working together for a common purpose will form a group. There can be multiple groups among a group with different tastes. The purpose is to execute some tasks which can be social or technical activities. The people with strong affinity towards an activity will unite and form a roadmap and execute their activity. Such kinds of groups can be seen in different social media platforms and executing the activity. The groups are formed by all sectors of people from government and non-governmental organizations (Kozlowski et al., 2006; Laal et al., 2012).

### *Dependent Variables on Social Media and Health Information*

Sharing the misinformation in social media is a global issue and it affects very badly in implementing many health policies and other government programs (Silvia et al., 2020; Kumpel et al., 2015). The vaccination programs have been badly affected in states like Kerala in India recently. Many of the developed countries are facing problems like the anti-vaccination campaign in social media. This is having a long standing impact on the health of people and the expenditure on the health sector by the government. Studies show that the vaccination drive reduces the expenditure by the government in the future by two fold (Tuija L. et al., 2017).

### *Stress Coping Framework*

Stress is a defensive mechanism arising when an external stressor like distress or any other disaster. The stress curve is initiated with an alarm which makes the mind that a stressor is acting. The body will start resisting it with a counter mechanism. If the stress continues for a long time, then there will be exhaustion. The continuous stress for a longer duration will lead to diseases and even death. There will be a coping mechanism for the stress. Normally, the mind will adapt to the stress and the individual is forced to undergo some leisure activity or other activities to reduce the impact of stress. Medication is another mechanism to counter the stressor (Choi et al., 2012; Folkman, 2010).

### *Stressors*

Stressors are the external factors that exert stress on a body or mind. It will have an influence on the mood, sense of well-being, health and behaviour. When it exceeds some

threshold limit, the physical and mental health is getting affected and may sometimes lead to death. The impact of stressors will vary depending on the socio-cultural environment. An individual with continuous exposure to stress may not be affected much and he finds a coping mechanism. In some cases, the impact of stress will be heavy and the consequences may be huge. Life events like loss of the in-laws, humiliation and sense of insecurity may affect the individual in different severity (Schneiderman et al., 2005; Serrão et al., 2020; Atkinson et al., 2017).

### *Stress Appraisals*

Stress appraisal is the evaluation of the event that caused the stress. Cognitive appraisal is the major component in assessing the stress. When the appraisal is on the harm or loss or threat will result in negative consequences. When we take it as a challenge, there will be a positive outcome (Alhurani et al., 2018). There are two appraisals in the Transactional stress or coping model. In the primary appraisal, if the situation is stressful, then go for the secondary appraisal. If it is not, then exit the appraisal process. A secondary appraisal is used for getting additional information to go for a coping mechanism. It can be an emotion focused or problem focused depending upon the situation (Lazarus et al., 1984; Schuster et al., 2006).

### *Stress Coping*

Coping is the stabilizing factor resulting in the psychosocial adaptation arising due to the stressful events. The healthcare workers were usually considering their job as a challenge and taking it as their ultimate duty to serve and save the life of an individual. Limited media exposure, hiding of the epidemic duties, religious coping are some of the coping mechanisms followed by the healthcare workers during distress (Munawar et al., 2020). Praying, sharing the experiences, physical exercise and relaxation are also adopted as coping mechanisms (Raja Lexshimi et al., 2007; Dey et al., 2014).

### *Personality*

Social media can be used for the assessment of one's personality by looking into the everyday expression from the activities followed by an individual. Sensing technologies like social media can be used for collecting the data about thoughts, feelings and

behaviour by closely examining their responses towards each and every situation. The behaviour may vary as the real world and virtual world actions are different in the same individual due to the nature of a person (Campbell et al., 2008; Lathia et al., 2013). Personality plays a major role in determining the stress appraisal and coping mechanism (Harari et al., 2020).

### *Social Support*

Social support determines the intensity of the stress among the individual. A strong social support during the distress will reduce the impact on mental health. It will help people to cope with the distress or other natural calamity (Kaniasty, 2020). The mediating variables associated with social support are stress, anxiety and self-efficacy (Xiao et al., 2020). People with lower social support are experiencing more mental health problems and vice versa (Khoury et al., 2021).

### *Explanatory Variables – Social Media Interventions*

### *a. Policy making*

The Government of India, State governments and other stakeholders must formulate an IT policy for health care by consultation with each other. There is already an IT policy existing in India for EHR and is followed by State and central governments. Health sector being a sensitive area and a lot of regulations needed in the health related information sharing in the Internet. Any policy that is meant for the health sector must be interoperable with the existing IT policy (Kyza et al., 2020). Currently the information shared in social media is not monitored properly. The enforcement agencies come into the picture only when damage has been caused to an individual or any other entity (Hartely et al., 2020; Kumpel et al., 2015).

### *b. Content Management*

Social media is the major information sharing media in the Internet environment. There are many types of people with different motives sharing the information on the Internet (Teoh, 2019). Sometimes that will have a negative or positive impact which affects an individual or an ethnic group or a government program or a government itself. The health information shared may be misused and may affect an individual's personal life

(Merchant et al., 2018). There should be some law that ensures the protection of the interest of the patients. Even the misinformation shared on the Internet may adversely affect the government programs. The law should take care in curbing the misinformation sharing on the Internet (Treharne et al., 2020).

### c. National Framework

The Department of Electronics and Information technology approved a framework and guidelines for the use of the Internet for government organizations. This will enable effective communication between the government and the public. The national framework will assign manpower to interact with the public through social media. The framework will ensure the responsible person is disseminating information and giving the guidelines to the public with responsibility (Mehmet et al., 2020). The direct intervention of a concerned person will give more reliability on information and trust on public programs by the public. The case of the health sector is different because it is more concerned with the responsibility of reliable information related with health (Eysenbach, et al., 2020). A minor deviation from the actual one will adversely affect even the life of a person when it is concerned with health information (Watkins et al., 2019).

### d. Awareness

It is the right of people to get convinced about the safety and effectiveness of the medicine. Normally the research data are protected under the trade secrets of companies. The public health programs need to share critical information with people to increase participation and to make people accountable while having informed consent (Johari, 2017). With the detailed analysis of Adverse Events Following Immunization (AEFI), it is reported that there are many instances of AEFI reporting systems that are not uniformly robust and transparent. This made the way for the argument for a separate compensation mechanism based on a no-fault system (Nadimpalli et al., 2017).

### e. Guidelines and practices

It would be better to have a guideline to go through an article posted in social media. When we are interacting with a person in social media, especially when concerned with

the health information, there should be authenticity on the information shared, authenticity of the person and time and accuracy of the information shared (Hennessy et al., 2019). Normally people accept the information as such it is received and fall prey to some hidden agendas or cyber cheating. This will have a distant impact on personal life and the society especially in health matters (Barreto et al., 2017; Kelly et al., 2019).

## f. Social Media Regulations

Social media plays a major role in spreading misinformation and hate speeches. A comprehensive strategy is needed for the intervention in social media. Social media platforms are evolving with more regulations and restrictions based on the privacy issues and the socio-political issues arising in the due course of time (Rochefort, 2020). The major factors involved are the political acceptability and administrative difficulty in implementing the regulations. Freedom of expression and the extent of the regulation are hurting due to the matter being subjective. It is difficult to assess the boundary line for the freedom of expression in a quantifiable manner and the implementation of the same will become difficult for the enforcement agencies. Self-regulation by the media owners and the limited regulation by the government is the possible alternative (Gorwa, 2019; Haufler, 2001).

## g. Secure data sharing

Health information requires to be channeled in a secure and reliable way. It should be connected with various healthcare institutions across India. Such network channels can be formed on top of the existing networks like National Knowledge Network (NKN), NICNET, etc. By ensuring adequate privacy and security mechanisms, the health information can be ensured with privacy and security (Zhang et al., 2018).

## h. Social Networking

Health care workers can use social media to network with colleagues to share health information. There are many potential risks in sharing information especially when connecting with patients online. Health care professionals can collaborate and promote health education. There are cases where the shared information is distorted and shared in the social media. There is no preventive mechanism once it is released to cyberspace.

The person who is posted is held responsible for the ill effect of any posts in social media (Clark et al., 2018; Pantic, 2014; Chan et al., 2018; Hemsley et al., 2018).

### i. *Monitoring*

Social media analysis plays an important role in assessing the social media content. The monitoring of social media content will be able to predict the trends in politics, health care sector, marketing, etc. The tools will download the relevant content and archive in the database. The researchers can make use of this data and use the keywords or combination of keywords to analyze the domain area we are interested in. The organicity can generate actionable management recommendations out of the analyzed data (Owyang et al., 2010).

### j. *Accessibility*

Accessibility is the ability to access social media for the purpose of interaction. It is the ease with which information, user details and expertise which can be accessed through social media (Wixom & Todd, 2005). The user may prefer a social media platform where his acquaintances are involved in (Boyd, 2007). This will enhance the sharing of personal information with their friends in social media (Joinson, 2008).

### k. *Online behavior*

The online behavior of an individual may be different from the offline behavior. He may behave differently when he is online and may be sharing malicious contents on the Internet. But he will be behaving normally in normal social life. This kind of person shows some unusual behavior and may not be aware about the consequences of sharing the prohibited contents on the Internet. It is a usual practice to share the misinformation that is shared in the Social media without the awareness about the consequences. (Lisa et al., 2015; Chisholm et al., 2020; Lorenz et al., 2019; Columb et al., 2018)

### l. *Enforcement*

Cybercrimes are the new phenomenon which has emerged with the Internet Technologies. These are cyber dependent and cyber enabled crimes ((McGuire & Dowling, 2013; Ajayi, 2016). Social media has been used for connecting with the people in a gang for unlawful activities. Enforcement agencies will use this as a resource for

investigation (Klausen, 2015). The enforcement for the misuse of social media by sending misinformation and fake information becomes difficult due to the claim of freedom of expression. The user may have used it without awareness of the consequences or he may have believed it as factual information and shared it in social media (Talwar et al., 2020; Deibert, 2019).

## 3.5    Research Methodology

### 3.5.1   Mixed Research Method

A mixed research method is followed in this study. There is a combination of qualitative as well as quantitative research methods are incorporated by involving the philosophical assumptions and the theoretical frameworks to justify the findings of the study (Creswell, 1994). The qualitative and the quantitative research methods have their own importance. A mixed method is not replacing the either studies but minimizing the drawbacks of the individual methods and improving the strength of both methods (Onwuegbuzie & Leech, 2005). All research in social science attempting to provide the warranted assumptions about an individual or a group and their living environment and their evolvement (Biesta & Burbules, 2003). Mixed method research typologies include mixed model designs and mixed method designs. One can mix the qualitative and quantitative approach within and across the research (Creswell, 1994; Morgan, 1998; Morse, 1991; Patton, 1990). Mixed research narrows down the differences between the quantitative and qualitative researchers and promote shared responsibility in attaining the educational quality (Johnson & Onwuegbuzie, 2004).

In order to assess the dynamics of the sentiments against the healthcare system in India, a systematic mapping and content analysis is being proposed using social media monitoring. A combination of descriptive and exploratory methods in the form of quantitative and qualitative observation is proposed for the purpose of stakeholder monitoring in social media. The flow of activities for the qualitative data analysis is given in the figure 3.2. It is reasonable to combine both methods as the social media monitoring provides the robustness of qualitative research with the sample size of quantitative research (Grafton et al., 2011). The case study was mainly focused during the distress period in India. The social media activities will be surging during the distress

period and the impact of the misinformation in social network is more prevalent during that time. The use of social media will be more during that time for the relief and rescue operation.
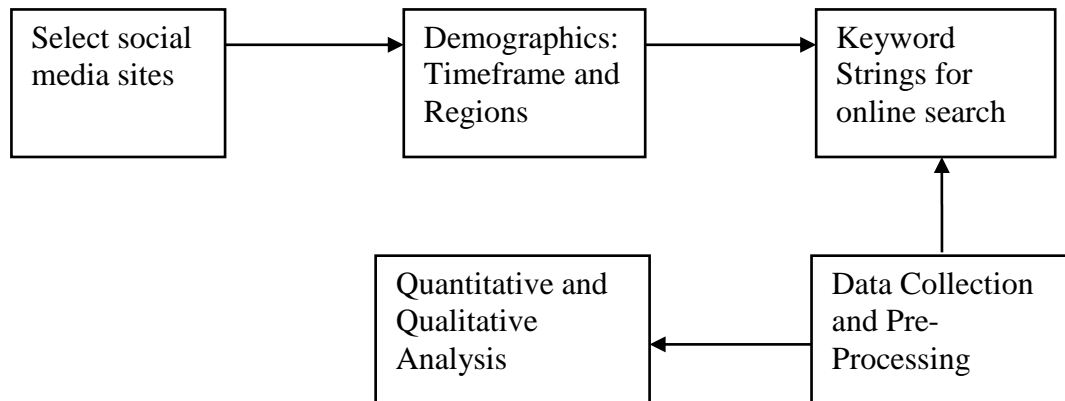


*Figure 3.2: Data Collection and Analysis Diagram*

### 3.5.2 Case study based on select instances and information

Case study is a research strategy which focuses on the retrieval of dynamics of the single setting. Case study can be done with single or multiple cases and analysis can be done in multiple levels (Yin, 1994). Case studies may be a combination of interviews, questionnaires and observations. It can have qualitative or quantitative evidence or both. Multiple cases are considered for the study. Yin (2009) explains the context of case study can be used to explore and explain the phenomenon of real life contexts where they occur. The intrinsic case study to investigate specific cases of a sample population can be transferred to other cases and contexts (Sheikh et al., 2009).

### 3.5.3 Triangulation

In a mixed method of research and conceptualization, the data integration is a major aspect. The three principal purpose of data integration is the illustration, triangulation or convergent validation and the development of analytic density. The triangulation has been as established as a qualitative research with the emergence of grounded theory and the campell's paper on 'Triangulation' as a means for convergent validation (Campbell & Fiske, 1959; Glaser & Strauss, 1967; Fielding, 2012).

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                    │ Problem Statement & Objectives │
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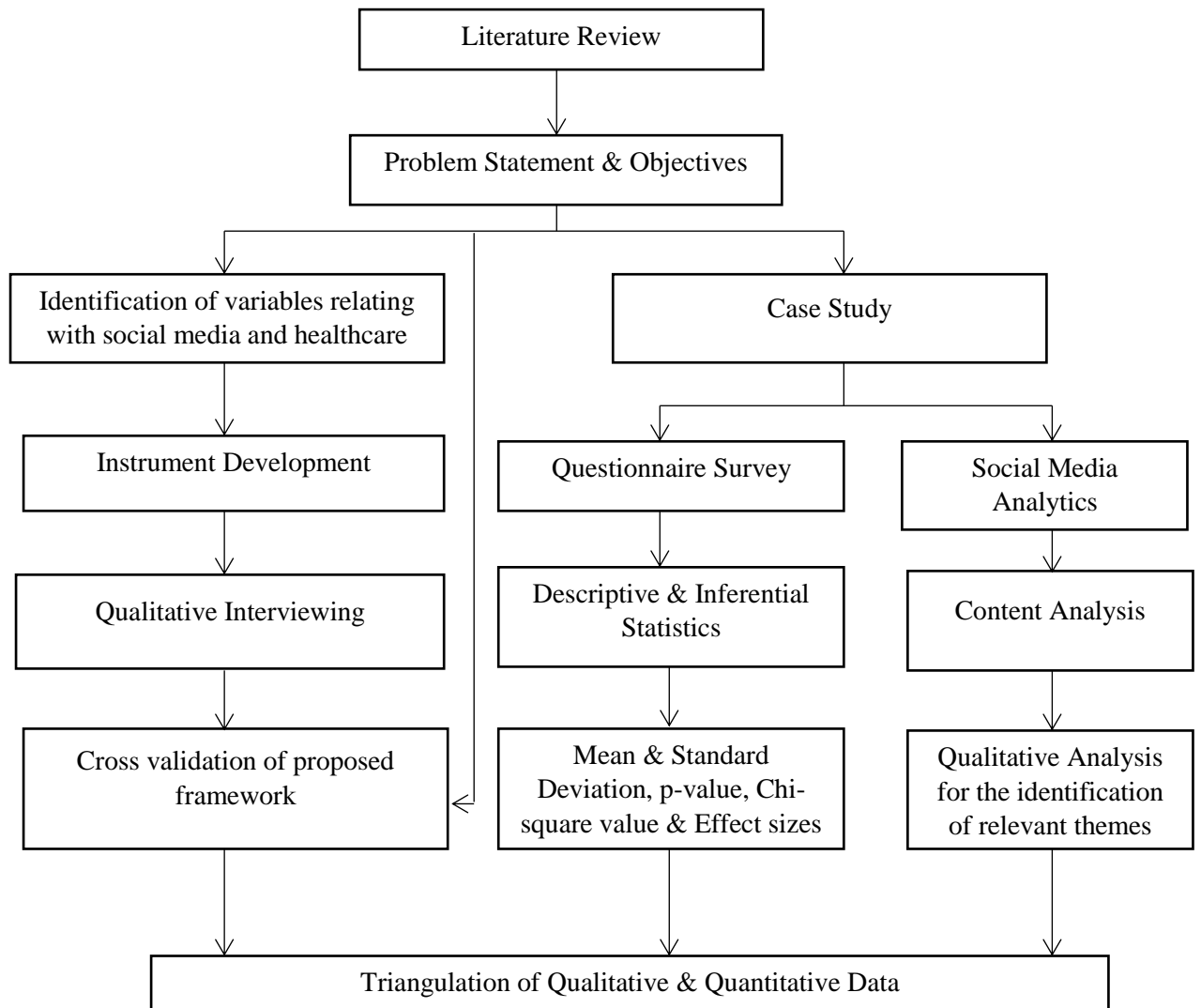


*Figure 3.3: Flowchart of research*

The research starts with the literature review by selecting the literatures related with social media and healthcare. Based on the literature review the problem statements and objectives will be identified. As it is a mixed research, there will be qualitative and quantitative surveys and case studies based on the social media and healthcare. As part of this study, three cases were considerd for the analysis of the social media data. The content analysis was done based on the social media data during the vaccination program during 2018, Nipah Virus infection during 2018 and the COVID-19 during 2020 and 2021. We selected these cases because the misinformation is normally communicated during the distress period and we will get considerable amount of data during a distress

time. After the analysis of the qualitative and quantitative data we triangulated the data and deduced the findings to answer the research question.

### 3.5.4 Justification for Mixed Method Research

With the advancement of ICT and the most modern infrastructures at the hospitals and the living environments, the living space became more complicated. The use of smart gadgets and the socio-cultural factors got entangled each other and that had reflected in the healthcare sectors also. The introduction of any kind of healthcare programs or any other activities by the government should be able to answer all the concerns raised by the citizen. The concerns may be related with the programs or the impact of the program in the future or near future and how that is related with the socio-cultural beliefs.

So there is a necessity of data integration and requires a well thought approach to synthesize findings and respect and contradict contradictory findings. Quantitative elements may sometimes fit for the grant of research rather than meeting the fit for purpose (Fielding, 2012; Christ, 2009). Mixed method has benefitted the social transformations by promoting greater social justice. Here the qualitative methods are relying on field work engagements to get close to the participants (Mertens, 2010). The qualitative/Qualitative mixing is not a just differentiation of texts or numbers but it is an understanding the theory of variance that featuring variables and correlation against the theory of process associated with interactions and events (Maxwell, 2010). Mixing the methods can illuminate some kind of research questions when considering some empirical cases better than mono methods.

### 3.6 Conclusion

The psychological behavior and the technology are closely related in the period of Web 3.0. The intervention of the technology in the healthcare sector has improved the accessibility and the delivery of the better healthcare to the citizen. At the same time the intervention of the negative factors like the fake news and the misinformation had made the situation worse and that had added more burdens on the government in executing the healthcare programs. The study shows that the mere intervention of government or the healthcare providers or the enforcement agencies will not resolve the problem. The participation of people from all the sectors is needed for curbing the

misinformation in social media. The misinformation sharing in the social network is also related with the psychological behavior of an individual and that requires the qualitative analysis.

The analysis of the information shared in the social media can be done using different tools available in the Internet. That will fetch the actual intent in the information shared and the sharing pattern can also be assessed for finding the contents in the messages. At the same time a detailed questionnaire based survey can also be conducted to have quantitative analysis. By consolidating the findings from both the research methods can be consolidated and synthesized for the making a framework. A case based study was conducted during the distress because the misinformation sharing is more frequent during such period.

# CHAPTER 4

# QUALITATIVE STUDY

## 4.1 Misinformation and Mental health of Healthcare Professionals

### 4.1.1 Introduction

The mental health of healthcare providers may not be considered crucial during the period of a pandemic. It is normally the least concern for the authorities when there are a huge number of patients infected with the epidemic diseases. The COVID-19 also left many of the healthcare providers in trauma. Many of them were given away their life by fulfilling their duty. The death of the in-laws, colleagues, or family members will be adding more to the mental stress among healthcare providers. The separation from the family, fear of spreading the disease among the family members and colleagues, and the non-availability of suitable and sufficient protection equipment or devices; especially as part of their obligation to follow their professional ethics will induce more stress among them.(Khalid et al., 2016) More than one-third of the workers with high work engagement had occupational stress, high levels of occupational stress leads to lesser work engagement.(Cordioli et al., 2019) Courses based on mindfulness can improve wellbeing, quality of life, and workplace efficiency in terms of productivity among the HCWs. So the organizations should promote mindfulness for self-care and quality of care.( Chiappetta et al., 2018) The burnout at work during the pandemic will be high due to the fear of contracting infection, separation from the family members, physical and verbal abuse from the public, and the long work hours due to a large number of critical patients. (Basking et al., 2016) The attack against healthcare workers was prominent during the COVID around the globe and India also witnessed many such incidents like threatening and eviction from the home (McKay et al., 2020). Social media plays a crucial role in the public health sector. The person to person communication in online and offline methods has got a significant outcome in controlling the global pandemic like COVID (Heymann & Shindo, 2020; Velavan et al., 2020; Dabbagh, 2020).

### 4.1.2 Theoretical Foundations for Stressors and coping mechanism

Living systems maintain steady internal physical and chemical conditions despite the changes in the external conditions which are commonly referred to as homeostasis. Any factor or threat that affects homeostasis is stress. The threats are the 'stressors' and the response to the stressor is the 'stress response'. Severe or lasting stress response will

lead to the disease or tissue damage (Schneiderman, 2008). One of the stressors during the COVID-19 period that are affecting the public health workers were misinformation. In addition to that, the anxiety of family members away from the healthcare workers during COVID-19 duty, the reduced salary of the health care workers which have affected their loan repayment and other daily chores(Goodell, 2020) , the misinformation in the social media had created confusion among the public and the healthcare workers were also confused in following the guidelines. Our research model is the combination of the social media honeycomb framework and the stress coping mechanism framework. The distress period is the peak time when social media is flooded with misinformation and fake news. This will be affecting public, healthcare workers and the government programs. At the same time social media is also an effective supporting tool for relief and rescue operations. The collective intervention of the government, society and technology can reduce the impact of misinformation and fake news.

The honeycomb model for the social media framework has seven blocks. They are:

- Sharing – "The extent to which users exchange, distribute and receive information."
- Presence – "The extent to which users know if others are available."
- Relationships – "The extent to which users relate to each other."
- Identity – "The extent to which users reveal themselves."
- Conversations – "The extent to which users communicate with each other."
- Reputation – "The extent to which users know the social standing of others and content."
- Groups – "The extent to which users are ordered or form communities."
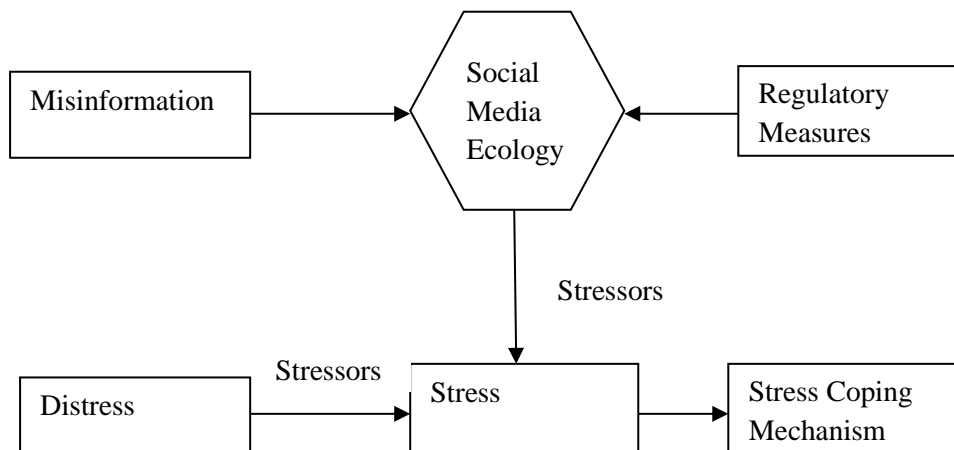
*Figure 4. 1: Social Media Ecology and the Stress*

The coping responses are tolerant and engaged. The tolerance is the actions that are followed to remove the negative consequences of the stress. Engagement is related to engaging in activities to make changes out of the stress factors. The conceptual model for the research is given in figure 4.1 which tells about the stress coping framework due to the distress and the interventions to prevent the misinformation in the social media.

### 4.1.3 Methods

The data collected using the Google forms. Due to the COVID-19 protocol, the physical one to one interview was not possible. So the questionnaire was prepared and sent to the healthcare workers and asked to fill their response. The respondents were mainly the public healthcare professionals who were actively involved in the healthcare activities during the COVID-19 pandemic. The data collected for the period April 25, 2020 to October 01, 2020. An in-depth qualitative interview was performed with the healthcare workers who were actively involved during the COVID-19 pandemic. Details of the participants are given in table 4.1. A prior consent form is attached with the questionnaire and a question included getting their consent for participation in the interview.

*Table 4. 1: The demography of the participants of the qualitative Interview*

| Sample Characteristics | N (%) |
|---|---|
| **Gender** | |
| Male | 18(43.90%) |
| Female | 23(56.10%) |
| **Geographical Area** | |
| Urban | 24(58.54%) |
| Rural | 17(41.46%) |
| **Age** | |
| 18-25 yrs | 5(12.19%) |
| 26-30 yrs | 4(9.75%) |
| 31-35 yrs | 12(29.27%) |
| 36-40 yrs | 14(34.15%) |
| 41-45 yrs | 3(7.32%) |
| 46-50 yrs | 1(2.44%) |
| 51-55 yrs | 2(4.88%) |
| 55+ | 0(0) |
| **Social media friends** | |
| 10 or less | 8(19.51%) |
| 11-100 | 8(19.51%) |
| 101-200 | 5(12.19%) |
| 201-300 | 5(12.19%) |
| 301-400 | 2(4.87%) |
| 401 or more | 11(26.83%) |

### 4.1.4 Data Analysis and Results

*Social Media Ecology and the Misinformation*

Though social media is a platform which is very useful during the emergency periods, there is also another side which is making life miserable during the distress. The misinformation shared in social media can make the situation worse. There was mixed response from the respondents on the social media reports during the distress. As per the honeycomb model of the social media ecosystem, there are seven parameters that are guiding the social media behaviour of a person. Depending on the behaviour of a person, the social media ecosystem will lean in a direction. That direction can be made neutral with the support of the government, NGOs, individuals and the platform owners with the technology interventions. Considering the people's perceptions we cannot draw a specific boundary to categorize particular information shared containing good or bad content. It is clearly a subjective matter. Sometimes provocative content for one person may not be provocative to another. It depends on many factors like country, ethnicity, language, etc.

The fake news or misinformation or disinformation in a SM ecosystem will affect the user in many ways. The normal psychological impact will be stress, anxiety and Depression which will lead to many physical illnesses also. If these symptoms are not addressed properly, that will result in burn out and affect the healthcare system to a large extent. The psychological behaviours of the healthcare workers are not studied properly in India. The conditions of the healthcare workers become worse during any distress. The COVID-19 situation left so many questions on the working condition of healthcare workers.

*Social Media reports during Distress*

Participants shared their views on the type of the reports shared in social media. Some of them have the opinion that social media is having a positive impact and some of them opined that it is having negative impact and remaining participants have mixed responses. Social media is considered to be a medium for communicating the health communication to the users in an easy and efficient manner (Garfin et al., 2020).

"*Most of them are really good, Sharing authentic publication and recent research*" -
(P22)

The major concern is the exaggeration of the news reports in the social media as well as
the fake news. Participants P29 and P35 are of the opinion that the social media is
exaggeration in nature and at the same time P35 opined that it is also informative.

"*Heavily exaggerated, out of context hype about death during initial few months*" -
(P29)

"*Its informative, sometimes more exaggerating... only focusing on numbers, not much
interests about the things like use of mask, social distancing promoting*" - (P35)

### *Impact of Social Media reports*

Normally the social media reports are shared among the peer groups and that will spread
among their networks depending on the sensitivity of the news or reports contained in
it. The distress like COVID-19 without any cure will make people more anxious. The
situation like the COVID-19 was a new normal to the people around the globe. They
were forced to wear masks, limited their mobility, cut their entertainment and restricted
access to leisure places (Garfin et al., 2020). This has created a sense of insecurity among
people. In addition to that the restriction of mobility made the people stay at home and
made family interactions impossible for many days. This has created stress, anxiety and
depression among the people. The health workers anyway had to do their duties despite
all these limitations. They need to take care of their family and also the society. This
additional responsibility and the fear of the contact with unexpected COVID patients
will make them more anxious. In addition to that there were incidents of ostracism of
health workers who were involved in COVID-19 duty (Pappa et al., 2020). The people
returned from the Gulf countries were forcefully sentenced to home quarantine by the
local people in some places. Such incidents created more panic among the health
workers. Reporting of such incidents with the misinformation will make the health
workers sicker. The response from the respondent P2 is

"*Confuses and agitates me*" - (P2)

The social media shares the news reports which are having catchy headlines and sensitive news lines. Most of the media houses are having online editions of their channels. That will generate more income in the form of advertisements. The advertisement income generation will be more if they are getting more hits. Inorder to get more hits, they need to give sensitive news. Even the low profile news items are made sensitive with the help of catchy headlines and exaggerating the incident (Swire-Thompson et al., 2020). Sometimes social media misleads people and they get anxiety when they hear negative news and what happens on the next day due to the uncertainty. The response from P28 follows like this

"*Anxiety on hearing the negative news which are highlighted*" - (P28)

The people using social media regularly will tend to follow the news and other reports in the media. There will be a curiosity to know the situation of such people. There are many websites and applications which will update the COVID status including the government owned ones. At the same time the government representatives were also briefed on the status on a daily basis to give awareness and the spread of the disease. At the same time the information is shared in many ways like misinformation, dis-information and fake news. That will be conceived by the public as genuine information and will be shared among their peers.

*"Its good in understanding the severity of the situation, but at the same time, it increase the mental stress and strain"* - (P8)

The people already under panic about the disease will be getting more strained due to the information shared in the media. The increase in the spread of disease, death rate and the non-availability of the cure for the disease will make the people more stressed. The healthcare workers are the more affected in this scenario. The physical, mental and the social wellbeing will get affected in such situations.

*Sharing misinformation in Social Media*

The content sharing will be having some occurrence period. The misinformation about autism among the MR vaccinated children is a regularly occurring content sharing during any kind of vaccination programs by the government. Though the study was

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removed from the Lancet journal, the information is shared across the social media platform as if it is a genuine report by citing the journal Lancet. The people spreading the misinformation in the SM will have some agenda in propagating the same. Such a sharing pattern can be seen during all the distress across the world. These kinds of agenda setting people will make use of the sentiments of people and propagate their agenda (Wang et al., 2019). The affected people are the soft targets and they can be used for their activities without much effort and cost. The misinformation and the kind of reporting affect the doctors, and also the patients. Most often the common people spread misinformation without knowing the actual facts behind (Ahmed et al., 2020). The respondent P9 believes that the user is unknowingly forwarding the misinformation as awareness due to his good intention.

"*They could be doing it thinking it's true and doing (it) for a reason of spreading awareness. unfortunately the one who start(s) circulating wrong info should be behind bars .. *" - (P9)

P3, P10, P28, P32 and P42 have an opinion that there is some agenda behind the sharing of misinformation in social media. Agenda setting during the distress or greater campaigns on healthcare programs are the better time to get the attention. During this period the searches on the healthcare programs, disease, symptoms after effects of a medicine will be more. If social media content related to this is initiated, then it will come in the top priority search item. If it is good enough to grab the attention and the sentiments of the people it will become viral and the purpose of the person initiating this content will be fulfilled (Pappa et al., 2020).

The social media users with attention seeking behaviour will share the contents with more engagements in their feed and try to get more 'likes' and 'comments'. Sometimes they may be doing it unknowingly but the damage is done on the social media environment and the government programs on healthcare particularly.

"*Mostly people pass on things without any deep thought on them or concern*" - (P22)

Some of them responded that the social media needs a thorough scrutiny during such instances and there should be a fact checking facility to verify the authenticity of the

information shared in the social media (Swire-Thompson et al., 2020). WHO has initiated a link in their website in the name "Myth Buster" to give the facts on the information shared in the social media and give awareness to the reader.

### *Role of Government of curbing the misinformation*

Government has a major role to play in curbing the misinformation in social media. Government is using social media for spreading awareness among the public and briefing the awareness in the daily press meets during the distress. Governments can initiate the development of applications in their control to give the factual information about any topic which is critical in the healthcare programs (Sell et al., 2020). The use of the government controlled application will give them more authenticity in communication and the threat can be controlled to some extent. Public will then rely on such government controlled information sources for clarifying their doubts.

"*Govt cannot interferes in every aspect.People have to be responsibke(responsible) and get information from authentic sources only*" - (P10)

The repondant P10 gives some insight that the government cannot interfere in all aspects of social media communication. But they can have an information source which is updating the authentic information.

"*Media screening center should be associated with every district control cell, legal action against those spreading misinformation should be initiated*" - (P29)

There should be some responsible people who can set up a media screening centre to assess the fake and misinformation in the mass media and social media and then give sufficient inputs to tackle such information spreading in the social media (Swire-Thompson et al., 2020). P29 suggests this and also added that there should be legal action against those who are spreading the misinformation.

### *Handling of Misinformation by the social media user*

As a responsible citizen, one should be always aware of his responsibility towards society and humanity overall. So whenever he finds something which impacts the wellbeing of the society, he should be able to rectify it or take necessary actions to

correct it. The case of social media environments will be the same. When someone finds something which affects the social media ecosystem, he should respond immediately to rectify it. The misinformation spreading in the social media will impact the physical and mental health of an individual and the welfare programs by the government in a country (Sheufele et al., 2020). Such a halt has happened in many places in India especially during the MR vaccination campaign. An individual can report such instances either to the government or to the enforcement authorities to prevent such incidents. Sometimes people search on the Internet or other Social Media platforms regarding their doubts on any healthcare concerns (Swire-Thompson et al., 2020). Instead of that they can consult a healthcare professional for their doubts in any healthcare campaigns like vaccination, epidemics, medicines, etc. The respondent P10 has the opinion that the social media user should verify the things before they endorse it.

"*Varify(verify) with authentic data before endorsing it*" -(P10)

There are a large number of online news portals and websites available now which disseminate all kinds of information. So a layman may not be able to identify the genuine information. It will be better if there is a government owned portal which can be used to disseminate the government programs and interactive services which will be able to clear the doubts of the public (Szmuda et al., 2020).

"*Follow only authorised sites..if any confusion remaining then either need to contact the enquiry number given by the government or contact your doctor*" - (P15)

Another option is the use of enquiry numbers and the social media platforms controlled by the experienced healthcare professionals who can handle all kinds of doubts which are posed by the public. Sometimes a healthcare professional without proper knowledge may also create damage to the healthcare programs. Government should take necessary steps to give regular training to the healthcare professionals to handle such situations.

### Role of Enforcement Agencies to Handle the Misinformation

Nowadays the enforcement agencies are also active in social media in disseminating the awareness programs. The social media pages of the enforcement agencies are continuously publishing the aftereffects of the use of the social media for spreading the

misinformation or for any other illegal activities. With the advent of cyber technologies, people are using the platform for so many applications in day to day life (Datta et al., 2020). Life has become simpler with technology in terms of cash transactions, application processing and other online activities. That also gave way for online frauds also. The use of social media as an entertainment activity has resulted in many kinds of illegal activities also on the other side (Swire-Thompson et al., 2020). The cybercrimes in India increased many fold in the recent past. Social media will have so many networks. A viral message may be traversed in so many networks and it will become difficult to trace the origin of the misinformation. There should be some technology intervention to identify the misinformation in the initial stage itself to control the spread at later stages. Respondent P22 had opined that the rumors should be identified at the origin itself and should legal action

"*The origin or rumours should be picked and dealt in legal matters*" - (P22)

It is also a need of the hour that there should be a health IT cell team to identify the misinformation in the health domain and report it to the enforcement agencies and should take necessary action to prevent such instances.

"*Health IT cell should scrutinize web and media pages and should take action to curb circulation of false information*" - (P29)

It is difficult to demarcate the information content between derogatory or any hate content in the social media text. The content may be conceived by different people in different ways, especially a country like India that has many kinds of diversity. That is in the form of religion, caste, language, ethnicity, etc. So the enforcement agencies are finding difficulty in charging the people under these sections.

### 4.1.5  Discussion

Social media is a platform which enables communication in an easier and effective manner in terms of cost and reachability of the information. The healthcare sector has been benefited in so many ways in handling the situations like COVID-19, Nipah infection, Vaccination campaign and other natural calamities in India. The government, NGOs and the individual volunteers support the relief and rescue operations and other

support when transportation is affected. Social media turned into a lifesaving support system in many instances in India. The information exchange between the government, NGOs and the citizens has become a revolutionary development (Garfin et al., 2020). The other mode of communication became an official matter and the social media communication has been turned into a people friendly matter. The involvement of the citizens in the government and policy making has been improved so much and the transparency in the government proceedings also increased resulting in the reduced corruption and more trust towards the government programs. People now become more concerned about the privacy in the data and they rely on the government institutions for transactions.

On the other hand, the same technology poses a threat to the healthcare program and the life of people. Many healthcare programs initiated by the government have been affected due to the misinformation, fake news and the disinformation. WHO has listed the misinformation in the social media as one of the threats that is leading to vaccine hesitancy through the social media. The findings of the qualitative analysis give a clear indication of the role of social media in spreading the misinformation and its impact on the healthcare programs. Government, NGOs and individual volunteers play a crucial role in tackling the misinformation challenges. The role of healthcare workers in fighting the same is crucial in the current scenario. A tech savvy healthcare worker can take part in fighting against the misinformation. The social media was flooded with the information during the COVID-19 pandemic and there was a new term coined for that namely, 'infodemic'. The information overload in the Internet caused confusion among the social media users, government, public, healthcare workers and the application owners. There was a strong dilemma among the citizens on what to believe. Looking into the large information pool, they were confused on what to take and what to reject (Datta et al., 2020). The misinformation is also overloaded in the Internet making almost all the agencies confused on how to prevent and how to tackle the situation when people are physically and mentally and even economically in distressed condition. That was a huge challenge for every higher authority all around the globe. Many government authorities have initiated their own applications and portals to give awareness to the public and advised them to stay away from advice through social media or any un-

authentic web portal. Even the small social service providers started their own applications to give authentic information. Sometimes it was believed that the misinformation was more dangerous than the COVID-19 pandemic. In many situations, there was a clear indication that the misinformation really affected the mental health of people in all aspects. The misinformation was introduced as a double blow to all the responsible authorities. It literally affected the world like coronavirus.

The misinformation is perceived by the user in different ways based on his experience. Some misinformation will appear as a genuine one and the information is shared among his peer groups and circulated. The misinformation then is exaggerated when it comes as word of mouth publicity. That will have undesirable outcomes in the real world. Cyber world is inflicting some confusion and dilemma and the information from there circulated in the real world through word of mouth will affect physical and mental health. Sometimes that may lead to hate crimes in society. The instances of many types of phobia erupted across the globe along with the pandemic covid-19. The major one is the Sinophobia which resulted from the fact that the pandemic erupted from the Chinese province Wuhan. There was widespread attack against the people of Chinese origin in many European countries. India also got into a similar situation with much misinformation targeting a particular community. Normally, the misinformation and pandemic or any other distress will be resulting in some hate crimes and other crimes in the society. The type of hate depends on the religion, location, language, etc. where the particular distress is started. There will be some set of people who are making use of the situation and plan their agenda to plot their propaganda. That will give much media attention and more coverage than usual. The affected will be the more distressed because of the discrimination and social isolation caused by the pandemic and the propaganda. There will be a long lasting mental trauma due to this. The trauma due to the disease may be lasting for a few weeks or months. But the other one will last forever. The hate due to the misinformation based on religious sentiments will last forever. That will create a sense of insecurity and social isolation among different sectors of people. They will be affected physically and mentally.

The government must initiate some collaborative effort with the NGOs and other volunteers to fight against the misinformation in the distress period. The misinformation is something increasing exponentially during the distress period. Government can put some control on the social media interactions during this period. The Government of India has taken some initiatives in this aspect and the social media application like WhatsApp is forced to limit their forwarding information to less than five participants at a time. The most frequently shared messages are limited to one. Similarly many Apps followed this suit to prevent the spread of misinformation rapidly. Limiting the recipient will reduce the forwarding rate to some extent. Many applications started their myth bursting links to educate and give awareness to the users. There were fact checking links in the mainstream newspaper editions and the visual media which also helped to give awareness to the public. The awareness among the people is the best method to curb the spread of misinformation.

A social media user himself can act as a myth buster by sharing the factual information from the authentic resources and informing the misinformation generating sources to the enforcement agencies. He can also give the reference to the authentic information in the social media groups where the misinformation is initiated. The friendly and casual talk is another way of fighting the misinformation along with the actual pandemic. People will believe their close aides more than an unknown person educating him (Szmuda et al., 2020). Sometimes it will have more impact on social awareness. Such kind of information sharing will be effective and the listeners will administer the same to their peers also. The individual volunteers with a sound knowledge in artificial intelligence or the social media analysis can support the government in identifying the misinformation and preventing the spread of misinformation. The information shared in the health domain will always have negative sentiments and the reports will be negative in nature. If the disease is deadlier, then the frequent words like death, fatal, deadlier, etc. will emerge in the texts. That will have some negative impact on the readers. When the misinformation is pumped in the communication channels, the intensity of these negative sentiments will increase and will worsen the situation.

The enforcement agencies should be alert in such situations from day one of the emergence of any kind of distress. The people behind the misinformation spread will be always looking for an opportunity to pump their information in the social media. Enforcement agencies should also be equipped with the analytics tools to detect the misinformation on social media to take proactive action. If the message is initiated and it is spread to some groups, then the enforcement agencies will not have control over it. There should be a division at the enforcement agencies to give training and awareness among the prospective communities of the society like students, teachers, etc. to tackle such situations.

## 4.2 Covid-19 and Misinformation

### 4.2.1 Methodology

With the emergence of the COVID-19 from epidemic to Pandemic, we considered the articles related to corona, fear, epidemics and social media for the study. Social media platforms like Twitter and Facebook are considered for the analysis of the data. The twitter data was collected using the R programming. Selected conversations are used to point out the type of discrimination and fake news that are spread through the social media. The major contribution of fake news and misinformation that are spreading through the social network groups meant for religion and the political parties. Most often the distress is related with the communal angle in such networking sites.

### *Google Trends*

Google Trends is a website by Google which analyzes the popular search about various queries across the globe. Normally it assesses the current trending topics in the internet and the user has the option to compare different search keys. Google Trends shows that the search on 'Corona Virus' has the pattern of the virus infection across the globe. There are two peaks in the graph. Initial one is in the fifth week of the emergence when the infection was high in China and it faded for some time. Later it picked up as the infection spread across the globe. People normally are not bothered about when it occurs in China. Other countries did not take advanced steps to tackle the situation. The situation became worse when it spread across Europe, Eastern Mediterranean region and the Americas.

Fig. 4.2 shows the trends of search in Google about 'coronavirus' from December 31, 2019 to April 5, 2020. There were many other trending searches during this period. It includes the "Tablighi Jamaath" conference held in Delhi and the resulting spread of COVID-19 among the participants and the contacts with the participants. This had resulted in the surge of Islamophobia in India. Similarly with the onset of COVID-19 in China and its spread in Europe and America resulted in Sinophobia and the people from China were attacked in different parts of the world. The major search keys related with Sinophobia were "Hatred", "Sinophobia", "Fear" and "Racism" along with the normal keywords like Corona and related queries. Tablighi Jamaath related topics were mainly concentrated on "Hazrat Nizamuddin Aulia Darga", "Spitting", "Zabur", "Muslim", "Mosque" and "Muhammed". The news about the spitting of people gathered for Tablighi Jamaath is not cooperating with the health workers and they even spit over them and the surrounding had got much attention. This had created a hate against the Muslims in India (Shemin 2020).
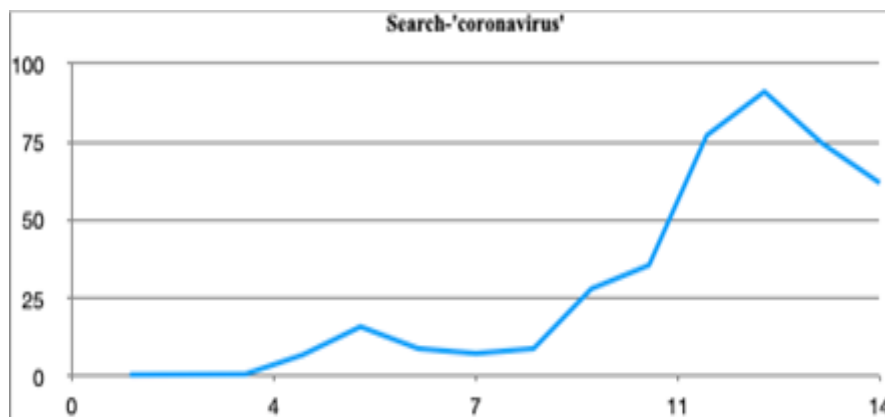


*Figure 4.2: Google Trends of COVID-19 infection*

*(Source: Data from Google Trends)*

The major queries were on the symptoms and the details about the coronavirus. The breakout query was the corona and its spread in California. "The beer and corona" was another trending query during that period. Some other related queries included the "status of COVID-19 in different countries", "death toll due to corona infection", its "symptoms" and "the map of the corona infection across the globe".

*Twitter Data Analysis*

Tweets from Twitter are accessible to the unregistered users also. Other social media platforms like Facebook allow only the registered users to read the messages. So Twitter allows a vast number of users to extract the data of their relevant topic and do research on the data and deduce the socio-economic and behavioural patterns of a particular group based on the analysis. The trending topic in Twitter can be obtained from the Twitter trending hashtags. Twitter has no reciprocated relationship unlike the Facebook relationships. The relationship is either directed or undirected. The life cycle of a particular tweet will be depending on the relevance of the topic at a particular time. Some tweets will be repeated when similar kinds of events happen. Twitter data is normally assessed based on the sentiment analysis of a particular topic of consideration using Artificial Intelligence or Natural Language Processing technologies (Tsur et al., 2012; Bastos et al., 2012; Bruns et al. 2013; Anber et al., 2016).

Twitter data related to COVID-19 during January 28, 2020 to March 22, 2020 was collected for the analysis. The initial study of the tweets revealed that many tweets are becoming viral and creating panic among the public. Normally, the health related information is negative in nature. The news reporting, social media posts, tweets all contain the negative reports on death, sufferings of people infected and shortage of food, medicine and other essential materials. In addition to that, social media will also flood with fake news and misinformation. This will impact the mental health of the people already with anxiety, fear and stress. Many factors are behind the emergence of fake news and misinformation spread in social media. The search keys for collecting the Twitter data are given in table 4.2. 230000 tweets were collected during this period for the analysis.

The twitter data is processed before subjecting to sentiment analysis and the word extraction. The tweet extraction and processing is divided into following steps:

   i. Extracting tweets using Twitter Application Programming Interface

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ii. Cleaning the tweets by removing hyperlinks, special characters, hash tags, converting to lower case letters and numbers

iii. Getting sentiment score for each tweet using the packages available in Comprehensive R Archive Network (CRAN)

iv. Segregating positive and negative tweets for analysis

The keywords were selected based on the trending hashtags in Twitter and also the common slogan followed by different organizations across the globe. The main keywords which are commonly used were "Social Distancing", "Break the Chain", "Stay Home" and "Flatten the curve". These keywords were commonly used in all the media and some more country specific and virus specific keywords were also used to extract the data.

*Table 4.2: Search Keys for Twitter data collection*

| Tags used for data mining | | |
|---|---|---|
| #TogetherApart | #nCoV | #lockdownindia |
| #socialdistancing | #2019-nCoV | #coronavirusindia |
| #StayHome | #Betacoronavirus | #CoronavirusLockdo |
| #FlattenTheCurve | #Wuhan | wn |
| #lockdownindia | #CoronavirusOutbreak | #21daysLockdown |
| #JantaCurfew | #CoronaOutbreak | #CurfewInIndia |
| #FightCOVID19 | #BreakTheChain | #COVID-19 |
| | | #coronavirus |

First, the cleaning of the tweets is done to process further. Normally the tweets are collected and saved as different Comma Separated Values (CSV) files. They need to merge together for the processing. Initially the tweets are filtered by removing the hyperlinks, symbols like #, @, !, etc. , removing the stop words in English, numbers and then converting to lowercase. Now the texts in the tweets are ready for the analysis.

*Extraction of most frequent positive and negative words*

The health domain will be having the negative sentiment words in majority. The classification of positive and negative words is based on the Bing lexicon. Virus being the topic of research and the disease causing element, it is in the top most position and it has occurred more than 20000 times in the collected tweets. Most of the other words coming in the top position are closely related with the virus, its adjectives and the after effects after the viral infection. Most of the negative sentiments are related to fear and sadness. That is causing stress and anxiety among the user who is not well aware of the disease and topic he is dealing with. Figure. 4.3 shows the occurrence of most fifteen frequent negative and positive sentiment words extracted from the tweets collected. Compared to the frequency of negative sentiment words, the positive sentiment word frequency is very less. "Trump" is the most frequent positive word in the tweet and has occurred about 6000 times. The fake news needs to be viral to reach the intended user and the agenda set by one faction will be successful if the news reaches the maximum number of audiences. So they will use maximum negative sentiment in the tweet. As per the human behavior it is natural that he will be more interested in the rumors and spread it across. Thus the viral tweets in the virtual world and the word of mouth in the real world will have a huge impact. The authorized reports or the justification by the concerned authorities will reach the intended user at a later stage.
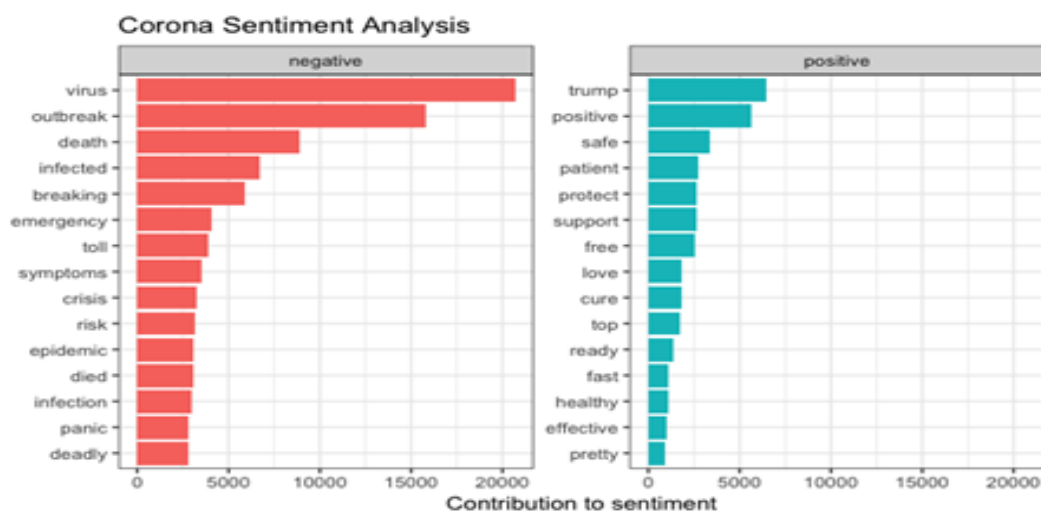


*Figure 4.3: Positive and negative sentiment words which are most frequently used in the tweets Sentiment Analysis*

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The sentiment analysis is done using the "syuzhet" package from CRAN. The "get_nrc_sentiment" package will return the sentiment values for the emotions. Normally the emotions are classified based on the grouping of English words in different emotion categories. The emotion categories are anger, anticipation, disgust, fear, joy, sadness, surprise, trust, negative and positive. Once we run the "get_nrc_sentiment" function, it will return values of different emotions. By assessing those values, we can deduce the type of tweets that are posted during a particular period. Fig. 4.4 shows the sentiment plot for the tweets collected during the COVID-19 incidents. The data is collected till March 22, 2020. The sentiment plot is divided into six phases. For each emotion, there will be six values. We divided the period from January 28, 2020 to March 22, 2020 into six phases. This is done to analyze the sentiment of the COVID-19 as it progresses. Normally there will be increased tweets during the onset of an event and it will progress gradually. The agenda setting will be done in the initial phase to get the attention of the audiences. At the later stage government authorities will take necessary actions to prevent the spreading of rumour or fake news. So in the later stage the tweets relating to the agenda or rumour will die down and will be limited in number. We can see that the fear and anger is high in the initial phase and it is decreased in the final phase and in overall the fear got less value compared to trust. The sentiment value is also calculated for each tweet and the overall averaged sentiment value is -0.035. It shows the overall sentiment of the tweets collected during the specified time is negative in nature.
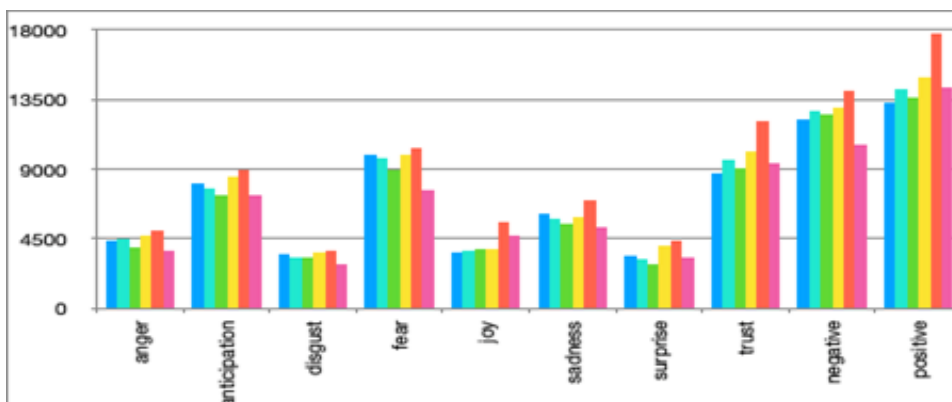


*Figure 4.4: Sentiment scores during the period specified for data collection during different times*

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The analysis of sentiment shows that the negative sentiment tweets were decreased in the due course of time. The emotion, fear reduced in the final stages compared to initial stages. Instead of that the positive sentiment and the trust increased. That may be mainly due to the steps taken by the respective governments and the social media platforms in curbing the fake news and the misinformation. The social media groups were continuously alerted by the police department to refrain from posting and sharing un-authentic contents.



*Figure 4.5: The Co-occurrence terms in a tweet and the network of tweets shared*

There are many words which are related and they are co-occurring throughout the tweets collected. Fig. 4.5 shows such a network with a sparsity of 99 percent. We got around 19 words. All are closely related with virus corona and its impact like death, spread, outbreak, cases, etc. Most of them will generate fear in the social media user and the patient. Even after the COVID-19 is taken the flattened curve in Wuhan, China, the Wuhan and China remains the most co-occurring even after the infection rate declined there and is prominent in other parts of the world.

### 4.2.2 Discussion

The COVID-19 also resulted in many conspiracies in the cyber world as well as in the physical world. It had resulted in many heated arguments among different world leaders and there were accusations of the spread of the disease and vaccination. But the disease had created a clear damage in the economy of almost all the countries in the world. Most of the countries declared lock-down resulting in many traumas among the citizens of the

country. Though the virus is not fatal like MERS and SARS it spreads all over the world by killing more than one million people and infecting more than 30 million people across the globe. Along with the disease, the social media spread rumors and fear mongering messages. Already the people were restricted in their home due to the social distancing. The stress and anxiety in such people is enormous. The people quarantined in hospitals and other relief centres went through a trauma which made many of them to evade isolation. The people working away from home are already afraid of the health condition of their in-laws and friends. The physical meeting of the relatives made it impossible for them. The rumours spread among the labourers stranded in different locations were forced to return to their home. That has created havoc in cities like Delhi in India. People gathered in huge numbers that feared there would be another disaster if they contracted the disease.

The conspiracy theory is veiled in times of distress across the world. This has created another ruckus in social media. The media is flooded with lots of fake messages and misinformation to misguide the public and align with some ideologies based on their inclination towards it. Normally the misinformation in social media focuses on race, ethnicity, gender, religion, etc. which are more sensitive in the era of Internet technologies. The COVID-19 is also proved that religious sentiments can be set aside when fear of death is inside the minds of people. There was no protest when the government took strict action against the religious gathering. The religious leaders become helpless during this situation. Even different religious leaders came down in the social media and other mass media to refrain from all types of gatherings by the believers.

Any distress happening across the globe will be assessed based on their country of origin, religion, ethnicity, race, etc. Based on that the agenda is set on social media and they will create fake information, misinformation and disinformation. An information to become viral, it should embed with hate and fear or any rumor. This will have an impression on the reader and they will start following such information spreading groups or people. The fear induced in people will be used for promoting some products by the company, attract people towards particular sections of people and sometimes direct them

towards hate crimes. The fear mongering fake news is repeatedly spread during all the distress of similar nature. The fake news regarding population control and the vaccine sales agenda has been used during the vaccination campaign, Nipah outbreak and the corona pandemic. Such messages or tweets in social media will create a huge adverse impact on the people already affected. The mainstream media also play a major role in spreading the fake news. They were not verifying the authenticity of the news when it got viral in the social media. Sinophobia erupted in many European countries during this period. Italy has announced a 'hug Chinese campaign' to curb the corona induced racism. The effects of fear, alienation and discrimination due to the COVID-19 infection are escalated with the restriction of movements, loss of jobs and stereotyping. That led many people to denial, stress and depression. Though the disease can be cured with medicine or other containment methods, the anxiety and fear will last long. They need to get psychological intervention. The healthcare workers, community volunteers, Police officials, relief workers and doctors may also fall into stress and anxiety due to the alienation from their family and relatives. A hope in the minds of the affected people and the people with depression or anxiety will have a positive impact. Some messages will have healing impact on the people:

*"They are not the hiding patients*

*They are staying solitude for you"*

The message is a hope for both the patient and the listener. There are many initiatives by Police and volunteers to promote the "stay at home", "Break the chain" and "Social Distancing" campaign through social media. Social media was the only medium to communicate with people directly during the lockdown period. Government has taken strict action to keep the people coming out of the home without any reason. Fig. 4.6 shows a series of the events after experiencing distress and the response in people, government and the media.
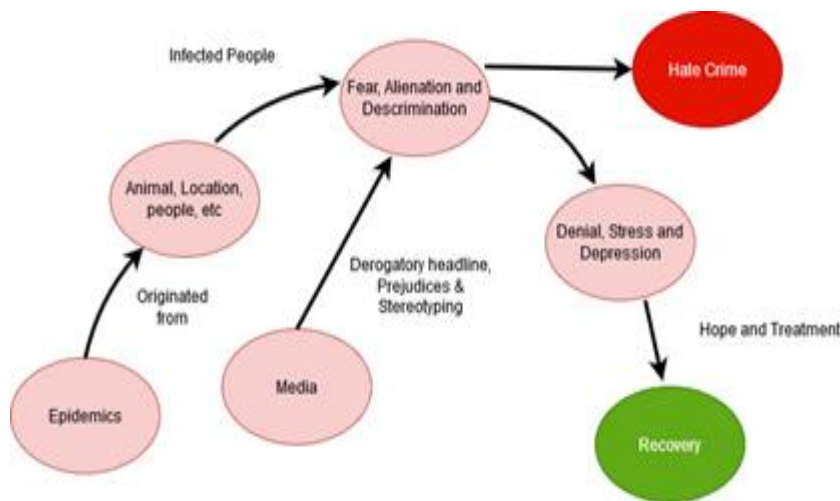
*Figure 4.6: The occurrence of a distress and the origin of the social media panic and its influences in human being*

### 4.2.3  Suggestions

The fake news and the misinformation in the social media will create fear among the audience especially when it is about the health news. The analysis of COVID-19 Twitter data shows that the sharing of positive news in social media will generate hope in the people with anxiety and stress due to fear. Some of the steps that are followed in the social media that are given hope among the patients and the in-laws are listed below:

●  The people coming out after the quarantine were greeted with applause by the healthcare workers and other government authorities. That had created a positive vibe in the public as well as the person put under quarantine for many days.

●  Positive news on epidemics like the recovery rate will reduce the fear among the people affected as well as the in-laws of the affected people. The anxiety and the stress among the patient, doctors, and their in-laws will be reduced at a considerable rate.

●  Symbolic gestures like the tapping of the utensil and clapping hands as gestures of appreciation of the healthcare workers, doctors, police personnel and volunteers will raise their prestige. That can create a positive energy among them and also in the patients. People in India and Italy showed such appreciation.

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- The "Myth Buster" link on the WHO website is a positive step in handling the misinformation and fake news. This will provide more accurate information and can alleviate the doubts in the minds of people

- Incorporating the appropriate algorithm to filter misinformation by the social media platforms

- Government and other organizations involved should continuously be updated about the infected, cured and the death counts through the social media and the government controlled platforms.

- The recovery from the disease by the patients in the volatile age group was a positive sign. The in-laws living away from their old parents may get more relief from the stress by watching or reading such news from social media or mass media.

- Creative activities and sharing such arts on social media platforms will boost the mental health of the people and that will be a kind of psychological intervention to the people living in lock-down conditions.

- Platforms like WhatsApp, Telegram are more concentrated on puzzle solving in groups. In addition to that they are also used as crowd sourcing of the relief material and sharing the Do's and Don'ts during the lockdown period.

## 4.3 Vaccination Drive and Misinformation

### 4.3.1 Introduction

Electronic government (or e-government) essentially refers to "The utilization of Information and Communication Technologies (ICTs), and other web-based telecommunication technologies to improve and/or enhance the efficiency and effectiveness of service delivery in the public sector, towards citizens and enterprises." (United Nations University, 2007). Social media will enable the stakeholders to engage, communicate and collaborate to achieve better e-Governance (Oliveira & Welch, 2013).

ICTs will make government-citizen (GC) communication more efficient and effective. Social Network Sites (SNS) have proven to be a game-changing networking tool in the healthcare sector, as well as successful in implementing healthcare programmes. At the

same time SNS can also affect healthcare services. In several ways, this is posing a serious challenge to the healthcare industry. The use of social media in e-Governance applications in the health sector is in an immature stage and it is to be exploited for the information exchange (Tursunbayeva et al., 2017).

An effective Government Inter-Organizational Information Integration (GIII) faces several challenges in the form of availability of technology, infrastructure, volume of information, information dissemination responsibility, varying official formalities, information security, privacy and lack of coordination among different organizations (Alam, 2007; Ndou, 2004). When there is a lack of coordination among the organization, there will be confusion among the citizens. This will result in the rumors. Rumors will be resulting in the spread of misinformation and fake news.

A MR vaccination campaign has begun in India in order to meet the United Nations' target of sustainable development goals. The Indian government collaborated with UNICEF, the World Health Organization (WHO), and Lions Club International to bring the benefits of the MR vaccine to children aged 9 months to 15 years. According to the WHO fact sheet (WHO, 2018), immunisation prevents an estimated two to three million child deaths due to diphtheria, tetanus, pertussis (whooping cough), and measles each year. An additional 1.5 million deaths could be avoided if vaccination coverage was increased. Approximately 19.5 million infants did not receive the routine immunisation vaccine. In 2015, India was responsible for nearly 36 percent of measles-related deaths. Vaccine hesitancy is one of the top ten global health threats, according to the WHO, and it affects all countries across the globe. SNS is one of the mediums that instil vaccine hesitancy in individuals in the form of misinformation.

A SNS can be used for anti-vaccine information dissemination for publicity purposes and induce vaccine hesitancy among the users. It can also be used to combat vaccine hesitancy (Stahl et al., 2016). According to WHO officials, measles deaths in India have decreased significantly since the introduction of the measles vaccine (WHO, 2018). The effective vaccination campaign will further reduce the child's chances of dying young. According to a UNICEF (2009) survey in India, 25% of parents were unaware that vaccines could protect their children. Only 11% of parents are aware that their children

should be vaccinated. Some people are concerned about the vaccines' side effects (Panda et al., 2014).

Misinformation was one of the factors contributing to the decline in Kerala's vaccination rate. There will be a hidden agenda to spread misinformation, and social media is an excellent platform for doing so. The anti-vaccination campaign and misinformation linking vaccines with various diseases and side effects are primarily to blame for the rise in vaccine hesitancy among parents (Dyda et al., 2020; Byström et al., 2020).

### 4.3.2 Social Media, Vaccine Hesitancy and Information Integration

With the introduction of Web 3.0, the Gov 3.0 system was established, utilising Web 3.0 ICT in electronic governance. This resulted in the emergence of Health 3.0, which employs ICT for health communication and information exchange. Web 3.0 had improved the government's healthcare programme with the help of non-governmental organisations, the general public and individual volunteers (Charalabidis et al., 2019; Aceto et al., 2020; Nam, 2016). The Inter-organizational Information Exchange (IIE) involves complex interactions and challenges in information dissemination. The cross verification of the information across various institutions requires a flawless information exchange and processing (Pardo & Tayi, 2007; Yang et al., 2012). IIE is critical in the research and the public policy formulation. Trust and privacy are the main concerns in the IIE especially when it is dealing with healthcare information (Karlsson et al., 2017).

There are two stakeholders in the information Integration, viz. External to the government (citizen and business) and the internal (employees and government agencies). Government should educate citizens and businesses about the added values and benefits of the integration to prevent external resistance and needs to establish an effective mechanism for internal collaboration to prevent internal resistance (Jaeger & Thompson, 2003; Signore et al., 2005; Luna-Reyes et al., 2007). Information Integration Theory says that the values and weights generated out of the information integration will have influences on our attitudes. Information with high values and high weights will have a strong influence on our attitudes (Anderson, 1971; Anderson, 1974).

Despite the fact that the world's countries are committed to the WHO's immunisation targets and policies, vaccination rates are declining (WHO, 2018). Social media has a significant impact on the low vaccination rate (Dyda et al., 2020). People use online resources for health information shared by strangers to avoid paying the fee charged by a traditional source of health advice (WHO, 2018). According to a study on YouTube videos, the majority of them contained biasing misinformation, or fake content, and there is an inverse relationship between the popularity of the video content with the misinformation and expert ratings (Loeb et al., 2018).

The concept of diffusion theory is about interpersonal influence. There is a choice of why the information is sought from others and information is given to others. It also explains how the information influences others (Gatignon & Robertson, 1986). Social media platforms disseminate news from the mainstream media, fake news sources, and partisan media. Identifying the types of news sources can help to prevent the spread of misinformation (Pennycook et al., 2019). In addition to community leaders and healthcare professionals, the role of the media in a vaccination project is critical (Greenwood, 2014). The scientific understanding of the project should be communicated to the media on a regular basis and should be included in the communication plan. Vaccination campaigns, social mobilisation messages (Wakefield et al., 2010), peer education, celebrities influencing the local population (Hoffman et al., 2017), and vaccination campaigns in schools and universities will increase vaccine intake and awareness. For privacy and security concerns, multidisciplinary approaches are required (Blenkinsopp et al., 2007).

Multiple interventions are required for a successful vaccination campaign (Mazzoni et al., 2017). The Internet has become popular, and it quickly disseminates vast amounts of information to the general public. This has also made it easier for anti-vaccination activists to spread their views. In order to combat misinformation, health workers and Health Care Professionals (HCP) must update their knowledge to clarify the patients' questions and concerns. They must be up to date on the latest research and scientifically counter vaccine-skeptical parents. So, the HCP must be enthusiastic and committed (Faasse et al., 2016). The use of Information and Communication Technology (ICT) can

help to bridge the information gap between the communities they serve (Sato et al., 2013). Anti-vaccination comments on social media are of the analytical thinkers with a low level of authenticity. They are more concerned with the body and health, whereas pro-vaccination comments are more genuine (Adam, 2012). Though people are using social media for medical advice from strangers, it is not a replacement for traditional health care (Anwar et al., 2015).

The people who will benefit from the vaccine should make a commitment. They must be dedicated to the well-being of the society in which they live. If the recipient is a child, the guardian or parents should assume responsibility. Changes and improvements will appear faster if the concept of fairness is introduced into the vaccine and vaccination (McClure et al., 2017; Fitzpatrick, 2007). Because of the emotions and deeply held beliefs that lead to blind denial, the vaccination programme faces opposition from the anti-vaccination faction. They spread false information, myths, prejudices, and frauds. There are potentially biased pharmaceutical industries involved in vaccine research and development (Donald, 2010). Taking both aspects into account, the success of the vaccination programme necessitates a collaborative discussion among all stakeholders, including industry, academics, government institutions, organisations, journals, and the general public. Controversies would be sterile if there was an open and scientific debate based on comparison and discussion of ideas (Akmatov et al., 2012).

### 4.3.3   Research Design

We conducted a case study of MR vaccination campaigns in India to analyze the impact of misinformation on healthcare and the role of GIII. The MR vaccination was a campaign to curb the measles and Rubella by the end of 2020 from India. The study was focused on the analysis of social media data and the trends in social media during the MR vaccination campaign held in India.

*Data Collection*

The 'Google Trends' during this period was also taken for assessing the trends of the MR vaccination campaign on the Internet. The keyword used is "Measles Rubella". We extracted the trends during the period January 2017 to August 2018. We extracted the

information pertaining to India only. The peaks in the trends observed during each phase of the MR vaccination campaign.

The Twitter data from the period January 2017 to April 2017 during the first phase and September 2017 to February 2018 during the second phase of the immunization campaign in India were considered for analysis. The keywords used are vaccin, immun, MRcampaign, swasthbharath, routineimmunization, measles and rubella. We had collected approximately 30000 tweets during this period. After removing retweets we got 1796 tweets by pre-processing the data. It includes the removal of URLs, hashtags and other Twitter handles.

We had collected the links of the news shared on social media by giving the search key on the website https://app.buzzsumo.com. That will retrieve the news links and user engagement details in social media like Facebook and Twitter. The keywords used are "MR Vaccination" and "measles-rubella". We had selected the period from January 2017 to August 2018 because it was the period where the MR vaccination campaign was conducted in India in a phased manner to attain the goal of eliminating Measles and Rubella by 2020.

*Data Analysis*

The analysis included the assessment of trends during the MR vaccination campaign, Sentiment analysis of Twitter data during that period and finally engagements of various social media applications.

As an initial step, we explored the trends about vaccination using the "Google Trends". We used the keyword "Measles Rubella" and assessed the trends. The trends will also show the most frequently used search terms related to vaccines. This application can give the statistics regional wise also. This will be helpful in analyzing the data and trends in the Internet during the vaccination campaign in India.

In the second step, we focussed on the Twitter data extracted using the keywords related to the MR vaccination. The sentiment analysis of the Twitter data revealed that many factors are affecting vaccination campaigns initiated by the government. Analyzing the Twitter data, it was found that most of the tweets containing the Uniform Resource

Location (URL) related to the news about the vaccination. Further assessment of the URL had given insight on catchy headings of different newspapers, blogs, and other social media sites like YouTube and Instagram. The process of Twitter data sentiment analysis is done in the following sequence:

- Extraction of tweets using the Twitter application
- Cleaning of the tweets
- Getting sentiment score for each tweet
- Segregation of positive and negative tweets

In the Third stage, we extracted the engagements in various social media using the URL https://app.buzzsumo.com. From the obtained result, we had taken only Facebook and Twitter engagement for the study. All other social media results have fewer engagements compared to Facebook and Twitter. In India, Facebook is the most commonly used social media application. This is mainly because huge data can be shared and also the social networking criterion is different in the two platforms.

### 4.3.4 Results

***Google Trends during the Vaccination Campaign***

As per Google trends, during the MR vaccination campaign in India, the search for MR vaccination has increased after announcing the program. The peaks in the graph in figure 4.7 show an increased search since the announcement of the program by the government in each phase.
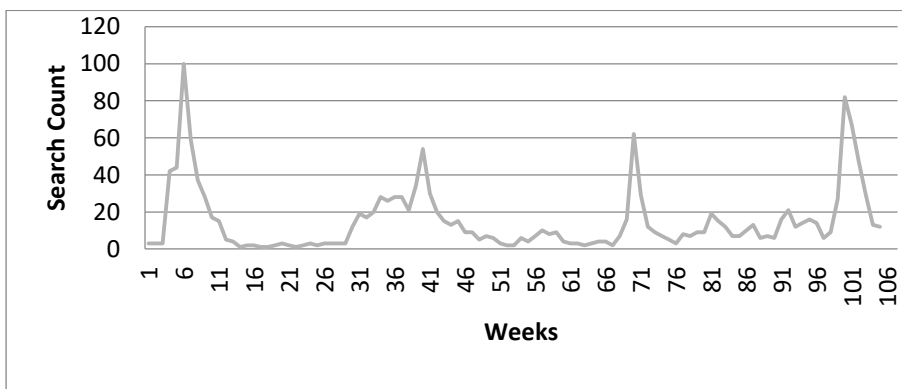


Fig. 4.7: Google Trends during the period of January 2017 to December 2018

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The searches are mainly about the MR vaccination and its side effects. The graph is created from the data obtained from the 'Google Trends' application by giving the keyword 'Measles Rubella'. This application will give trending searches across the globe. We can also get the region-wise search results using this application. Google Trends also gives the top searches on the topic of interest. The searches on the Internet are normally associated with the conspiracies and the important events of that time. The major related searches include "Autism -Disorder", "Adverse effect", "cause", etc. It shows the concern of an individual while taking medicine.

*Twitter Analysis*

We used the 'Syuzhet' package in the R language for sentiment analysis. 'Syuzhet' breaks the sentiments into 10 different emotions, namely - anger, anticipation, disgust, fear, joy, sadness, surprise, trust, negative, and positive. We got 13.2% positive, 12.03% negative and 74.78% neutral sentiment. The sentiment was analyzed based on the keywords in English.
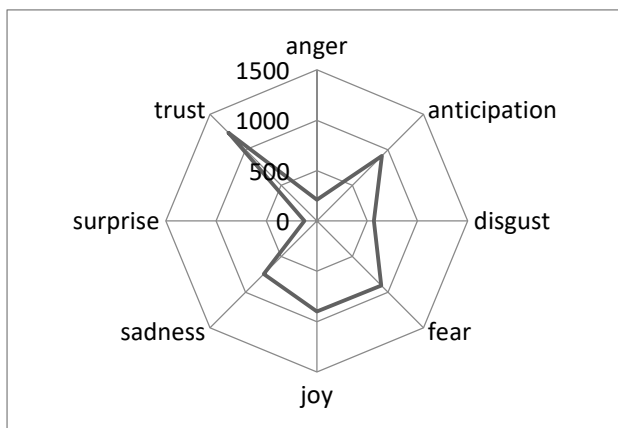


Fig. 4.8: Sentiment analysis of Twitter data on MR vaccine campaign

There are many tweets with religious, cultural, and other behavioral aspects. The sentiment analysis shows that most of the tweets are neutral. Normally healthcare-associated texts will have more negative sentiments. Most of the tweets contain URLs with negative sentiments. The news about the Adverse Event Following Immunization (AEFI), religious context with vaccines, anti-vaccination campaign from other countries, and the conspiracies in vaccine ingredients. Such news was focusing on some

particular religion and invoking vaccine hesitancy among the people belonging to that religion. Another set of people propagating the side effects of the vaccine and creating negative sentiments against a particular system of medicine. Based on the sentiment analysis of the Twitter data, the fear emotion in figure 4.8 is more than joy. More the negative sentiment in the text, the more the impact on the reader it creates. The text containing emotion fear will have more social media engagement. This behaviour is made use of by the anti-vaccination campaigners for propagating their agenda. Normally such kinds of people will look for opportunities to spread misinformation. The circulation of the misinformation by such people will have some other motives and the people will fall prey to that agenda.

*Analysis of Social media engagements*

The website https://app.buzzsumo.com retrieved 185 articles using the keywords "MR Vaccination" and "measles-rubella". After removing the duplicate results, we got 179 articles and it is used for analysis. The website retrieved the links which are having at least 5 engagements in social media. We selected the social media engagements of Facebook and Twitter because other social media engagements are having only minimal engagements compared to Facebook and Twitter. The media links are analyzed manually to classify according to the variables chosen after the literature survey. The classifications of social media engagements based on the factors identified is given in Table 4.3.

Table 4.3: Social Media Engagements and the factors considered for the classification

| Classification of SM engagements | Factors considered for classification | Authors |
|---|---|---|
| Awareness | The details with the importance of giving vaccination to the children. The awareness can be in many forms viz. misinformation in SNS, | Hoffman et al, 2017, Bragazzi. et al 2017, Dube et al, 2014, Castner et al., 2020 |

| | | |
|---|---|---|
| | vaccination efficacy, details of immunization, etc. | |
| General Information | The details about the MR vaccine, day of vaccination, briefing of the details of vaccination program by government etc. are categorized in general information | Schuster et al., 2015, Dyda et al., 2020; Byström et al, 2020 |
| AEFI | Adverse event following immunization is any unexpected medical occurrence that results after immunization and that may not necessarily have a causal relationship with the vaccine administered. | Dube et al., 2014; Castner, 2020; Bianco et al, 2019; Byström et al, 2020 |
| Accessibility | The ability to get the vaccine at right place, right time and right cost is defined as the accessibility | Dube et al, 2014, Castner, 2020 |
| Fear of vaccine | The state of the mind which resulted from the external influence like misinformation, adverse events, injection, after effects, etc. | Dyda et al., 2020, Castner, 2020, sato et al., 2013; Bianco et al, 2019 |
| Socio-political factors | The religious, social and political biasing or teachings or the practices will make people vaccine hesitant | Dube et al, 2014, Panda et al,, 2014 |
| Legal | The Legal category comes with the affirmative actions to prevent spreading of misinformation in social media. | Panda et al, 2014, Castner et al., 2020; Bianco et al, 2019 |

| Parental Attitude | Vaccine hesitancy and denial of vaccination occurred when the parents were not informed about the vaccination of their children | Dyda et al., 2020, Castner, 2020 |
|---|---|---|

Awareness and General Information class of news are having more social engagements among all other variables identified. The data which are not coming under the variable selected is classified as General Information and is containing the public information like the statistics of the immunization, media briefing by health officials and other government authorities, the announcement of the immunization schedule, etc. The articles which are having reports of the after-effects of immunization are classified as AEFI. AEFI is one of the major factors that are causing denial of immunization to the children. Accessibility is related to reachability to vaccination centres, more number of children, fear of losing their one day job, etc. Political factors include the decisions taken by some regional parties on vaccination programs, comments against vaccination, favoring some other system of medicine instead of vaccination, the allegation against the ruling government by the opposition on the failure in vaccination, etc. Fear of vaccines includes the pain during injection and the information received about the after-effects of the vaccination, etc. Some people refrain from vaccination because of religious sentiments. Such articles are categorized under the religious category. The people working for the vaccine hesitancy are informed about the impacts of their acts by the government authorities with the consequences. Some videos are also shared along with news articles stating the legality of spreading the misinformation. Such news articles are classified as Legal. The contributions of each factor are given figure 4.9.
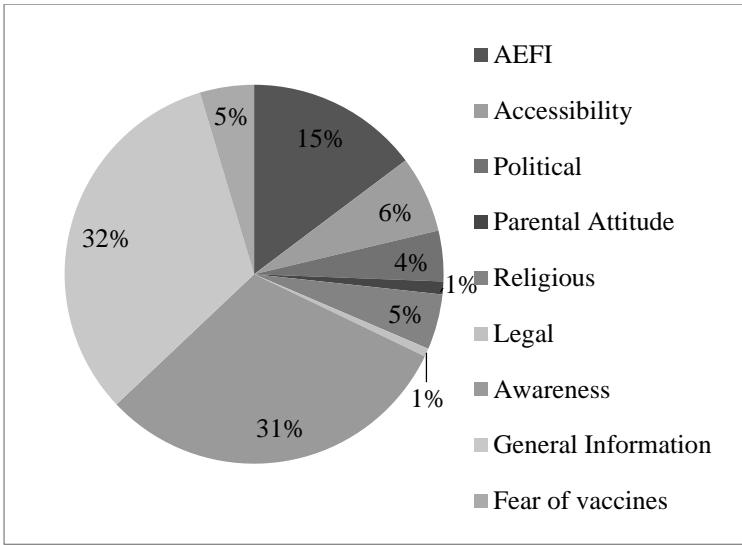
Fig. 4.9: Social media engagement and the article category

The news articles related with information on consent from parents are classified as Parental Attitude. The contribution of the category of articles based on the variables identified is given in figure 4.10.
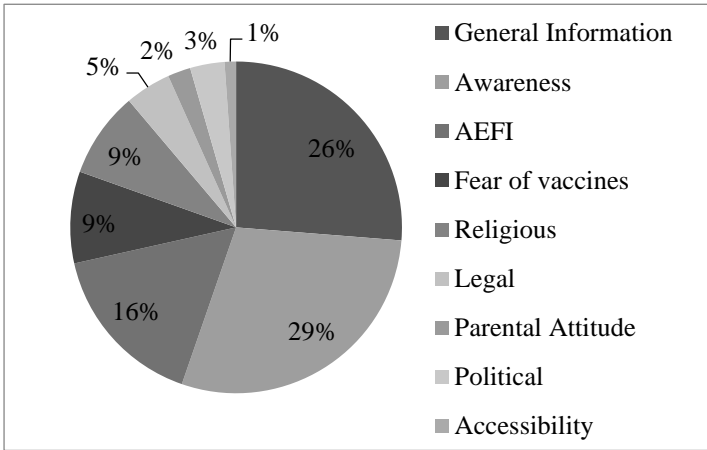


Fig. 4.10: Article category based on variables

More cases are reported on AEFI and are shared largely over social media. Comparing social media engagement and articles shared, we can see that social engagement and the number of articles don't have any relationships. The accessibility of immunization to the children is reflected in only two news links but the social engagement is about 19 percent next to the AEFI. Religious news articles are 9 percent next to AEFI but the social engagement is 5 percent which is fifth among the social engagements.

YouTube is having a major share in social media engagement. Only the top 17 articles based on social media engagements and the number of articles is considered for comparison. Video sharing websites take over the 27 percent share of social media engagement. There are 86 links containing the MR vaccination details shared on social media. The videos are an easier method of spreading misinformation on social media than text messages. The images will influence people more than texts. The fear and hatred can be induced more through the video. Figure 4.11 shows the websites and their engagements.
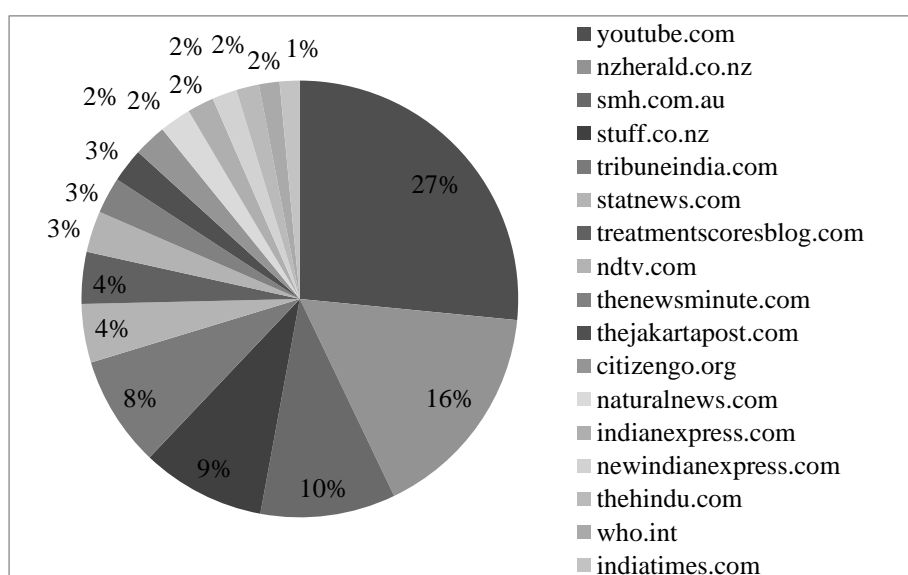


Fig. 4.11: The websites of the most shared links based on social media engagement and Number of articles

## 4.3.5 Discussion

Information Integration in the healthcare sector has more significance in the current scenario. The Government information dissemination has been improved with the advent of technology. Web 3.0 and the ICT applications improved the participation of citizens in the Government programs. The emergence of more social media applications improved the communication for information gathering and entertainment. People are following Twitter and other easily accessible social media websites to get knowledge about the vaccines. Looking into the data, we observed that there is a major share of Facebook engagement compared to Twitter.

The digital divide and the divide in the accessibility of the medical facilities played a major role in the aversion of people to immunization. The digital divide also leads to the accessibility to information shared in the digital platforms. Sometimes people are not aware of the importance of vaccination. Even in the cities, the people are falling prey to the anti-vaccination campaign because of misinformation. There are cases with people living healthy even without vaccines due to herd immunity. The GIII is facing challenges in these situations. The healthcare professionals face challenges in such situations in providing awareness campaigns. Adequate study and the information sharing through reliable sources may be useful under these circumstances. The motivation behind the vaccine hesitancy is initiated by many factors. Sage working group model for the vaccine hesitancy is given in figure 4.12.
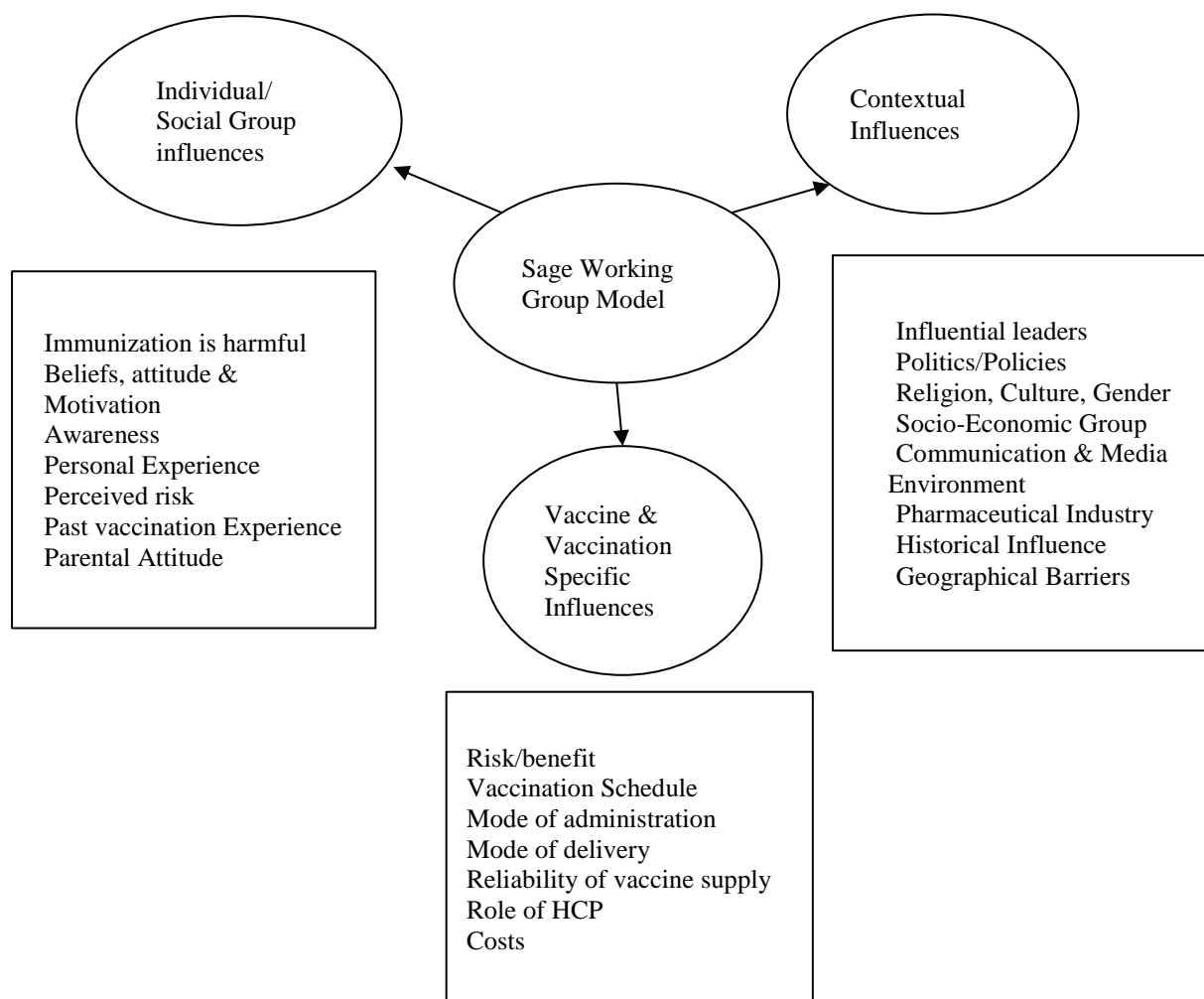


Fig. 4.12: Sage Working Group Model

We analysed some of the influencing factors using the social media data. The actions taken by the government, Non-Governmental organization and the individual volunteers are discussed in detail in this research.

Some of the factors affecting the vaccination programs and other health campaigns are discussed in detail as follows:

*Social Factors*

According to agenda-setting theory, media coverage increases the severity of the issue and it will create a negative impact on the mass initiatives by the government in vaccination programs (Begg et al., 1998). Even though the effective information integration in the government sector is effective, there are challenges of misinformation appearing in the reliable sources due to some vested interests (Mena et al. 2020). The article published in the Lancet Journal by Wakefield, et al. in 1998, which is withdrawn due to the fake findings and claiming that MMR is associated with Autism is such an example of misinformation from a reliable source. The claims in the article are still spreading in blogs and other social media platforms. The digital revolution happened due to the proliferation of mobile technology and the Internet. This has resulted in the easy accessibility of information to a large mass of people in India. Due to the lack of adequate cyber awareness among the common people in India, it is easy to spread misinformation through the social media platform and the propaganda behind it. This has worked well with many instances in India. The anti-vaccination campaign is also such an instance where the people are misled with fake information and stay away from taking the vaccination.

*Psychological Factors*

Based on behavioral psychology, behaviors are acquired through conditioning (Zachrisson et al., 2012). Fear of vaccines may be due to multiple reasons, maybe fear of injection, fear of after effects, etc. The fear of vaccines is common among young people. The hate of modern medicine and Chemical hesitancy is another factor that leads to vaccine hesitancy. Looking into the searches from Google Trends, we can see that the searches are more related to the after-effects of vaccines and the side effects of the

vaccine. The use of fake likes on social media posts will make the people visit misinformation based on their engagements (Gruzd et al., 2018). It is the responsibility of healthcare workers and the government to take measures to reduce the fear among such people. While implementing a vaccination program, the government should anticipate such negative sentiments in social media and other Internet resources. Currently, there are many blogs and vlogs (Video blogs) which are having misinformation about vaccines. This information is shared largely in social media applications like Facebook and WhatsApp. The government is taking many measures to curb the spread of such information but still that is not effective.

*Political Factors*

The efficient leadership and manpower required in the government to have a fruitful GIII. The will power of political leaders is required to have effective GIII. In some cases, the government may be forced to suppress certain information which will affect the government. That may be having a long term impact on healthcare programs. Every information that is hidden from the public domain will make the situation more complicated and give way for more speculations and rumours(Shin et al., 2017; Flynn et al., 2017). Such a situation is utilized by the anti-vaccine campaigners. The mass campaigns or distress will be the right time for them to utilize social media as their information dissemination medium. Even the political leaders are involved in propagating the anti-vaccination campaign. The awareness among political leaders about the vaccines and their affinity towards some views are also affecting the vaccination campaigns. They are the influencers; the comments by them in the public domain will have an impact on the minds of people. During the vaccination campaign, anti-vaccine campaigners flooded such news in social media and another communication medium. The rivalry between the systems of medicines will also lead to spreading the misinformation (Caulfield, 2019). The traditional healthcare providers are the main propagator's anti-vaccination in Kerala.

*Religious Factors*

The multi-cultural country like India faces many challenges in healthcare programs especially due to the cultural differences in the religious faith. This will also have an impact on the GIII. India has its own traditional systems of medicine and they follow the system according to their culture. If the information integration is not considered the cultural aspects, then there will be a huge impact on the government campaigns. Religious beliefs in society also refrains people from taking vaccination. The government warned the anti-vaccination campaign activists of taking necessary legal action. Many of the social activists forwarded the complaints against the anti-vaccine movement on social media. Other clerics were clearly stated that it is against a particular religion and it is for population control. Depopulation agenda related articles got five percent of social media engagement. Another claim is that the vaccine is developed from Israel and the vaccine is for Muslim genocide. In some places, the HCPs were manhandled and the vaccination program went back on foot. The government took a more rigorous effort to tackle this situation by taking legal action against the responsible people. The vaccination campaign was also extended to achieve the vaccination target.

The government of Kerala, India took some strategies to tackle the misinformation in the SNS and the initial hesitation to take vaccines has been reduced and the vaccination campaigns become successful. Table 4.4 summarizes the details of the strategies and the challenges taken by the government to improve vaccination.

Table 4.4: Summary of strategies followed by the government in Social Media and the challenges faced

| Actions | Strategies followed | Challenges faced |
|---|---|---|
| Involvement of the Governmental and Non-Governmental Organizations(NGOs) in the Awareness through Social media | • Government authorities briefed the proceedings regularly through social media<br>• Police and other enforcement agencies | • The behavioral instinct of people to share the sensational news on immunization adverse events |

| | | |
|---|---|---|
| | are continuously informed about the consequences about spreading the fake news through the social media<br>• The NGOs and other independent social workers continuously shared the importance of vaccination through social media<br>• Awareness of the adverse events after immunization<br>• Interaction of Healthcare workers through SNS platform for better reliable information | • Lack of technological intervention to prevent fake news/ messages<br>• Emotional factors influence the parents after getting the news about the adverse events after immunization<br>• Self-proclaimed experts in the social media giving detailing about the disease or vaccine |
| Involvement of celebrities and Influencers in promoting the vaccination campaign | • Involvement of public figures in the campaign through social media and other mass media<br>• Involvement of religious leaders in the campaign to tackle the religious sentiments | • Orthodox religious leaders influence the people by quoting the holy books and spread fear among them<br>• Fake news about the population control by such groups<br>• Modern medicine haters spread fake |

| | | messages on the Adverse Events After Immunization |
|---|---|---|
| Communication through mass media and other public events | • Use of Social media for briefing the importance of immunization<br><br>• Plays which are briefing the importance of vaccination<br><br>• Use of posters, brochures, stickers, and public announcements | • The use of videos and other fake information made a huge impact in the initial stage of the immunization program<br><br>• The videos and the speech by some religious leaders against the vaccination campaign influenced people from some sector<br><br>• The delay from the health authorities in delivering the facts on the misinformation shared in social media |

The GIII has played a major role in this situation. There were many SNS engagements among NGOs, Government agencies and other volunteers in information integration and fighting against misinformation and anti-vaccine campaigns.

### 4.3.6 Main Findings

The success of vaccination is mainly related to the information shared in social media. The vaccine intake can be improved by disseminating the information with weight and value. The IIE should be carefully done to make the information with more weight and value. This will improve the attitude of the citizen and result in increased vaccination intake. If the information has low weight and more values, the information consumer will delay the vaccine because he knows the value of the vaccination and prefers to delay the intake. Figure 4.13 shows the effect of the value and weight of the information on the vaccination.
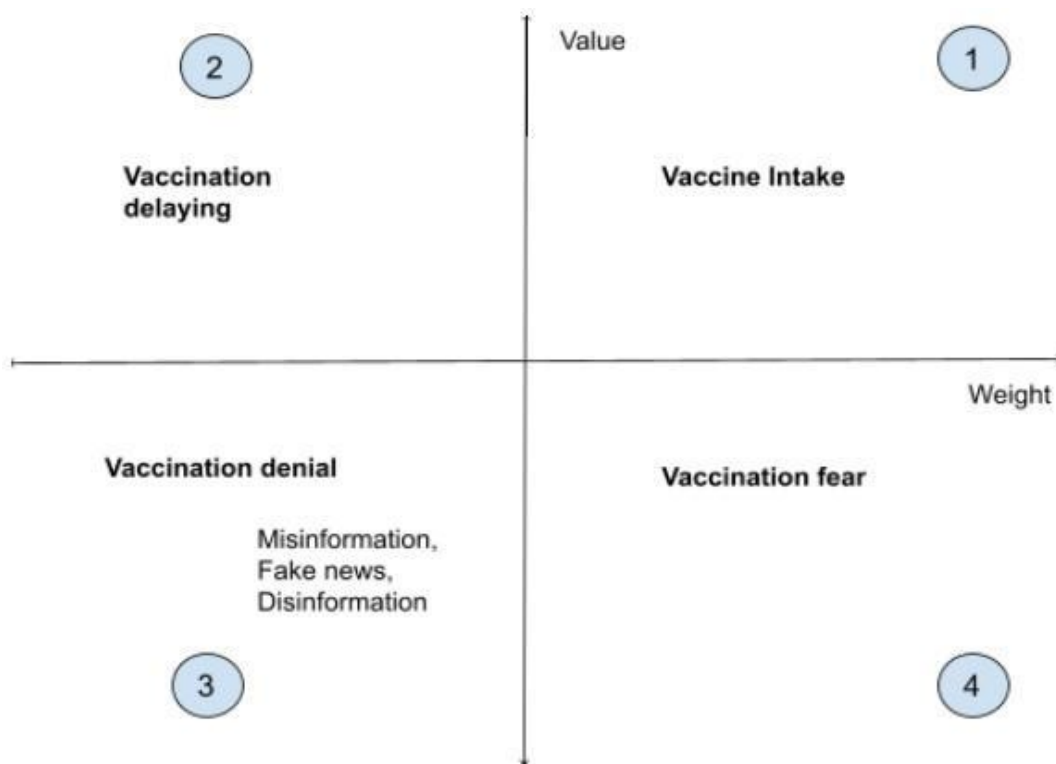


Figure 4.13: Information quality and attitude of an individual

In the third quadrant, we can see that the vaccine denial is mainly because of the misinformation and fake news in the social media. Here the weight and value of the

information is low. Though weight is high but the value is low will result in vaccination fear. The attitude of an individual towards the vaccination depends on the value and weight of the information. Thus IIE plays a crucial role in the government healthcare programs. Information sharing and Integration needs to be done at the right time to prevent the domination of misinformation in social media. When there is a weight in the information and low values, then the citizen will be in fear of vaccines. The internal resistance can be limited by the consolidation of the information resources by involving right people from different organizations. They should be technically competent enough to consolidate and integrate the information. At the same time the external resistance can be limited by the effective awareness and the taking precautionary measures in preventing and controlling the spread of misinformation.

## 4.4 Military & War Metaphor during Covid-19 in India

### 4.4.1 Introduction

The distress and the deadly pandemics are affected the human life many times in the history of human. Such situations need courage and empathy to improve the physical and mental health. The worry about the infection of the family of physicians were a real challenge as they are already one among with higher number of suicide cases (West et al., 2018; Sani et al., 2020; Santarone et al., 2020). This has necessitated the use of communication which is motivating the healthcare workers as well as the citizen affected. The emergence of the COVID-19 pandemic has created such situation where entire world was stood still without any clue due to the lack of cure and the complete lockdown in many countries. The citizen of country denied the movement and shutdown all the leisure and entertainments (Dhama et al., 2020). So the communications associated with the COVID-19 had flooded with war and military metaphors to give psychological support to healthcare workers and the citizen. The metaphorical discourse is not only imposed by the discourse but also by other contextual conditions prevalent in the society.

### 4.4.2  Methods

*Twitter Data Analysis*

During the emergence of the COVID-19, the social media played a crucial role in information dissemination and supporting the Non-Governmental Organization (NGO)s and the government organization in coordinating the relief and rescue operations. At the same time, there was a set of groups spreading misinformation through the social media and thus making the people more stressed and anxious. The process involved in the 'war' and 'military' metaphor analysis is as follows:

We had selected the hash tags that are related to India to collect Twitter data. The data collected since January 28, 2020 to April 21, 2020. The hash tags used for collecting the Twitter data is given in Table 4.4. We had collected 8,30,000 tweets during this period for the analysis.

Table 4.5: Tags used for data extraction

| | | |
|---|---|---|
| #TogetherApart | #nCoV | #lockdownindia |
| #socialdistancing | #2019-nCoV | #coronavirusindia |
| #StayHome | #Betacoronavirus | #CoronavirusLockdown |
| #FlattenTheCurve | #Wuhan | #21daysLockdown |
| #lockdownindia | #CoronavirusOutbreak | #CurfewInIndia |
| #FightCOVID19 | #CoronaOutbreak | #COVID-19 |
| #JantaCurfew | #BreakTheChain | #coronavirus |

- Identified the 'war' and 'military' metaphors using the Merriam- Webster dictionary. We got 164 'war' synonyms and 75 synonyms for 'military'. We then taken the unique words of the corpus we collected. By comparing the

unique words with the war and military synonyms, most of the synonyms got very less number of occurrence in the corpus. So we had taken only 10 synonyms for study as they are occurred more prominently in the tweets. The words selected were 'war', 'military', 'battle', 'fight', 'attack', 'soldier', 'warrior', 'strike', 'terror' and 'weapon'. Using these keywords we had extracted the tweets from the already collected corpus of COVID-19 Twitter data. The resulting corpus had 3051 tweets.

- The sentiment analysis done by preprocessing the Twitter data. Normally Twitter data contains many symbols and other alphanumeric characters. For the analysis we require only the 'text' column. Words are the main part of sentiment creation. The numbers, punctuation, user name, videos, emojis and URLs are not required. Because they do not contribute to the sentiment of the tweet. All the text is converted in to lower case so that the duplication can be avoided as it is case sensitive. We can build the stop word file, so that that can be removed before processing. Stop words like articles, conjunctions and auxiliary verbs does not contribute to the sentiment.

- Based on the Naïve Bayes classifier we classified the input text in to the specified emotions like anger, anticipation, disgust, fear, joy, sadness, surprise, trust, positive and negative. Basically there will be a set of vocabulary in our training set for comparison. We used the 'Syuzhet' package in the R software. The tweet content will be matched against the training vocabulary word by word. In the next step we will be building our own word feature vector. Finally we will plug our feature vector in to the Naïve Bayes classifier.

### 4.4.3 Systematic Metaphor Analysis

We had used the systematic metaphor analysis technique developed by Schmitt (2005) for the analysis of the data. The community's social mode of thought, language and action can be interpreted by using this method. It is related with reality which focuses on the social construction of the world. We had identified the metaphor as 'war' and 'military'. For that the synonyms are also selected from the Merriam-webster dictionary

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and further segregated the COVID-19 tweets in to a refined set. It is basically done to identify the sentiments contained in the tweets belonging to those two metaphors.

First the text is parsed word by word by using the monogram frequencies of the Twitter data. Then it is compared with the synonyms of the metaphors we identified and then extracted the tweets for the study. In the next step the metaphorical concepts are interpreted and analyzed based on our context of study. The interpretations can be useful for identifying the actual intentions of the user who tweeted the text. In the same manner, the user who re-tweeted the text will also have the same intention.

### 4.4.4 Results

The sentiment analysis shows that, the tweets with the 'war' and 'military' metaphor will have more negative sentiments. The figure 4.14 shows the sentiment analysis plot for the tweets with the military metaphor. The analysis shows that the 'war' and 'military' metaphor can be useful for enacting the laws which are essential when the epidemics without any vaccine affects whole world. The communications in Twitter conveyed with 'war' metaphors which has positive impacts in the short term. In the long run, it will affect the mental health of large population. That is creating another silent epidemic among the citizen. The plot shows that the fear and anger emotions are very high compared to other emotions. In addition to that the negative sentiment is having upper hand. All these parameters adding to the depression, anxiety and stress among the people. In addition to that the government can propagate their agenda in the name of 'war' and 'military' to any extend. The patriotism is the outcome of the war and military metaphor for which the citizen are bound to obey the rule without much hesitation. Fear, anger and sadness are all contributed to the negative sentiments. The fear of disease may have caused mainly due to the fear of death, in-laws affecting disease, instability in the income due to the loss of job, movement restriction and so on. There was no scope for entertainments due to lockdown and the movement restriction.
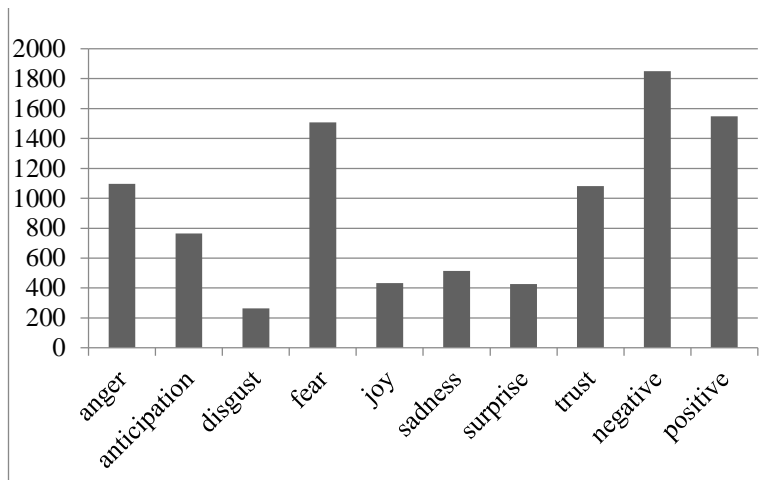
Figure 4.14: Sentiment analysis of Twitter data

The sentiment value of tweets extracted is given in the figure 4.15. It shows that the overall sentiment value is -516.75 which is very high at the negative end. The average value is -0.169. So we can see that the war and military metaphors will be more dangerous for the health communication. It will affect heavily when the disease is more deadly. The disease like COVID-19 had already impacted the economy and health care system not only India but also whole world. The recovery of the epidemic will be subsided with the trauma created by the epidemic and the mental illness of the citizen caused by the multiple reasons arising of the situation.
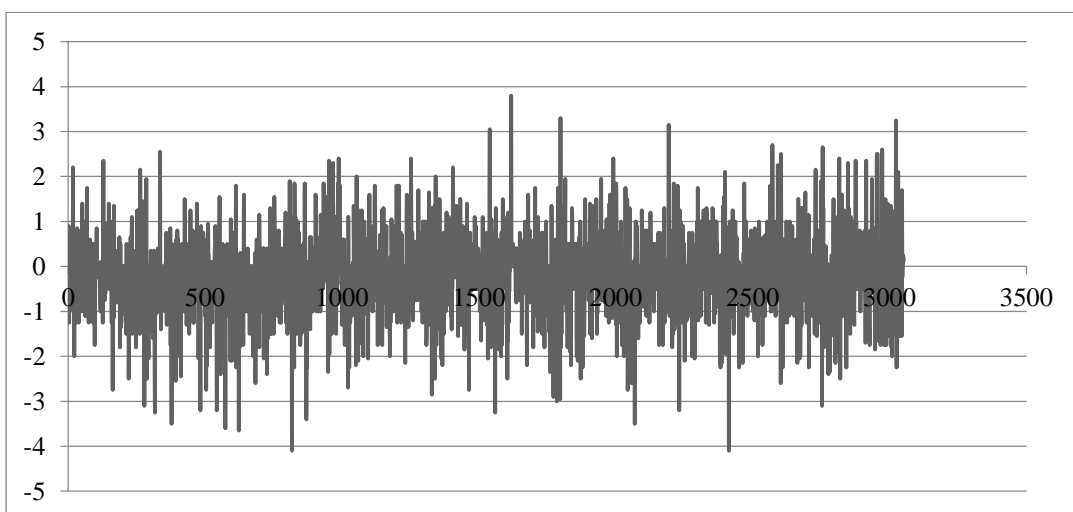


Figure 4.15: Sentiment values for Twitter Data

### 4.4.5 Discussion

People are depicted as soldiers rather than citizen to fight against the COVID-19 in this context. This may lead to the patriotism rather than the awareness. Sometimes the patriotism evoking may sideline the awareness and create negative impact. The economic crisis and epidemic spread in in India will have drastic impact. It will create a mounted stress and anxiety among the people in losing the money as well as the fear of epidemic. The war metaphors are normally related with discipline. A pandemic like COVID-19 requires a disciplined citizen for preventing the spread of the disease. The use of paramilitary and the enforcement agencies for controlling the movements of citizen and the public transport made the situation a war like. So sometimes that had a positive impact in keeping situation under control to some extent.

Table 4.6: Interpretation of 'War' metaphor during the period of COVID-19

| Imagery | Reality | Hash Tags | Qualifiers |
|---------|---------|-----------|------------|
| Enemy | Corona Virus | #coronavirus, #bioweapon | Adding enemy at the expense of virus in reality for propagating political agenda. |
| Soldiers | Health Care Professionals(HCP) & Voluteers | #coronawarriors | The general model of the situation may lead to the avoidance of patient experience |
| Strategy | Reducing the number of new infection and save the economy | #FlattenTheCurve, #breakthechain | Hiding of actual death or infection rate, making use of situation to enforce new economic policies |
| Rescue | Isolate people from going out to control the disease | #stayhomestaysafe | - |
| Traitors | It includes the people violating the lockdown | #drones | Add some section of people to the traitor |

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| | norms put forward by the government | | list at the expense of COVID-19 |
|---|---|---|---|

The war metaphor imagery of the COVID-19 is given Table 4.5. Corona virus is depicted as 'enemy' and we are 'waging war against corona viruses. The soldiers are the HCP and the volunteers. In an address to the nation, Prime Minister of India mentioned citizen as 'soldiers' who need to 'stay home' to 'fight' against the enemy (corona virus). The strategy of the 'war' is to reduce the number of new infections and to save the economy. There are rescue operations to isolate people to control the disease and provide basic amenities to the people stranded away from the family due to lockdown declared by the government. The people violating the lockdown norms are treated as traitors who are trying to fail the war against the enemy. In addition to the interpretation there are some qualifiers which can propagate some hidden agenda which is coming in line with the reality. The political parties can add new 'enemy' in this situation to gain political mileage. Another situation is the 'general' and 'soldier' relationship between physician and patient and also government and citizen. This is more dangerous condition. The authoritative nature will increase and it will lead to anarchy. The government can take any decision in the name prevailing situation with obedient citizen. Similarly physician will only prescribe medicine and will not listen to patient to his personal experience about the disease. Physician will know the condition of patient in the prevailing situation and the previous experience. So there will be hesitancy in listening to the patient. There is some other case of including a section of people as traitors for political mileage and for bringing up hidden agenda.

There must be a global solution and it should share responsibilities to curb the epidemic which is emerged without any clue to tackle it. There is proper vaccine for the disease and trying existing drugs which are used for similar disease. In the long run, when a disease is not settling down and there develops a battle fatigue. This will derail all the efforts laid down by the government and the civil society. In this situation, government should promote the civil responsibility and the solidarity among global power instead the idea of warfare. People are already in lockdown for months and the disease is still

prevailing, then the situation becomes worse. The daily wage workers and small shop owners will be affected heavily. The lack of transactions in the market will bring down the income of government and government need to spend more on curbing the disease. The war like situation will definitely affect the population and they will try to break the regulations.

Metaphors are normally considered as a tool to convince people about the epidemic when it cannot be explained with the medical terminology to a layman. Literacy and education is one of the main aspects in spreading awareness. When people lack this, metaphor takes the situation under control. Physician can simplify communication with the use of metaphor. But at the same time it also propagates inaccurate and potentially stigmatic language by harming the mental wellbeing of the citizen (Nie, 2016). 64 percent of the conversation contains metaphor when a physician communicates with the patient with serious illness. Similarly, patients also use metaphors to discuss their illness with physician (Casarett et al., 2010; Semino et al., 2018). The advertisements of sanitizers, personal hygiene and personal care materials against microbes in mass media will create an enmity among all microbes including the vast majority of human friendly ones (Institute of Medicine (US) Forum on Microbial Threats, 2006)

On one side people used the keyword "coronawarrior" for raising the confidence of health workers at the same time some people taken this opportunity as spreading their political agenda. They used "coronajihaad", "chinavirus", etc. for evoking heartedness in the name of a pandemic (Sasitha, 2020).

## 4.5 Nipah Outbreak in Kerala and Social Media sentiments

### 4.5.1 Introduction

Nipah Virus(NiV) is the emerging disease virus which is appeared in domestic pigs Malaysia and Singapore in 1998 and 1999. Nipah Virus infection/ Nipah Virus encephalitis, was first isolated and described in the year 1999. This infection has high rate of fatality and the World Health Organization (WHO) report shows that the outbreak since 2001-2015 had a mortality rate in the range of 40% to 75% (WHO 2018).

NiV is Zoonosis which affects the human and animals which are hosted by fruit bats (Daszak et al., 2012). NiV was first identified in Kampung Sungai Nipah, Malaysia during an outbreak of disease that took place in 1998. Pigs were the intermediate hosts this time. There were no intermediate hosts in subsequent NiV outbreaks. In 2004, humans became infected with NiV as a result of consuming contaminated date palm sap by infected fruit bats in Bangladesh. Human-to-human transmission has also been recorded even in the hospitals in India (Kulkarni et al., 2013). NiV infection has a range of clinical appearances, from asymptomatic infection to acute respiratory syndrome and fatal encephalitis in humans. NiV is also capable of causing disease in domestic animals like pigs and cow (Ling, 1999). No vaccine is available for either humans or animals. The only primary treatment available for human cases is intensive supportive care. As per the reports from the WHO, the morbidity and mortality rate due to NiV infection in South-East Asia region during 2001-2018, especially in Bangladesh is given in the figure 1. The mortality rate is about 76%. In India as per WHO report, NiV outbreak happened thrice till 2018 which affected 85 people and taken the lives of 62 persons with a fatality rate of about 73% (Krishnan, 2007).

### 4.5.2 History of Nipah Infection

In Bangladesh and India, the possible NiV transmission was suspected to be human-human. As per health authorities reports there was no evidence of animal-human transmission possibilities. Thus health care professionals (HCP) are cautioned to take precautions while dealing with patients and submitting and handling laboratory samples (Chattu et al., 2018). Mass culling of infected pigs in Malaysia was done to prevent the spreading of the infection. Biosecurity measure to prevent the bats coming in contact with the infected pigs should be done to prevent the spread of the disease (Krishnan, 2007). Use of person protective equipment and education about the infection should be incorporated while exposing to the potentially infected person or domestic animals (WHO, 2019).

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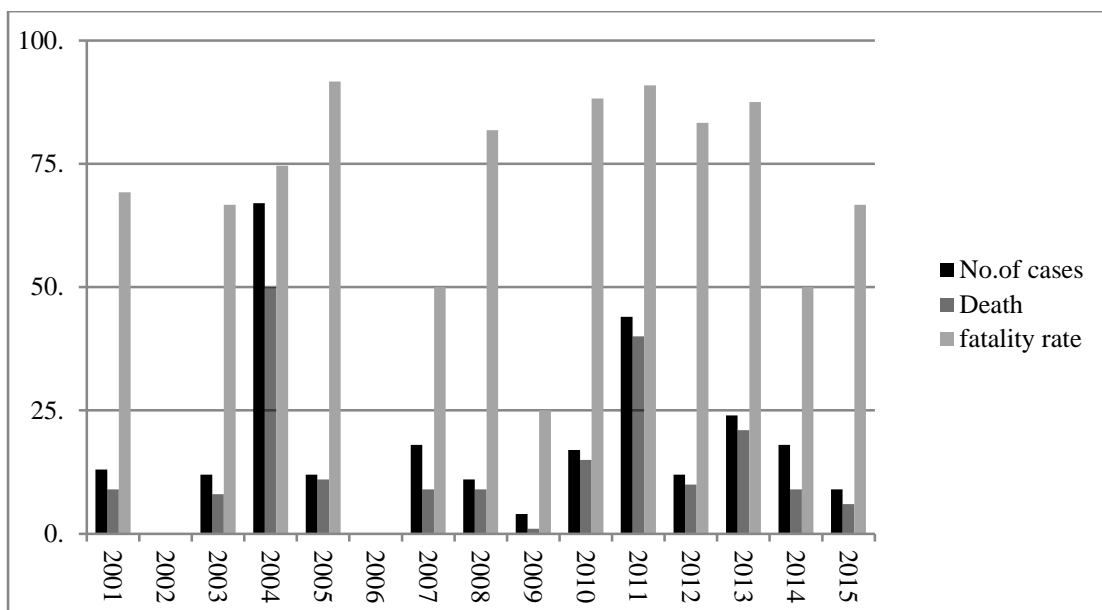
Figure 4.16: Impact of NiV infection in Bangladesh during 2001-2015*(Data source: WHO website, http://www.searo.who.int/entity/emerging_diseases/links/morbidity-and-mortality-nipah-sear-2001-2018.pdf?ua=1)*

### 4.5.3 Nipah Infection in India

In India, the first case of Nipah infection reported in the year 2001 in Siliguri, West Bengal. That year 45 deaths confirmed out of the 66 infected cases. Next outbreak was on 2007 in Nadia, West Bengal which took the lives of 5 out of 5 reported cases. This is as per the morbidity and mortality rate report released by WHO on Nipah or Nipah like virus encephalitis in South-East Asia region since 2001 to 2018. The latest was in Kerala in the year 2018 which got a fatality rate of 89.47% (WHO, 2019).

With the timely intervention of government and the HCPs, the NiV infection and its spread was controlled within a short span of time. The first wave of infection started in 3rd May, 2018. The second suspected death is happened in May 17 and the samples collected from the patient and sent for the test. Nipah infection is confirmed on May 20, 2018. By this time fake information started to spreading through the social media (TNM Staff, 2018). This is affected the normal lives in the Kerala state, especially in Kozhikode and Malappuram districts where the infection is reported. By June 10, 2018, the second wave of infection is passed and no cases were reported thereafter. By 30th June the

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Nipah surveillance came to an end. The timeline of the Nipah infection in Kerala is shown in figure 4.17.



May 17: Second Death, suspected NiV, sample Collected

May 22: Fruit bats suspected of NiV infection

May 30: NiV tested negative for Fruit bat

June 30: NiV surveillance ends

May 3: First wave Patient 0

May 20: NiV confirmed, 2005 IHR followed

May 23: Fake Message on NiV Spreading in Social Media

June 10: NiV restrictions ends
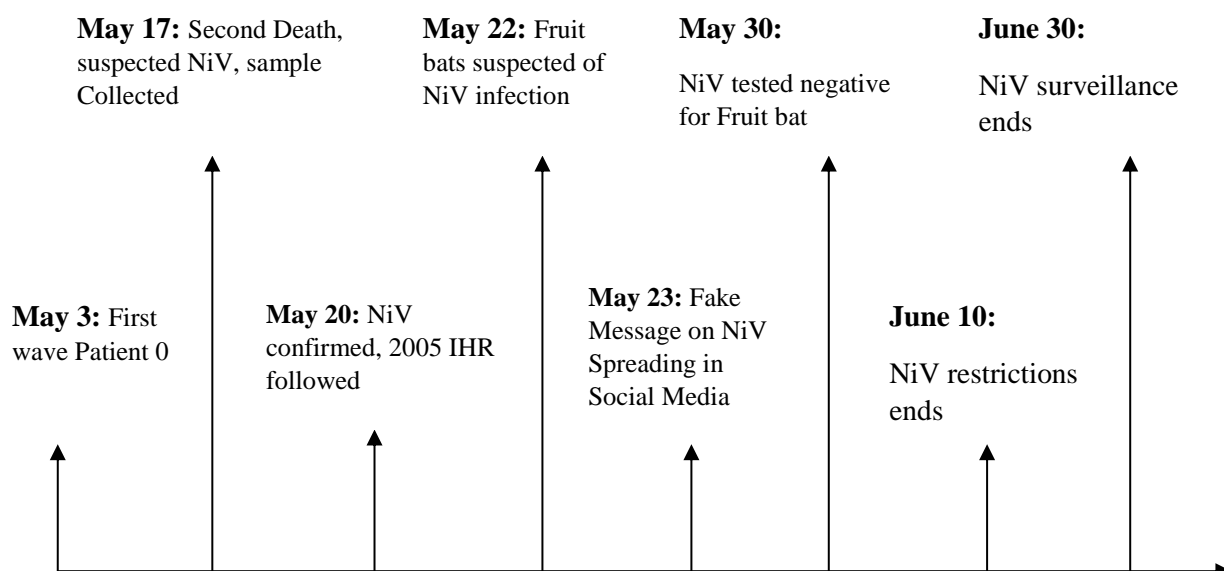
Figure 4.17: Timeline showing the major milestones in the Nipah epidemic in India during May-June 2018

NiV infection is reported in Kozhikode district of Kerala state in India during the month of May 2018 and it took the lives of 17 out of 19 infected people (WHO, 2019). Being deadly, NiV was put in control by the health department of Government of Kerala by taking all the measures. But the fear caused by the fake reports in the social media created a fear in the minds of people and the tourists visiting Kerala. Authorities and the HCPs are taken all the measures to control the spread the NiV infection to large areas.

### 4.5.4 Socio Economic Impact of Nipah Infection in India

Though the infection was under control, the fear spread among the people had huge impact. Social media played a vital role in spreading the fake information. This is not only affected the health care sector but also other domains like transport, tourism, fruit business, etc. The fatality rate of NiV has made things worse. This induced fear among people in travelling which affected public transport (Mathrubhumi, 2018), business activities (The Business Standard 2018), etc. Tourism contributes a major share in the gross domestic product(GDP) of Kerala. It affected heavily due to the Nipah outbreak.

As per the International Health Regulations (IHR) 2005 norms, if the event has serious public health impact or having potential international health concerns or cause public health impact and spread rapidly internationally, the event shall be notified to WHO as per the international health regulations. There are 64 articles which details on the regulations on travel, surveillance, health information sharing, etc. that are complaining with the International Human Rights (WHO, 2005). Many countries restrictions imposed by on the outbreak of Nipah in India. It shows that the South West countries are more concerned with the Nipah in Kerala, because more number of people is migrated to these countries for work and people are transiting regularly among these countries (Press Trust of India, 2018; Baumgaertner, 2018).

### 4.5.5 Fake News at the time of Epidemics

We define "Fake news" as the intentionally and verifiably false stories that can mislead the readers. Fake news can also be originated by unintentional mistakes in reporting, conspiracy theories, satires and sarcasms that are misinterpreted by the readers, false statements by the celebrities, misleading reports and the rumors that are spread from one particular article (Allcott & Gentzkow, 2017). The main motivations behind spread fake stories are: 1) the virality nature of the media will have large reach for advertisements. This will create considerable revenue and 2) the popularity of a candidate contesting in election become high (Allcott & Gentzkow, 2017; Subramanian, 2017). It is now easy to setup a website and disseminate information in easier manner. The reputed mass media may fear to spread false news because of losing their reputation. With the increased popularity of the social media platforms like Facebook and Twitter, spreading of fake information become easier (Allcott & Gentzkow, 2017).

The Nipah infection created a huge panic among the people. The mainstream Medias and the other mass Medias reported about the danger posed by the Nipah infection. The fake news was flooded in the social media platforms like WhatsApp, Facebook, Twitter and it added fuel to the fear on NiV infection. The MR vaccination campaign in Kerala during October 2017 also faced stiff resistance from one section of people in spreading misinformation and that lead to the low enrolment for vaccination campaign during the initial phase (The Hindu, 2018). This has led to the program extension which added

some additional financial burden on the government. The same situation was made use for the spread of hatred among people also. The comment appeared in the Facebook to spread hatred against one particular community goes like this:

*"'Nipah' virus was first found in Malaysia, then in Bangladesh and now in Peaceful dominated two districts of Kerala.. "Something Unique".."* (Facebook, 2018)

In addition to the hatred towards the religion, there are also the cases of hatred towards the systems of medicine. A renowned Naturopathy physician in Kerala is in front of the hatred against modern medicine and vaccination programs. He claims that the NiV is the creation of Pharmaceutical companies and government is sponsoring it (Vadakkanchery, 2018). Another Naturopathy physician also came up with a video and claimed that there is no Virus and it cannot transfer through the remains of the fruits bitten by fruit bats. He demonstrated it by eating the remains of the fruits eaten by the bats. This is enhanced their reputation and claimed that the versions of the Allopathic doctors were wrong. So their versions of nexus between modern medicine and the Pharmaceutical companies got more support from common people. The video has been shared through social media like WhatsApp and Facebook (Armanasco et al., 2017). There are more than 1 million views in his Facebook official page and also in YouTube. On the onset of this misinformation, Government authorities forced to take action against these two people (Malayalam Troll, 2018). The fake messages and disinformation resulted hugely in the income of Kerala government. It affected many sectors of business and created fear in the minds of people.

Government officials, ministers, HCPs, Non-Governmental Organizations and Social activists were interfered and conducted press conferences regularly to tackle the fear caused due to fake messages and disinformation. It has made difficult for the authorities to convince the people on the aftereffects of Nipah infection.

### 4.5.6  Methods

*Research Approach*
To carry out the research on the influence of social media and the mainstream online news media in the time of disasters, we used a quantitative research method to study on

the disease Nipah that affected the people of Kerala during May 2018. We started with the empirical data collection. The data collected from different newspapers in India since May 20, 2018 to June 30, 2018. This is the period from the Nipah infection reported and the official declaration of the containment of the infection in Kerala, India. In addition to that the literature on epidemics was also selected from different journals. The secondary data about Nipah also collected from the WHO website and the Government of Kerala website. The Facebook and Twitter data also used to assess the involvement of social media in the control of epidemics. The data collected from the Facebook and twitter by selecting the keywords "Nipah" and "NiV". We collected the newspaper headlines because most of the tweets are having the links to the newspaper reports. The headlines will be visible in the tweets while going through the tweets. This will influence the people to read that particular article in the news. Newspaper headlines form the summary of the news reports (Dor, 2003). The newspaper headlines normally contain the editorial details in crisp form and direct the reader's attention towards the article and make them to read (Bonyadi, et al., 2013).

*Data Collection*

We identified the online edition of the newspapers which are having more number of circulations and covered the news on Nipah in large scale. Two regional newspapers (Mathrubhumi and Malayala Manorama) having English edition and three national newspapers (The Hindu, Times Now and Indian Express) are considered for our study. In addition to that we are also collected Twitter data during this period. The text collected from the news headlines are subjected to the sentiment analysis and they are used for comparative analysis.

*Data Analysis*

The collected twitter data had 8717 tweets and 1824816 retweets. These twitter data are subjected for the sentiment analysis. The steps involved in sentiment analysis are:

- Extracting the tweets from the Twitter

  "TwitteR" package is used for the extraction of tweets from Twitter. The keywords used are "Nipah" and "NiV"

- Cleaning of tweets for further analysis

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There are 16 variables in the file downloaded upon extracting the Twitter data. Twitter data contains lot of special characters like #, @, URLS that are not contributing towards the sentiments. So they are removed from the tweets before processing. Only the texts under the "text" variables are chosen for the sentiment analysis.

- Getting sentiment score for each tweet

  The tweets are then subjected for the sentiment analysis using R program. "Syuzhet" package is used for sentiment analysis. "tm" and "SnowballC" packages are used for the text mining and analysis. We will get emotion score for each tweet by running the get_sentiment function. Syuzhet package will breakdown the emotion in to 10 different categories viz. anger, anticipation, disgust, fear, joy, sadness, surprise, trust, negative and positive.

- Segregating positive and negative tweets

  After getting the sentiment score the tweets are now segregated based on their values to positive, negative and neutral sentences.

  If sentiment score >0, the tweet is positive

  If sentiment score <0, the tweet is negative

  If sentiment score =0, the tweet is neutral

In the case of newspaper data collection, we had retrieved all the headlines of the news articles which are reported on the Nipah infection during May, 2018. All these news headlines are then put for sentiment analysis in the same manner that is done with Twitter data. The wordcloud diagram for the newspaper headlines and Twitter are given in the figure 4.18a-4.18f. In all the cases "Nipah" is the word with largest count. The words like virus, panic, death, spread, scare, outbreak are prominent here which are contributing to the negative sentiment. Open vocabulary differential language analysis can be done to predict the personality of a user from the Facebook status updates (Schwartz et al., 2013) and this same method is used in Twitter platform to predict the personality (Liu et al., 2013).

Figure 4.18a. Twitter



Figure 4.18b.Times Now



Figure 4.18c. The Hindu



Figure 4.18d. Indian Express

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Figure 4.18e. Mathrubhumi      Figure 4.18f. Malayala Manorama

Figure 4.18: Word cloud for different media texts

The word cloud based on the sentiments in Twitter data shows that, there is more number of keywords which represents the emotion "fear" and "trust" but their frequency count is very less. All other emotions are having less number of words but their frequency is more. Emotion "joy" is having more frequency keywords but the words representing the emotion "joy" is less. Emotions play a crucial rule in seeking attention of authorities in the long overlooked grievances (Freelon D et al. 2018; Jensen MJ et al. 2013) and provide support for the people in need (Lin Y-R et al. 2014). Emotional expression can facilitate to understand the combined action of the large population and it will be helpful in organizing the societies (Margolin, D et al. 2018). The word cloud based on the emotions on the sentiment is depicted in the Figure 11. The emotion "fear" is communicated in multiple semantics. That will depend on the media and the vocabulary of the user concerned.

Figure 4.19: Word cloud based on the sentiments in Twitter data

Comparing all the Medias and taking the sentiment, the percentage of negative sentences is very less in Twitter as shown in the figure 4.19. This is mainly because the social media platforms are attributing to the accuracy and self-expression of positive trait of an individual (Orehek et al., 2017). People tend to improve the self-expression values to impress the peers in the social media platform (Human et al., 2013). Self-presentation in social media makes a user to control self and maintain more positive impressions (Human et al., 2012). It clearly indicates that the individuals will share more positives in Twitter. People tend to express more positive emotion than negative emotion in Facebook than in their real life to present their better well-being (Qiu et al. 2012).



Figure 4.20: Positive-Negative sentiments in different Media

The sentiment levels in different online news media and Twitter is given in figure 4.20. Among that, the regional dailies show the least "joy" emotion and at the same the emotion "fear" is getting prominence. The health communication should follow some principles to alleviate fear, they should contain motivational appeals, they should be simple clear, positive and should both emotional and rational (Freimuth, 1985). A person's health behavior can be influenced by the friends, relatives, health professionals and other close aides (Bandura, 1986). The plot in Figure 4.21 shows that the Twitter is having better emotion score in communicating the health information compared to other traditional media. In a multicultural society, the behavioral change is a risky aspect as they are sticking with the core cultural values (Littman, 1985). This could lead to the fake information spreading to resist the behavioral changes in the community. The health information is profoundly available in the Internet which made the health information available to patient and decisions are slowly transferring from healthcare professional to patient (Freimuth et al., 2000).
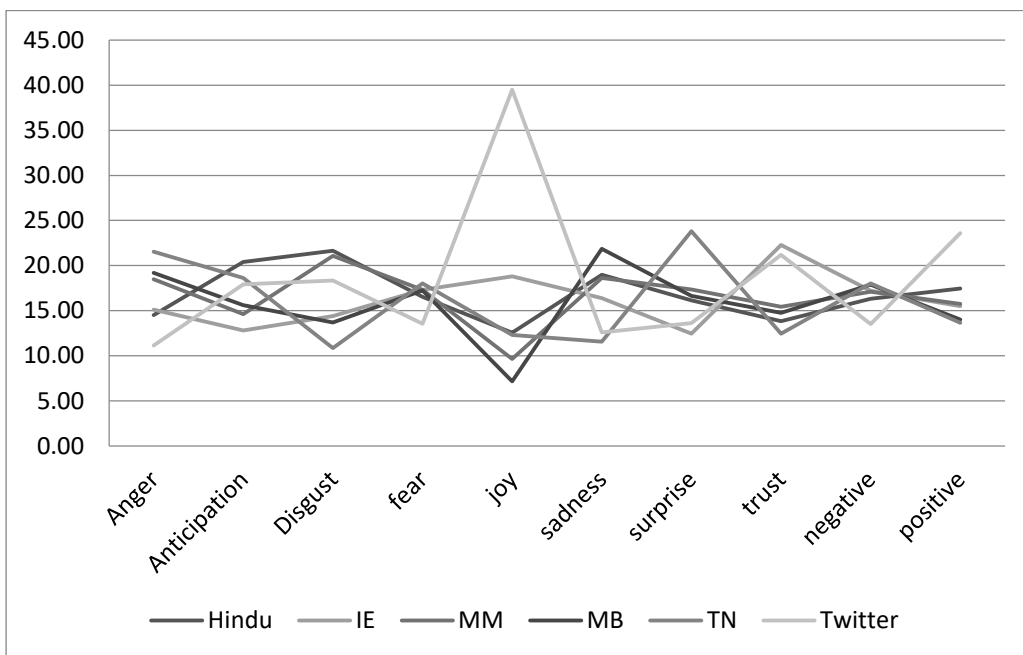


Figure4.21: Sentiment comparison in different online media and Twitter *(Hindu – The Hindu, IE – Indian Express, MM – Malayala Manorama, MB – Mathrubhumi, TN – Times Now)*

### Net Sentiment Rate(NSR)

Net sentiment rate(NSR) is represented as:

$$NSR = \frac{No.\,of\,Positive\,Tweets/Sentences - No.\,of\,Negative\,Tweets/Sentences}{Total\,Number\,of\,Tweets/Sentences}$$

Total number of tweets/sentences includes the positive, negative and neutral tweets/sentences. The negative sentiment rate indicates that the tweets containing more negative sentiment than positive sentiments. Depending on the number of positive and negative sentences/tweets, the polarity of the sentiment will vary. Considering the online versions of newspaper and the Twitter, all are having negative polarity as shown in the figure 4.22. It is mainly because the tweets/sentences are related with the deadly disease. We can see that the newspapers are having more negative polarity compared with the Twitter data. Out of the Newspapers, The Hindu newspaper is having least negative polarity and Indian Express is having more negative polarity.



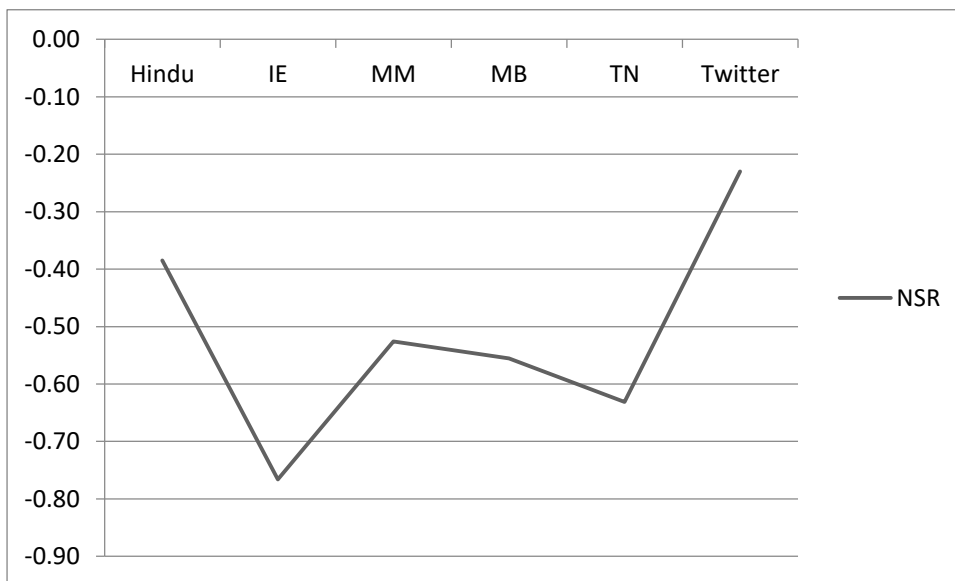Figure 4.22: Net sentiment rate in different Media *(Hindu – The Hindu, IE – Indian Express, MM – Malayala Manorama, MB – Mathrubhumi, TN – Times Now, NSR – Net Sentiment Rate)*

After going through many articles in the newspapers reports, social media posts and comments and literature on epidemics and theories we could find many direct and indirect impacts of the epidemic in a society. This shows the need of new policies and

strict implementation of code of conduct in treating the patients and the movement of patients and visitors in the hospitals and other clinics.

## 4.6 Conclusion

The case studies were done as part of the qualitative analysis during different distress period and the government healthcare programs. We selected those time frames because the social media is flooding with huge information in such instances and there will be lot of rumors and discussions happening based on the posts shared in the social media. Basically, the rumors are originating when there is an uncertainty in the information and the situation. That was visible during the emergence of COVID-19 and the Nipah infection. Traditional media also shared misinformation during that period. The content analysis of the social media and the traditional media revealed that the health information shared during the distress period contained negative sentiments. The health information itself is becoming a negative sentiment during distress. We recommend for the implementation of following policies to curb the epidemics and control the spread of epidemics.

i. The HCPs should strictly adhere to the norms of WHO in contacting the patients during the clinical procedures

ii. Government should put a control on social media considering it as an emergency situation during the outbreak of an epidemic although it is against the freedom of speech

iii. Strict action should be taken against the people spreading the fake news during epidemic outbreak

iv. Regular alert by the HCPs and government authorities required for tackling fake news and disinformation

v. Regular briefing of the situation by government is needed to prevent the eruption of rumors.

vi. The traditional Medias should follow some principles in reporting the health information.

# CHAPTER 5

# QUANTITATIVE STUDY

## 5.1 Introduction

The availability of an enormous amount of data in social media can be utilized to improve the delivery of service and its quality gaps. Though the Internet is the source of unlimited information, the information delivered is not reliable to some extent. The people, otherwise not a content generator, are active in social media and generate a huge amount of data in the social media platform. Such kind of data may be of his thoughts and findings from his limited knowledge. But this information is communicated with a large audience on the Internet. Such communications may be used as an expert opinion by the peer group member of that individual. That will be shared in large and depending on the context and sensitivity of the topic, that will become a viral topic or sometimes that will die down. There are some instances where such a topic will keep on becoming viral in similar instances of happening in the real world. Normally, the sensitive contents are largely shared on social media during the distress period to get the maximum reachability.

The objective of the study is to assess the stress, anxiety, and depression among IT professionals due to misinformation and the impact of social media during the lockdown. COVID -19 distresses also resulted in information overload on the Internet. Internet addiction became a common phenomenon during the COVID-19 situation due to lockdown all over the world. Lack of access to public spaces and the physical work increased the stress levels. In the initial phase of the lockdown, the public enjoyed being at home but the real problem started to grow up in the form of stress and anxiety in the due course of time due to the lack of other entertainment. The only available option was to stay at home and use SNS and Television. COVID-19 is a potentially fatal disease without a known remedy, and the resulting social isolation and distancing increase anxiety (Xiang et al., 2020). Social isolation and negative sentiments drives one to emotional distress and negatively affects (Hawkley & Cacioppo, 2010; Leigh-Hunt et al., 2017) and lead an individual to anxiety and depression. We investigate that the anxiety specific to COVID-19 will result in misinformation sharing in social media due to the perceptual authenticity of the received information and the concern towards the

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in-laws. Social media behaviour is also a factor which results in sharing the misinformation due to the individual's perceptual difference.

## 5.2 Research Model

The hypothesized research model is given in figure 5.1. COVID Anxiety is an existing environmental stressor and is acting as an intermediary in the affective/cognitive response category. The dependent variable is the misinformation sharing in social media (MSSM). Social media are generally used by the younger population and the MSSM depends on gender (Chen et al., 2015). The covariates Threat of death and Social Media Behaviour (SMB) are also included. The stress, anxiety and depression are also leading to the misinformation sharing in social media especially when there is a panic in the society. The panic emerged as the disease didn't have medicine and the people tied up in the house due to quarantine and also lockdown by the government. The misinformation and the problematic use of social media are closely related. The lockdown and the lack of other leisure or entertainment activities were reduced and the people resorted to social media to back up that shortcoming. The panic and the stress during the pandemic resulted in the problematic use of social media (Heena et al., 2020).
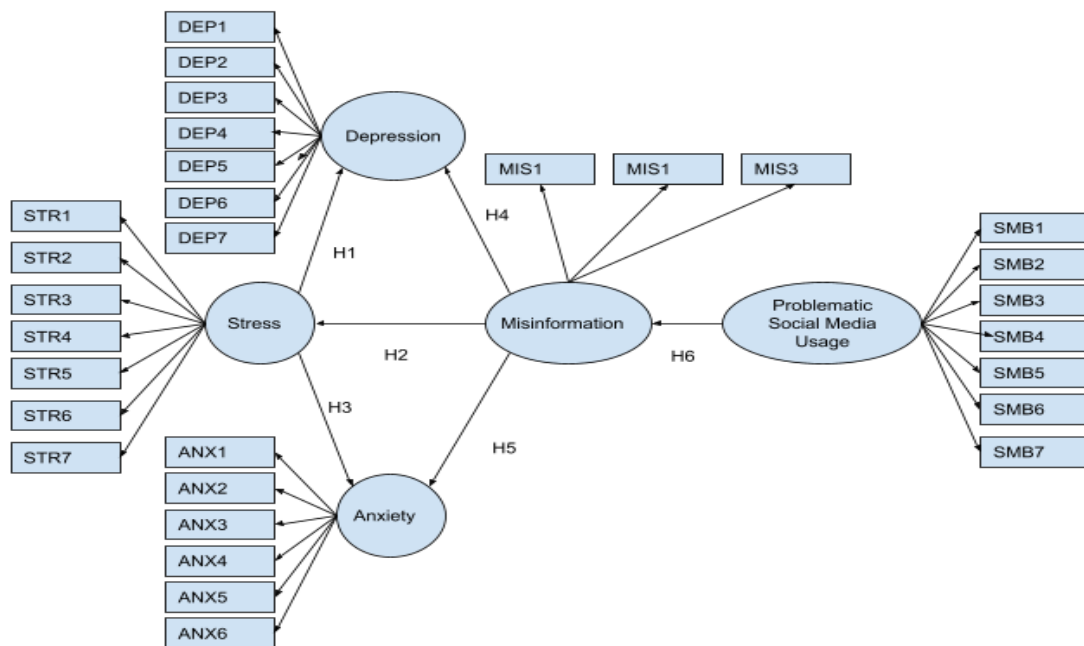


*Figure 5. 1: Research Model for the Impact of Misinformation among IT Professionals*

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## 5.3 Hypothesis

H1: Depression is the outcome of stress. The stress is in general associated with mental and physical illness. The mental illness is generally depression and anxiety. The physical illness will vary depending on the duration of stress (Jones-Bitton et al., 2020; Mao et al., 2020).

H2: For emotional relief people in distress used social media as an entertainment medium. The overuse of social media will make people share the information available in the media without verifying it (Elhai et al., 2020). The social media was flooded with a lot of information which was not verified and may be shared as part of the agenda. The sarcasm in the social media may sometimes be misunderstood and shared as factual information (Wang et al., 2019).

H3: stress is related to anxiety. The outbreak of the pandemic with the excessive hype on the death, after effects and the non-availability cure influences the psychological variables including the pre-existing anxiety and stress (Gordon et al., 2020).

H4: Depression is also related to misinformation. The pandemic without a freedom of movement and the concern about the family of the people will prompt them to send all the information concerning the pandemic. The pandemic like corona disease had created Infodemics in social media (Hossain et al., 2020; Lee et al., 2020).

H5: anxiety is directly related with misinformation. The information shared in the SM is huge and it is difficult to identify the genuinity of the information shared. In Addition to that the lockdown and quarantine had made the people stay back wherever they were and denied the visits of their in-laws. This increased concern made them share the misinformation unknowingly especially when it is related with the health tips and other precautionary messages (Sallam et al., 2020; Cheng et al., 2020).

H6: The problematic use of social media will result in the sharing of misinformation (Heena et al., 2020). The behaviour of an individual may be affected due to the exposure of misinformation and also the continuous interaction between the peer members of the social media groups (Nadai et al., 2020).

## 5.4 Methodology

A survey was conducted on COVID-19 anxiety and other psychopathology variables among IT professionals from India during the initial phase of the pandemic when lockdown was declared by the government. Our primary aim was to study the impact of COVID-19 anxiety, general anxiety, and general depression symptoms on the severity of misinformation in social media when social media is used as an emotional coping mechanism during the lockdown. The data is collected using a web based survey using Google Forms. It was circulated among the IT professionals working in India. There was an informed consent statement along with the questionnaire and a question added to get the consent from the participant. The demographic details of the survey are given table 5.1.

*Table 5. 1: Demographic information about respondents*

| Respondent's Profile | Response |
|---|---|
| **Gender** | |
| Male | 138(63.3%) |
| Female | 79(36.2%) |
| Do not wish to specify | 1(0.5%) |
| **Age** | |
| 18-25 | 23(10.6%) |
| 26-30 | 42(19.3%) |
| 31-35 | 34(15.6%) |
| 36-40 | 64(29.4%) |
| 41-45 | 37(17%) |
| 46-50 | 9(4.1%) |
| 51-55 | 4(1.8%) |

| | |
|---|---|
| 56+ | 5(2.3%) |
| **Marital Status** | |
| Married | 167(76.6%) |
| Unmarried | 46(21.1%) |
| Seperated | 2(0.9%) |
| Widow | 2(0.9%) |
| Engaged | 1(0.5%) |
| **Physical Disability** | |
| Yes | 216(99.1%) |
| No | 2(0.9%) |
| **No of years in this profession** | |
| Less than 1 year | 22(10.1%) |
| 1-3 | 24(11%) |
| 4-7 | 18(8.3%) |
| 8-10 | 23(10.6%) |
| 11-15 | 67(30.7%) |
| 16-20 | 49(22.5%) |
| 21-30 | 10(4.6%) |
| More than 30 | 5(2.3%) |

## 5.5 Instruments

We queried the demographic characteristics age, sex, marital status and the disability status. The other online measures are described in the next subsections

*Depression, Anxiety and Stress (DAS) scale*

There were 24 questions with respect to the DAS scale where the symptoms were assessed during the first few weeks of the lockdown due to COVID-19 declared in India. The instrument used a likert scale from 1="Strongly Disagree" to 5="Strongly Agree" (Croasmun et al, 2011). We analyzed Depression, Anxiety, and Stress symptoms with 5, 6 and 13 questions respectively. We analyzed the DAS and they are closely associated with the misinformation sharing in the SM. Depression and anxiety is also closely related to stress. The stress is the mediation factor between anxiety and misinformation and also between depression and misinformation.

*Social Media Behaviour (SMB) scale - Problematic Social Media Usage*

The SMB in a person depends on the personal traits which mainly follows the honeycomb model of SM behaviour. The honeycomb model has seven traits of an individual using social media. They are presence, sharing, relationships, identity, conversations, reputation and groups (Kietzmann et al, 2011). Social media behaviour scale is a six item self -report measure of social media use developed in English. It uses a likert type scale from 5="Strongly Agree" to 1="Strongly disagree". The items include "I am regularly using social media" and "I feel restless when I am out of social media". The consistency is ensured by using the first-person voice in the item (Duke et al., 2017).

*Misinformation Sharing*

Misinformation sharing in social media has many reasons behind it. Some people do it purposefully and some may do it unknowingly. The sarcasm contents which are of different intentions may be treated as facts and shared in the social media (Datta et al., 2020). There are three items in the misinformation sharing: we used the likert scale from 5="Strongly Agree" to 1="Strongly disagree".

**5.6 Results**

*PLS Path Modeling*

PLS path modeling is used for the data analysis in this study. The sample size of the research is small and the PLS path modeling is effective in this case. PLS is a variance

based structural equation modeling technique (Hair et al., 2012; Henseler et al., 2009). This technique is effective in exploratory research which aims at testing and validating the models. It follows a two-step analytical approach; 1) assessment of the measurement model and 2) structural model assessment. SmartPLS 3.0 is used for the analysis of data (Ringle et al., 2015).

### *Reliability and Validity*

The construct validity is worked out by the two step structural equation modeling approach (Andersor et al., 1988). To achieve that, the internal reliability and the convergent validity for the constructs are assessed first. That is followed by the assessment of the construct's discriminant validity. The determinant validity of constructs is given in table 5.2

*Table 5. 2: The correlation matrix for the instruments identified*

|  | Anxiety | Depression | Misinformation | Problematic Social Media Use | Stress |
|---|---|---|---|---|---|
| **Anxiety** | 0.852 |  |  |  |  |
| **Depression** | 0.706 | 0.679 |  |  |  |
| **Misinformation** | 0.563 | 0.431 | 0.823 |  |  |
| **Problematic Social Media Use** | 0.171 | 0.156 | 0.291 | 0.706 |  |
| **Stress** | 0.823 | 0.844 | 0.477 | 0.162 | 0.770 |

The value of composite reliability should be 0.7 and above for the recommended acceptable level and the average variance extracted should be 0.5 or above (Chin, 1998; Fornell et al., 1981, Gefen et al., 2000).Further to ensure the discriminant validity of constructs, the average variance among each construct and its measures should exceed

the variance shared between the constructs and other constructs (Fornell et al., 1981). By observing table 5.3 we can ascertain that the internal reliability and the convergent validity of the measurement model in this study is at satisfactory level.

The correlation of each construct should be less than the square root of the average variance extracted to ensure the discriminant validity (Fornell et al., 1981; Hair et al., 2010).This criterion has been achieved in the model.

*Table 5. 3: Construct Reliability and Validity*

|  | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|
| **Anxiety** | 0.905 | 0.906 | 0.930 | 0.726 |
| **Depression** | 0.798 | 0.826 | 0.853 | 0.460 |
| **Misinformation** | 0.760 | 0.783 | 0.862 | 0.677 |
| **Problematic Social Media Use** | 0.853 | 0.918 | 0.870 | 0.498 |
| **Stress** | 0.884 | 0.890 | 0.910 | 0.593 |

***Model Predictive Power***

To determine the predictive power of the model R Square was analyzed from the data using the PLS algorithm in SmartPLS 3.0. As per Falk and Miller (1998) the acceptable threshold of R Square is 0.1. The R square values for the Anxiety, Depression and misinformation are well above the threshold value. The R square adjusted and the R square values are given in table 5.4.

Table 5. 4: R Square values

|  | R Square | R Square Adjusted |
|---|---|---|
| **Anxiety** | 0.678 | 0.676 |
| **Depression** | 0.712 | 0.711 |
| **Misinformation** | 0.319 | 0.309 |
| **Problematic Social Media Use** | 0.085 | 0.080 |

The degree of the impact of each exogenous latent construct on each endogenous latent construct is measured using the f square value. The effect size is computed using the formula f square = (R square included -R square excluded)/(1-R square included). The f square value of 0.02 is considered to be small, 0.15 is medium and the value 0.35 is considered as a large effect(Cohen, 1988). Table 5.5 shows that the Anxiety and depression have a large effect on stress based on the SEM calculations. Anxiety has a medium effect with misinformation (f square = 0.13). Depression has a small effect from misinformation (f square = 0.03). The problematic social media use also has small effect with the misinformation (F square = 0.092)

Table 5. 5: f square values

|  | **Anxiety** | **Depression** | **Misinformation** | **Problematic Social Media Use** | **Stress** |
|---|---|---|---|---|---|
| **Anxiety** |  |  |  |  |  |
| **Depression** |  |  |  |  |  |
| **Misinformation** | 0.127 | 0.003 |  |  | 0.296 |
| **Problematic Social Media Use** |  |  | 0.093 |  |  |
| **Stress** | 1.413 | 1.841 |  |  |  |

## The Standardized Root Mean Square Residual (SRMR)

The SRMR is the index of the average of the standard residuals between the observed and the hypothesized covariance metrics. The estimated model fit is measured by the SRMR. For a study model to have a good fit the estimated SRMR value should be less than or equal to 0.08. Lesser SRMR value will be a good fit. The SRMR value of the study model is calculated as 0.076 and the study model has a good fit. The details are given in table 5.6. The Chi-Square value is 1124.711 and the Normed Fit Index value (NFI=0.720) is also measured.

*Table 5. 6: Model Fit*

|  | Saturated Model | Estimated Model |
|---|---|---|
| **SRMR** | 0.077 | 0.076 |
| **d_ULS** | 2.581 | 2.540 |
| **d_G** | 0.980 | 0.979 |
| **Chi-Square** | 1125.521 | 1124.711 |
| **NFI** | 0.720 | 0.720 |

## Path Coefficient Estimation and T statistics

The path coefficient in PLS and the standardized $\beta$ coefficient used in the regression analysis is similar in nature. The significance of the hypothesis is tested using the $\beta$ coefficient value. It is the expected variation in the dependent construct with respect to the unit variation in the independent construct. The $\beta$ value is calculated for every path in the hypothesized model. The effect on the endogenous latent construct was assessed based on the $\beta$ value. The greater the $\beta$ value, the effect will be substantial on the latent construct. The significant level is tested through the T statistics. The significance of the hypothesis is evaluated through the bootstrapping procedure and the path coefficient and T statistics are given in table 5.7.

*Table 5. 7: Path Coefficient and T Statistics*

|  | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (|O/STDEV|) | P Values |
|---|---|---|---|---|---|
| Misinformation -> Anxiety | 0.216 | 0.217 | 0.045 | 4.795 | 0.000 |
| Misinformation -> Depression | 0.034 | 0.031 | 0.043 | 0.794 | 0.427 |
| Misinformation -> Stress | 0.478 | 0.484 | 0.051 | 9.403 | 0.000 |
| Problematic Social Media Use -> Misinformation | 0.292 | 0.312 | 0.061 | 4.760 | 0.000 |
| Stress -> Anxiety | 0.721 | 0.720 | 0.037 | 19.504 | 0.000 |
| Stress -> Depression | 0.828 | 0.832 | 0.026 | 31.413 | 0.000 |

In H1, we hypothesized that the Stress will affect psychologically and lead to depression. As in Table 6.7 we can see that the stress is leading to depression ($\beta$=0.828, T=31.413, p<0.0000). Here H1 is supported robustly. Further, The H2 has the values ($\beta$=0.478, T=9.403, p<0.000) which is supporting the hypothesis of depression due to the misinformation. H3 is about the psychological behaviour of anxiety due to the stress resulting from the misinformation. The values are $\beta$=0.721, T=19.504 and p<0.000, which supports the hypothesis. In H4 ($\beta$=0.034, T=0.794, p<0.427), the model does not support the hypothesis of depression due to the misinformation. The p value is significantly higher here and doesn't support the hypothesis. H5 is the anxiety resulting from the misinformation in social media. The assessed values are $\beta$=0.216, T=4.795 and p<0.000. It also supports the model robustly. In H6, the hypothesis states that the problematic use of social media results in misinformation. The estimated values are $\beta$=0.292, T=4.760 and p<0.000 which supports the hypothesis robustly.

The greater value of the beta (β) coefficient indicates that the greater is the effect of exogenous latent construct on the endogenous latent construct. Depression due to stress is having the higher beta coefficient (β=0.828). It shows that the stress has greater value of variance affecting the mental health of people during the pandemics. The graphical representation of structural equation model is given in figure 5.2

***Confidence Intervals***
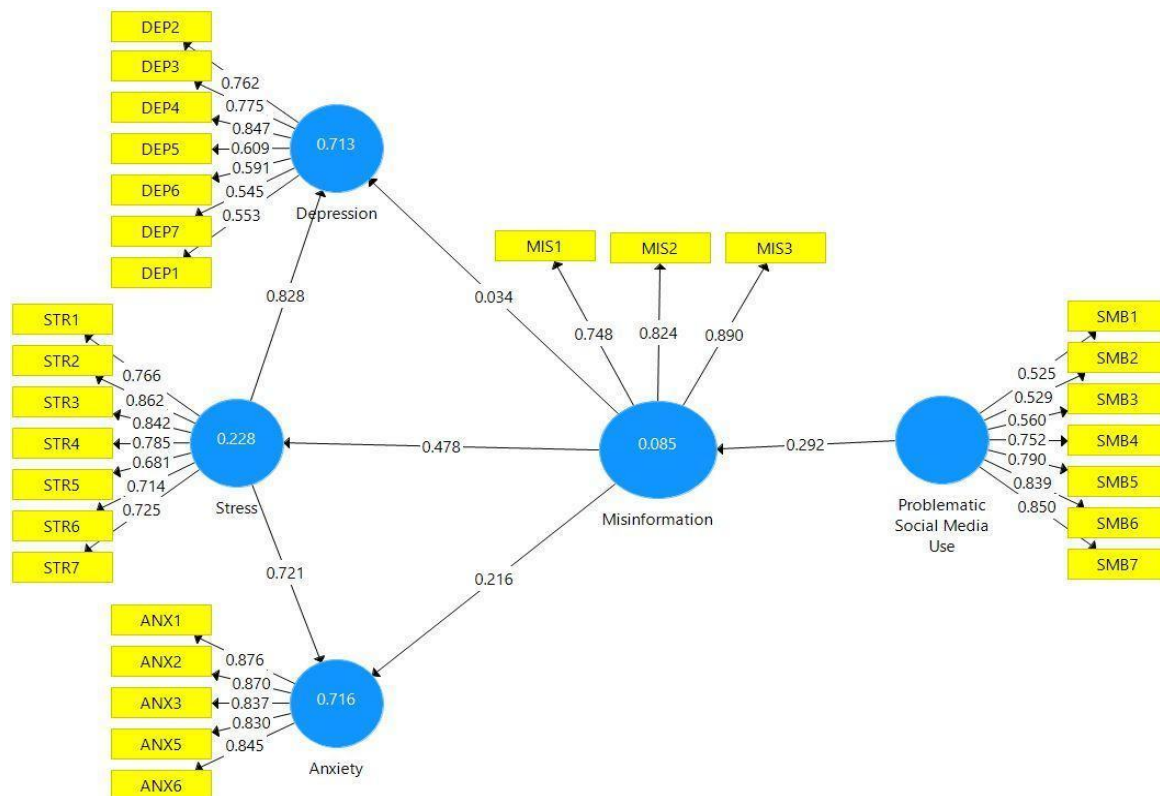


*Figure 5. 2: Graphical representation of structural equation model*

The path coefficient histogram is given figure 5.3. Path coefficient is a standardized partial regression coefficient. It can measure direct influence of one variable with another. It separates the correlation coefficients in to components of direct effects and indirect effects (Dewey & Lu, 1959).
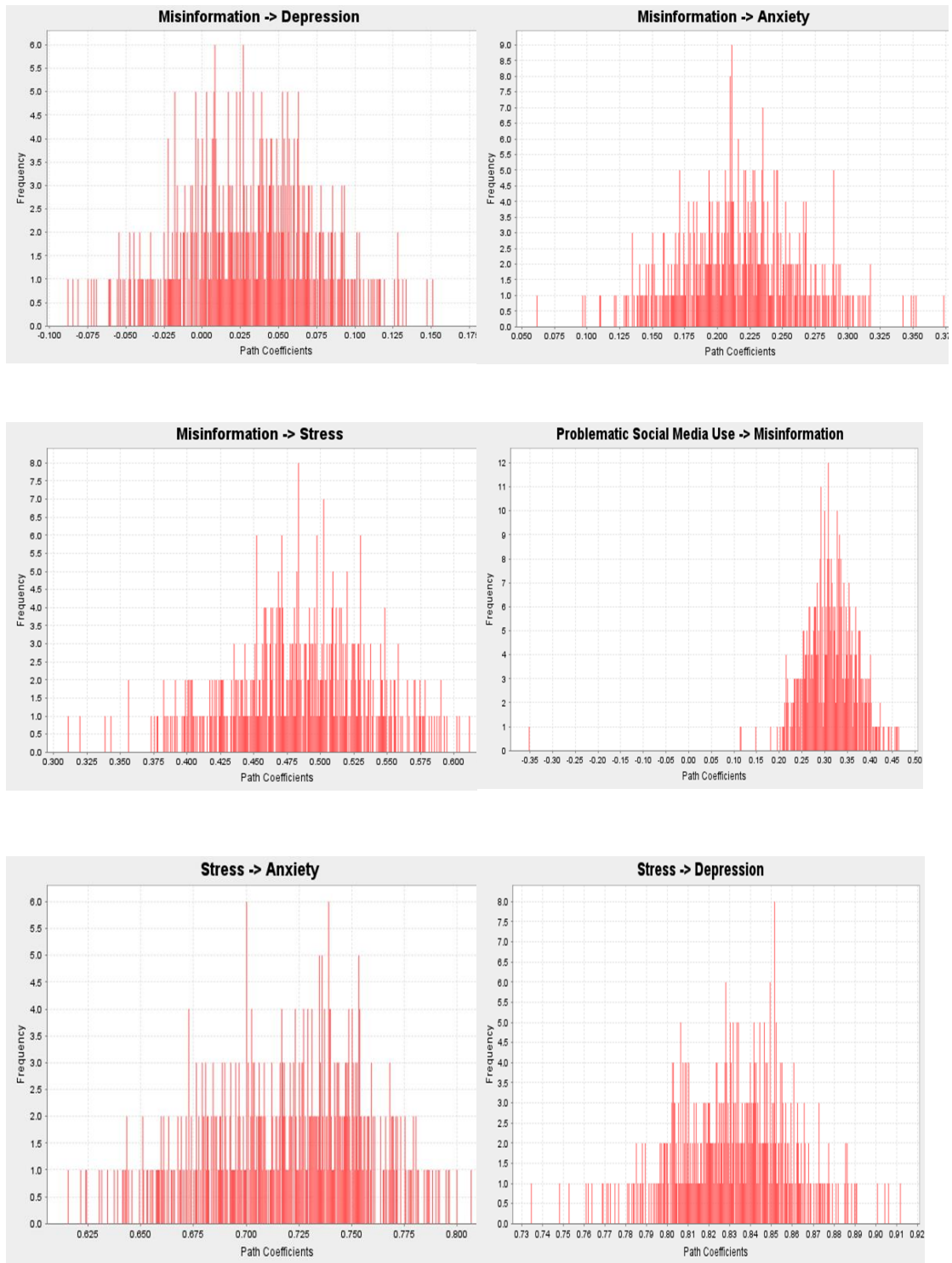
*Figure 5. 3: Path coefficient histogram*

**5.7 Discussion**

The objective of the study was to empirically analyze the factors affecting the mental health of people due to the misinformation shared in the social media and the problematic use of the social media during the distress situations. PLS-SEM techniques were used for the study of psychological impact of people due to the misinformation in social media. PLS-SEM technique is one of the effective methods for developing complex models and for studying small sample sizes. SEM used the PLS technique to test the conceptual paths. The mean value, standard deviation, skewness, and kurtosis values were measured as part of the descriptive statistics. The study revealed that there was no violation of the normality assumptions of the collected data. This can be visible from the results of the kurtosis and skewness values of the measurement model which stood between $+1$ and $-1$. Moreover, the results of the study revealed that the problematic social media usage, misinformation had a significant effect on stress, anxiety, and depression. The path coefficient $\beta=0.828$ for the stress factor and there should be a strong action required to tackle the misinformation in the social media during the pandemic. Considering anxiety and depression as psychological behaviour the path coefficient $\beta=0.828$ and $\beta=0.721$ respectively for the stress factor. Utmost care has to be taken to avoid stress to people during a pandemic which can be controlled. Here misinformation is one of the causes that is resulting in stress

Depression and anxiety has a direct effect of misinformation and also a mediating effect from stress and misinformation. The problematic social media usage plays an important role in the impact of psychological behaviour during pandemic. The hypothesis H4 was not supported here which indicates that the depression has less impact by the misinformation. All other hypotheses found to be valid and conforming to the hypothesized model.

The problematic social media usage was mainly due to the absence of other leisure activities during the lockdown. People were restricted from movement and they were not allowed to go outside and the situation was like an emergency situation in the country. People relied on social media to gather information. But the use of social media for leisure activities had made the situation worse. People used to search for health

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information during the pandemic from social media and they were unaware of the genuineness of the same. Some celebrities shared the misinformation in social media and some of the distorted facts are also shared during the pandemic. Common people conceived it as genuine information and shared it among their friends and relatives. Such spread of misinformation made the situation worse. In addition to fighting the pandemic, the government and other NGOs also put their effort in fighting the misinformation in the social media. During this period, most of the mainstream online media started a new section in their content, the 'fact check'. They had given the actual information and they explained the facts and figures behind any fake news or misinformation.

The misinformation in social media can be of many forms. Sometimes a person without knowledge or a little knowledge in a particular domain may produce content and share it on social media. Such contents may be without any factual information or without any reference and may be created solely by the knowledge acquired by the content creator. If such an individual is an influencer in social media, then the content will be shared and engaged more as factual information. There is also another chance of sarcasm being circulated as factual information. There are some people who are using the situation to propagate their agenda through social media. Distress is the right situation to get the attention for the agenda, especially when people were scared during the pandemic like COVID-19.

Stress is considered to be the cause of psychological imbalance. Especially, during the distress the stress will be more. The pandemic situation will create more stress and that will lead to depression and anxiety. The burnout situation due to the stress will cause physical illness. Normally the stress is a common psychological behaviour in human beings and that will be overcome by indulging in leisure activities or finding some coping mechanisms. It improves the wellbeing of the society through new innovations.

According to the General Strain Theory, the causes of the strain are mainly due to the lack of positive stimuli due to the distress. The COVID-19 pandemic had prevented access to the coping mechanisms like family interactions, leisure activities like clubs, movies, shopping, etc. This has increased the stress and led to strain in the IT professionals. The symptoms of the strain were visible in their response. The lack of

face to face interaction between the individuals had created a new form of stigma in the society. There will be a long term impact for this, especially in the children.

Socioemotional Selectivity Theory states the decrease in the level of motivation in the span of time. A pandemic situation in India has created such a situation where people are starting to lose their hope due to the lack of cure for the disease and the uncertainty in returning to normal life. Even after one year of the emergence of the disease, the cure was not made available for the public. Though the vaccine is now available, the supply is limited to a section of people in the society.

People used to access information from all sorts of the media during the pandemic. The media richness theory is dealing with the framework for the effective use of the communication medium for the information exchange. The information beneficiaries include all the people who are using the media. The misinformation has become a menace during this period. All the Web 3.0 technologies are used for spreading fake news and misinformation either knowingly or unknowingly. The use of social media is one among them. There are many instances where social media has been used for illegal activities and also it has the capability of overturning an elected government of a country. Though the positive aspect of social media is prominent, the minor use of the social media for the agenda setting will have a huge impact on the psychological behaviour of an individual. Sometimes it can be visible only after a long period of time.

**5.8 Conclusion**

This chapter discussed the quantitative analysis of the social media influence on the IT professionals. The fear of losing job and the uncertainty in the lock down and the COVID-19 were made them physically and mentally ill in some cases. The study was conducted during the initial phase of the infection and the severity of the disease was not emerged that time in terms of socio-economic conditions. The denial of the general facilities for the public and the movement restrictions made the situation worse. The people left with only one option to communicate with the outer world was social media. The information gathering and information dissemination got increased many fold during that period. There were people using their own contents by sharing their version of the disease and sharing it among his peer groups and then

subsequently reaching many others very quickly. The clickbaits in the social media platform and Internet made the situation worse and the content creators were made use the situation as an attention seeking behavior or sharing the rumors as part of their agenda. The spare time available during the lock-down resulted in the problematic social media usage and that was the main reason for sharing and creating the misinformation. The prolonged use of social media and the negative news had resulted in mental stress and anxiety. The after effects of the stress and anxiety can be seen at a later period of time in the form of physical illness.

# CHAPTER 6

# SYNTHESIS, IMPLICATIONS, AND RECOMMENDATIONS

## 6.1 Introduction

Previous chapters discussed the healthcare service and the impact of misinformation through social media among the healthcare workers. The study was also focused on the IT professionals and the impact of the misinformation during the pandemic. The quantitative and qualitative studies on the impact of misinformation in social media had a secondary impact in terms of psychological factors of a human being. This chapter discusses the implications of the study and discusses the methodology for triangulation which intends to compare and connect the findings from the quantitative and qualitative analysis resulting in proposing the need for the social media regulations and awareness during the distress. Section 6.2 presents the implications of this study. Section 6.3 discusses the practical and policy implications. Section 6.4 deals with the use of soft system methods in triangulation. Finally, this chapter ends with a conclusion in section 6.5.

## 6.2 Implications of the study

The previous sections discussed the impact of the misinformation through the social media during distress among the social media users and also the healthcare sector in India. There are many practical implications in the study conducted to the healthcare sector, especially in the government healthcare programs. There is always a need for collaborative effort from government, NGOs and the public in curbing the misinformation in social media.

### *Theoretical Implications*

Social media usage and engagement has many critical factors involved. It depends on the availability, accessibility and the awareness of a user in ICT. The psychological factors also play a crucial role in social media engagement. A person with addiction in social media usage will be more prone to misinformation sharing and creation. The emergence of Web 3.0 technologies enabled the common man to use the social media applications for his daily needs. Social media is also used by the government for the information dissemination other than traditional print and visual media. Practice theory says, lack of scientific and technological information accessibility is attributed to the

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lack of contact between scientists and public interaction. The technical progress should be in tandem with the public needs (Petryszak, 1977). Any kind of manipulated information with negative sentiments gets communicated faster through social media. This can influence the sentiments of people and even cause revolt and change in power (Mackenbach, 2012).

The use of mobile technology has become prominent and now it is the time to elaborate and educate the people on what is to be used and what is not to be used in telecommunications. There is always confusion among the enforcement agencies and the government is deciding the barriers of what is acceptable and what not acceptable content in social media is. The unified theory of acceptance and use of technology (UTAT) model contributes to the exploration of technology acceptance and usage. Self-efficacy, habits, satisfaction, trust and perceived risk are some of the several variables that complement the UTAT model. There are some behavioural intentions for using ICT system (Alalwan et al., 2017; Chao, 2019; Kabra et al., 2017).

According to Agnew and White (1992), the causes of strain in the individual are due to the failure to achieve positively valued goals; loss of positive-valued stimuli; and presentation of negative stimuli. They also claimed that these causes are dependent on the situation in which the individual suffers. This is derived from strain theory, which states that society is placing pressure on people to attain socially acceptable expectations even if they lack the ability to do so leading to strain among individuals (Merton, 1938). Jang (2007) indicated that women experience strains related to physical health, interpersonal relationships, and job strain (El Khamali et al., 2018) which are likely to trigger depression and anxiety and are less likely to lead to deviant coping behaviors. Likewise, when the theory of general strain is applied to adolescents, apart from family conflict, violent and property delinquency, examination-related strain predicts violence and status offending (Moon & Morash, 2017; Wang et al., 2020).

This theory may be crucial in the outbreak of a pandemic, i.e. due to the presence of the Covid-19, staff, and individuals employed in organizations and shops are vulnerable to sudden amplification of stressors. This was also indicated in Campedelli et al. (2020) research paper and can be applied to the current Indian scenario.

Socioemotional Selectivity Theory refers to the changes in the motivation level of the person with respect to lifespan (Carstensen et al., 1999). It means that as the person ages he/she becomes increasingly selective with regards to the investment of their time, effort and other resources such as change also bring about a shift in the motivation and cognitive processing of an individual" (Carstensen et al., 1999). This theory suggests that knowledge-seeking/acquisition and emotional regulation determine and inspire social interaction in a person's life (Psychologenie & Buzzle, 2020). The main assertion of this theory is that the motivational changes are closely associated with age, social preferences, and social network composition and are perceived to be beneficial for well-being and social adjustment (Löckenhoff & Carstensen, 2004).

In the early stage of childhood, time is unlimited and individuals process future-oriented knowledge acquisition, namely gaining new experiences, meeting new people, forming, and career planning that is future-oriented (Psychologenie & Buzzle, 2020). When a person grows older, time is limited, new experiences, and friendships begin to decline, and relationships with parents, family members, marital partners, and close friends that are fulfilling and supportive will be retained, and the rest of them will be discarded (Psychologenie & Buzzle, 2020).

Older people will communicate more frequently with family and close friends than younger people. The frequency of communication with weak ties (i.e., coworkers and acquaintances) might be lower for them (Chan, 2015). In a study, the authors have identified that utility, multimodal connectedness, and higher perceived risks of weak-tie support network preference can actually be the predictor and could cause stress (Wright et al., 2010; Chan, 2015). Another study revealed that age was the predictor of online dating concluding that as individuals grow older, their tendency to switch modalities and date offline rises (Hallam et al., 2019).

Media Richness Theory is used to describe the effective use of communication medium ability to match the richness of the information sent over it (Ishii et al., 2019). Prior literature have used this theory in the context of online discussion form (Balaji & Chakrabarti, 2010), e-book readings (Arndt, 2012), etc. The authors have concluded that perceived richness, media content, compatibility, and convenience influence

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student participation and interaction, and learning (Balaji & Chakrabarti, 2010; Arndt, 2012). The other work that used the media richness theory was on public relations practitioners' perception over social media platforms (Michel et al., 2016). The authors have concluded that the components for mass and traditional media platforms are not the same because social media demonstrated unique medium characteristics (Michel et al., 2016).

Merton (1938) indicated that innovation arises when there is a need for a particular technology and offers an inadequate opportunity to address such needs through established institutionalized means. These technologies can be both good and bad when it comes to the person. For example, prior literature has shown that the social network has an effect on innovation through learning, problem-solving, and creating new ideas (Kolleck, 2013; Abrahamson & Rosenkopf, 1997). This can be linked by fostering connectedness with others, sharing activities and news, and keeping in touch with old and new friends (Davey, 2016). However, in some situations, social networking can have an impact on the health and personal life of an individual (Davey, 2016; Pai & Alathur, 2020).

Stress coping model framework is used for study in qualitative analysis. There will be an ethical factor among the healthcare workers for executing their responsibilities. The pandemic like COVID-19 had created a never before norm in the society leaving behind many responsibilities and assessment by the government and the research community. The impact of the new norms based on the corona infection will have a long lasting impact on the society as well as psychological behaviour of the public as well as healthcare workers. We had incorporated multiple models in the study to effectively tackle the misinformation in social media.

## 6.3 Practical and Policy Implications

The study revealed many parameters in the fighting of the misinformation in social media and the effective utilization of social media for the government information exchange. The use of social media during the distress period is the main point of concern. In normal conditions, the misinformation may not get communicated effectively. So the people behind the vested interests look for the opportunity like

distress for spreading their agenda through social media. Some of the factors are listed below based on the study.

*Interdisciplinary approach in curbing misinformation*

The misinformation curbing should be planned by incorporating all the stakeholders to effectively implement in all the areas. The usage of media, people from all the disciplines, usage of hoardings, training, etc. will enhance the outcome. Social media and other mass media are helpful in spreading the importance of the message in a timely manner. The mobile phone proliferation in India is very high. This will enable easy communication even in remote areas also. The involvement of schools and NGOs can help to give better awareness among the students and thus create more volunteers coming up automatically. The healthcare officials should be prepared with all the necessary solutions for the fake news and misinformation during the distress.

*Regulatory measures to counter the campaign against healthcare program*

The inactiveness by the government on the misinformation and other fake messages in social media are the main cause of the rising campaign against healthcare programs. The freedom of expression is misused for halting the government run healthcare programs. A strict action on such fringe elements will curb the spreading of the misinformation to some extent. During the healthcare campaign in Kerala, such groups started spreading rumours on the campaign and the government had taken action against them. That prevented further spreading of misinformation to a large extent and the healthcare campaigns like vaccination programs had picked up.

*Involvement of government in research and development*

Normally the people involved in anti-vaccine campaigns are accusing that the Multinational Companies are responsible for population control and having other vested interests in the vaccine production. Involvement of the government in the research and development of vaccines will improve the faith in vaccines among people and the cost of vaccines may also be reduced. The people are more sensitive to the

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healthcare of their children and they will be targeted easily and can generate confusion with the support of misinformation.

### *Preparing the statistics of the healthcare activities*

Normally people are concerned about the Adverse Events Following Immunization (AEFI) in the vaccination programs. The government can take note of the statistics on vaccination and the outcome can be put in the public portals and can be communicated through social media. Normally people are more panicked about the delay in getting appropriate reasons about the AEFI. Prompt delivery of the information about the AEFI will reduce the mental stress among parents after immunization of their children. More turn out in the immunization program will enhance the willingness of the parents to immunize their children.

### *Educating health care professionals*

Sometimes the HCPs also had fear in vaccination or any other medicines which are introduced recently in the market. They were not fully educated about such medicines and will be unable to face the doubts of the common public. They should be fully aware about the AEFI and other details about the medicines and should be able to convince the parents about any concerns in the vaccination or any other medication. Any unconvincing reply from the HCP will enhance the stress level of the parent and also the hesitancy towards the medicines or any other healthcare programs.

### *Involvement of celebrities and other influencers in healthcare campaigns*

Celebrities and other influencers like religious leaders and politicians can help in the successful healthcare program. The people like anti-vaccine campaigners are mainly focusing on selected texts from the religious texts to substantiate their views in the anti-vaccination drive. This is spread through the closed groups in WhatsApp and Facebook. So the orthodox religious people will stay away from the vaccination and they will spread this message among their peer group also. The religious leaders can influence such people and make them stay away from such anti-vaccination campaigns. The

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celebrities can influence a large group of people and their fans group can spread the message in social media to curb the fake messages and misinformation.

*Consent from parents or in-laws before endorsing healthcare programs*

One of the major concerns shared on not vaccinating the child was that HCPs were not taken with the consent from parents. Parents were misled by the anti-vaccination campaign and they were informed that the vaccination is for population control and the vaccine contains the extract from the animal which is against a particular religion. The people behind the spread of misinformation in social media will always target the people who are more concerned about their children and their in-laws. If any adverse thing happens after the medication, they will make use of such incidents and spread it in the social media.

Though the scrutinizing of social media is against freedom of expression and there is less clear cut segregation of hatred or willful violation in the eyes of law, there are limitations in taking action against social media posts. Facebook has taken action against the accounts spreading misinformation which are testified as vaccine hoaxes by WHO. Now most of the mainstream media have fact check programs to burst the myths in the healthcare programs. This initiative began during the spread of misinformation during the pandemic COVID-19 across the globe.

*Implication of Policy and Practice*

The policy can be put into practice with the help of three stakeholders. The Government is the agency which is going to implement the policy, Public/Citizen are the stakeholders for which the policy is implemented and the SNS are the platform which support the government for monitoring the misinformation through SNS applications(Singh et al. 2020). Social media bridges the gap between top-down and bottom-up communication to improve the communication for better e-Governance (Goncalves et al., 2015). Social media analysis can be used as one of the essential data sources for the research. Social media is one of the cheapest sources of information that can be used as policy making resources for effective governance. It will improve

responsiveness and accountability (Ceron & Negri, 2015). The citizen-citizen interactions and citizen-government interactions through social media will enable the co-production of public policies. This will involve people from all sectors including citizens, politicians, bureaucrats and subject experts (Bertot et al., 2012; Kim & Cho, 2005; Ceron & Negri 2016).

## 6.4 Triangulation

The credibility and the validity of the research findings are assessed by the Triangulation. The triangulation ensures the research from biases arising out of single observation or single method of research. It will give more clarity and accuracy to the research ideas being investigated. The hypothesis can be assisted by one set confirming to another set. Triangulation can explain human behaviour which is complex in nature by using different methods to get a more balanced explanation to readers (Cohen et al., 2000; Joppe, 2000; Carvalho et al., 1997; Rothbauer, 2008; Noble et al., 2019). Denzin (p.301) proposed four types of triangulation methods.

(1) Data triangulation - periods of time, space and people were included

(2) Investigator triangulation - The study included more number of researchers

(3) Theory triangulation - More theoretical schemes were included to enable interpretation of a phenomenon

(4) Methodological triangulation - data collection methods such as interviews and observations were included for study

From the literature review, we were able to identify the factors affecting the healthcare programs due to the misinformation in the social media. The misinformation in the social media had adversely affected many healthcare programs and it was identified as one of the threats in the healthcare domain by the WHO. So the study on the misinformation in the healthcare domain is one of the much needed points of attention. The figure 6.1 shows the rich picture diagram showing multiple stakeholders in the society to intervene in the fighting for the misinformation in the social media and other

mass media. Social media can be used for the health communication that can be helpful in implementing multiple government healthcare programs. At the same time, on the other hand the misinformation can be used to halt such programs and also spread hate in the society. It is impossible to control the spread of misinformation completely in the social media. But the mechanism can be deviced to reduce the misinformation and spread of the misinformation in multiple ways. The basic training by the enforcement agencies, teachers and the volunteers can coordinate to give awareness to public on the anticipated misinformation and the reporting of the misinformation to the concerned authorities.

The SNS can device some tools with the AI intervention to find the misinformation by the implementation of some algorithm. During the COVID-19 situation, most of the SNS had implemented one or other form of strategy to prevent the misinformation by assessing the most shared posts, frequently shared posts, etc. Sometimes, there are cases of reporting by the SNS user about the hate content or misappropriateness of the post shared by some individual. The SNS admin will assess the same and they will take necessary actions by either blocking the content or blocking the user in that SNS or by reporting it to concerned authorities.

Healthcare professionals can assess the health related information in the SNS and give appropriate explanation or report the same to the concerned authorities. They can also do the intervention by posting the valid information by countering the misinformation. That will create awareness and the more accurate information. Healthcare professionals themselves can be a blogger or vloger to give more enlightenment on the information shared in the media.

An enforcement agency has much role to play in this scenario. They have to involve in the picture right from the beginning of any distress or mass healthcare programs and must be always equipped with the sufficient mechanism to intervene in the enforcement with the support of SNS. The enforcement agencies can seek support from the technical experts in identifying the source of the misinformation and the intention behind that misinformation by tracing the people created or shared the misinformation in social

media. The Technical experts can aid the enforcement agencies in detecting the fake news or the misinformation the social media by the help of the AI based technology solutions. Currently, there are many solutions are available to support the enforcement agencies due to the increase in cyber crimes.

Government has a major role in preventing and controlling the misinformation in the social media through implementing different policies and regulations. The involvement of multiple stakeholders is necessary for formulating the policies and regulations as these should not have an interventions in the fundamental rights of an individual. Now the barrier between the freedom of expression and the seditions are very vague and subjective. This prevents government and the judiciary from taking a decision on the content shared on the social media.
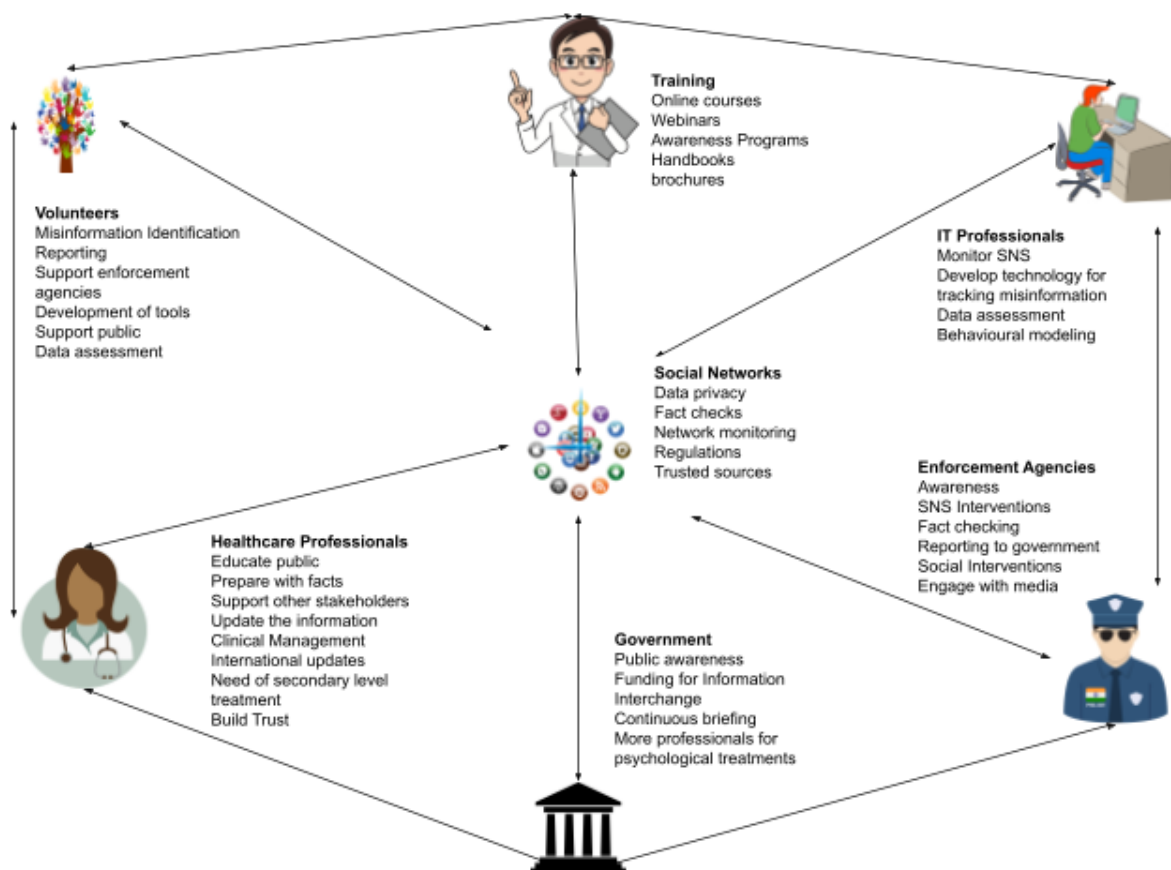


*Figure 6. 1: The Rich Picture Diagram for the Social media and misinformation management*

Schudson's(2008) Six or Seven Things News Can Do for Democracy gives a good insight for the discussion to fight the misinformation in social media by the actors listed in the Rich picture given in figure 6.1. The framework for the analysis is given below:

- Information: The fair and full information to the public will reduce the doubts in the minds of the public and the chance of falling prey to misinformation is less.
- Analysis: provide an effective framework for the citizen to verify the misinformation in the social media and also analyze the media regularly to block or report the misinformation.
- Social empathy: Ensure that people are provided with the sense that they are not hurting other people while sharing something in social media. People should have a sense of sympathy towards society so that others are not hurt because of one's doing.

- Mobilisation: mobilize people for public programs without compromising verification standards and public interest. The healthcare programs need public participation and there should be an effective mobilization.
- Investigation: investigate concentrated sources of misinformation in the social media and look for the links in the network for the curbing of the flow of the misinformation in social media

*Causal Loop Diagram*

Based on multiple case studies a causal loop diagram is formulated. The distress is the period where information explosion occurs in social media. Along with the factual information, the misinformation associated with the distress is spread through the media. The causal diagram of the research on misinformation and its impact on healthcare is given in figure 6.2. There are multiple loops in the diagram. The misinformation is creating multiple impacts on the society depending on the information content. This loop involves multiple stakeholders ranging from citizens, government authorities, Enforcement agencies, Healthcare professionals, IT professionals and NGOs.

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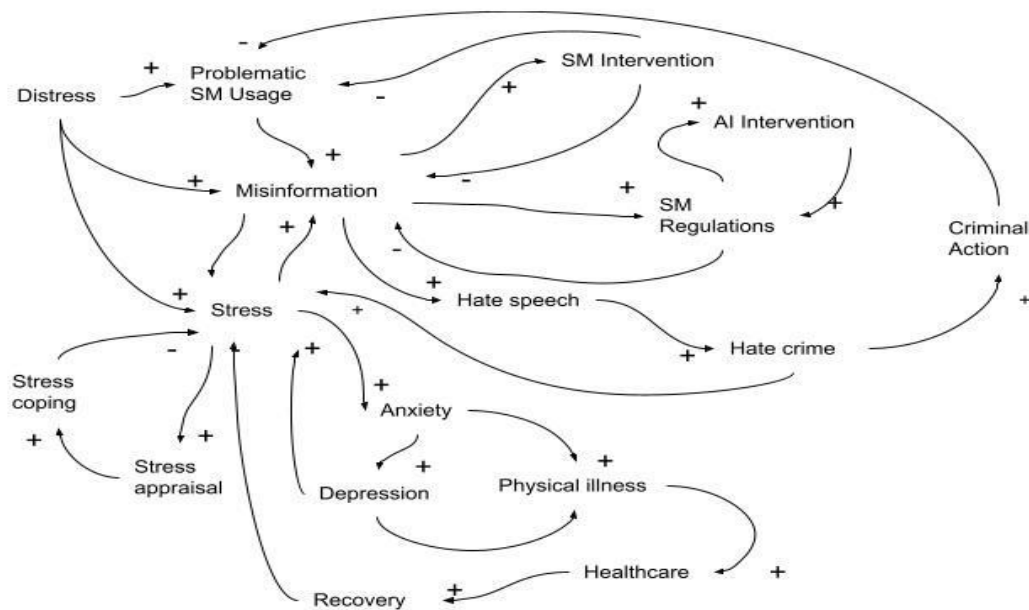
Figure 6.2: Causal Loop diagram depicting the impact of misinformation in Healthcare

***Loop 1:*** Distress →Misinformation → Social Media Regulation → AI Intervention

In this loop, the distress will be leading to more information interchange in the social media. This will take as an opportunity for spreading more misinformation through social media by many stakeholders like attention seekers, those who not aware about the information and the common man. The regulations put by the government on the social media and the social media platform through the AI intervention will reduce the misinformation and thus further distress.

***Loop 2:*** Distress → Misinformation → Hate speech → Hate crime →criminal action → Problematic social media usage

The misinformation during the distress may also lead to the hate speech in the society. During the COVID-19 distress, the same thing has happened in India and across the globe leading to much of atrocities and the hate crimes. The hate can be on the origin of distress, the people behind the distress or any other socio-political background of the distress. The people with vested interest will make use of this opportunity to set their agenda. The hate crimes can be prevented by the criminal action and that will further reduce the problematic social media usage.

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***Loop 3:*** Distress → Stress →anxiety →Depression → Physical illness →Healthcare → Recovery

The distress of any kind will have stress among the affected people. The stress can be of multiple reasons viz. the fear of loss of job, fear of loss of family members or in-laws, misinformation in the social media, fake news in the social media and the uncertaininty in the situation. This will leads to depression and anxiety that will be either long lasting or may end at the set of the distress. The anxiety and the depression will lead to the physical illness of many kinds that will be ranging from minor health issues to sometimes fatal situation depending on the health condition. The sufficient healthcare and the psychological support will lead to the recovery.

***Loop 4:*** Distress → Stress → Stress appraisal → Stress coping

The stress caused due to the distress sometimes may be innate stress appraisal by an individual or the emotional support from the peer groups. The stress coping mechanism can be provided to the individual to recover from the stress and some stress will be better for individual to improve the performance in the job like healthcare.

***Loop 5:*** Distress → Misinformtion → Social media intervention → problematic social media usage

The use of distress by the agenda setting people may be resulting in the misinformation. Normally the misinformation is conceived by the common man in multiple ways and they will be unknowingly sending the same to his/her peer groups. That will be further spread through the word of mouth communication. The social media intervention can prevent such spread of misinformation and the problematic social media usage

***Loop 6:*** Distress → Misinformation →Hate Speech → Hate Crime →Stress

The misinformation and hate speech leading to hate crime in some instances. This will create stress among the affected people as well as the friends and in-laws. The misinformation thus will be affecting the physical and mental health of the people affected and also the consumers of the media misinformation.

There are many interlinking loops apart from the loops discussed above. The causal loop diagram shows that the misinformation can have multiple negative impacts on the society and that is necessitating the importance of curbing the misinformation the media.

The framework for the misinformation mitigation in the society is given in figure 6.3. Many sectors are impacted due to the misinformation and multiple stakeholders should be involved in control and prevent the spread of misinformation. The Social media application is basically having an international presence. So the involvement of strong international policies is a must in addition to the national policies. The socio-economic and cultural aspects are also contributing to the inequities in the society. The misinformation shared in the social media makes use of this inequity and creates impacts in the society.
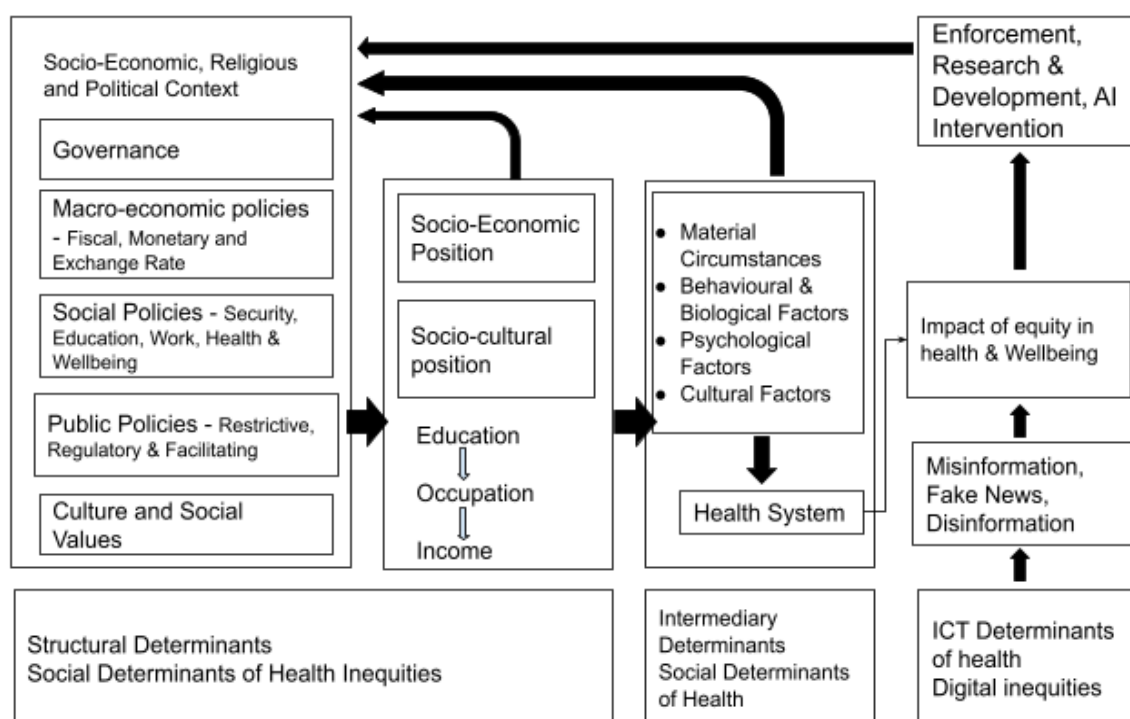


Fig 6.3: Framework for the social media and healthcare in mitigating the misinformation impacts

There are structural determinants and the social determinants of health inequities. The country like India is having a very complex socio-economic environment. Also the large number of population and the huge disparity in the resource distribution prevents

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majority of the population to access the public facilities like primary healthcare system. Also the huge cost in the private owned hospitals made them impossible to go for the treatments that require superspeciality intervention. The complex social divide based on religion, caste and other division also makes the life of people living in the villages miserable. They are the easy target for the agenda setting people to misuse with. In the current scenario, the social media is a major source of misinformation that can be spread across the world and that can have impact on the socio-economic situation of a state. Though there is a well structured institution for the governance is available, the situation can be made worse with a single line of misinformation.

The misinformation can be conceived by the user in different versions depending on the socio-economic condition of an individual. The case study on MR vaccination unearthed many factors that are affecting government healthcare programs. There were religious sentiments, hate towards a system of medicine, etc. Normally, the misinformation will be noticed only during the distress period or any mass programs by the government. So that lot of information is propagated through social media and other mass media. During this period, a common man finds it difficult to segregate the misinformation and the factual information. So the attention seekers and the agenda setters are making use of such instances as their opportunity.

The misinformation can affect the healthcare programs by the government in a large scale resulting in huge loss on public money. The religious and other psychological factors are used by the people with vested interest in propagating their ideologies through misinformation and fake news. Already, a section of people in India is marginalized based on socio-religious factors and they were further marginalized psychologically by misinformation thus increasing the health inequities.

All these are a complex situation and coming out of this is a great challenge by educating and by enforcement. The misinformation can be reduced to some extent by the AI intervention and other law enforcement acts. Though the experts are implementing and forgetting the impact after it settling down. But the mental health of the individual affected is unnoticed and that will have a short term or long term impact

depending on the damage that created in the mind of an individual. Government has to seriously consider such instances and give support to its citizen.

## 6.5 Conclusion

Inorder to have an effective healthcare system, all the domains including the technology part should be effective in curbing misinformation. Social media is more prominent in all parts of the globe because the commercial applications gained importance and the Internet has become cheaper. The IT professionals, NGOs, Volunteers, Enforcement Agencies, Government, Healthcare professionals are all should be always vigilant to tackle the misinformation and its impact on the citizen. The awareness and updating with the technology and the latest trends in the healthcare system is a must for tackling such a menace in society.

# CHAPTER 7

# CONCLUSIONS

## 7.1 Introduction

The Internet and its opportunities are having huge implications in our daily life. The exchange of information has increased many folds in the modern era with the help of the Internet and its derivatives. Social media is one of such intermediaries for communication that leverages the possibilities many fold in many domains of life interactions. This study focuses on the health domain which is not yet explored much on the Internet for the well-being of the human as well as the animals. The behavior and attitude change in different spheres of the communication medium especially in social media. People with introverted behavior become active in the virtual environment of social media. People otherwise calm and polite may behave in other ways in a virtual environment. Social media can be used for making everyday life simple and easier. Health care sector is very much dependent on social media for easy access to healthcare services. Many applications are now available for health care delivery and service. With all these advantages, social media also has many drawbacks which are affecting the healthcare services very adversely. The study focuses on such kinds of scenarios and assesses the impact of such instances.

## 7.2 Revisiting the Research Question

This section tries to answer the research question mentioned in section 2 through the studies carried out as part of this research

*Research Question:* How to improve the social media environment in India for better health care?

The social media analysis based on their engagements showed that the news headings with the negative sentiments will have much engagement in social media. The application used for extracting the news headlines with COVID -19 related keywords and showed many factors affecting the healthcare programs in India. Facebook and Twitter showed more engagements compared to other social media applications. The online version of the traditional newspapers is used for sharing the news reports in social media. They are coming up with catchy headlines that make the user read the article. So, rumors play a crucial role in attracting such kinds of audiences for the

reading of the news article. Online version of traditional media has many advantages over traditional paper news. The abundant opportunity of tapping potential advertisements is one among them. Since the advertisements in the traditional paper news will reach only a small portion of the society. The online version will attract more users and the advertisers will look for the hit count of a particular web page. So the online media are always looking for the news with more rumors and negative sentiments. Health sector always has such news to explore. The people now extremely rely on the Internet for seeking information. They refer to the Internet for treatment, hospitals and the doctors.

The study also revealed that more engagements are with the videos from YouTube. This indicates that the online media is capable of generating content and can be shared among targeted populations for agenda setting or any other purpose. People prefer watching videos rather than reading articles. The videos will have more impact on the minds of the people watching it than reading an article about the instances. Social media engagement is more on general information and awareness. The negative effects on immunization like AEFI got many engagements in social media. This can have distant impacts on the minds of parents and may lead to vaccine hesitancy. The drop in vaccination will have an impact on the secondary healthcare service of the government.

Epidemics are the short term and unexpected distress that will affect a large group of people and die down immediately by the timely intervention. Before that it will create heavy damage in the society in terms of lives, disabilities and economic impact on government and public. Social media can predict the spread of the disease effectively if the data shared in it is properly assessed. Social media can also become another disaster during distress. The Nipah period in Kerala had also many rumors and other hate mongering tweets/posts over the social media. Mainly the hatred was related to religion and politics.

The case study on COVID-19 showed that the newspaper headlines were shared more in information exchange in social media. The comparison of news headlines and Twitter data showed that the news headlines had more negative sentiments compared to Social media data. Fake news and misinformation spreading will be more effective at the time

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of distress. This can be seen from the search data in Google. The search trend becomes higher during the distress period. It can be seen that the vocabulary for negative sentiments are very less compared to other sentiments. This shows that the expression for the rumor can be done with limited vocabulary and it has a deep impact on the human mind. Some vocabulary in the mind has deep rooted fear factors in the minds of affected people. The people who lost their in-laws due to COVID will fear that vocabulary till their death. So, social media can influence people with such negative sentiments.

Natural calamity is also another distress like epidemics which will appear without any signal and last within a short span of time causing large impact on the social and physical and mental health. The aftermath of any disaster will be an opportunity for the fake news factory. During Kerala flood also there is much fake news which affected the mental health of the people affected as well as the in-laws of the affected people.

The survey showed that the misinformation and fake news affected the people in distress. Government had some control on the fake news during the flood which in turn controlled its spread in social media. Hatred based on religion and politics also played a major role in spreading fake news. The user behavior in social media needs to be assessed for spreading fake news. In the time of disaster, even positive behavior also paves the way for spreading misinformation unknowingly due to the impulsive behavior of an individual.

## 7.3    The Answer to Research Question

### 7.3.1  Misinformation and Mental Health

Though social media is a boon to the ICT revolution and improving the wellbeing of the society, it is also dampening the developments to some extent in the form of misinformation. There are many instances across the globe that has impacted the government and other healthcare programs. The fair use of social media should be ensured by the application developer, government, public, and enforcement agencies. Otherwise there will be a huge impact on the healthcare programs. The situation of covid in India and across the globe is the best example of how social media can impact

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or make use by some fringe elements to create panic among the people. There will be enormous information in the media and people may not be able to segregate such information into authentic and fake. Only way is to direct him to some authentic information provider. It can be a reputed government owned website, a well-educated and trained healthcare worker or a professional with expertise in segregating the misinformation from the informative content. There should be some collaborative efforts from all levels of people and organizations to achieve the goal of preventing the spread of misinformation. It cannot be controlled fully because the people initiating the misinformation have some agenda. They will keep on doing their duty of spreading misinformation. The volunteers with good subject knowledge can create their own contents and publish in the social media along with some catchy headings or phrases to attract the attention of the reader. They can also introduce some games or challenges to attract people to the contents and give awareness to them. The social media contents may affect physically and mentally. The volunteer organizations or individuals should find a way out to give some entertainment content to the affected. That will reduce their mental stress to some extent. COVID 19 also saw some unexpected scenarios of attack on the healthcare workers involved in the caring of COVID patients. That was also due to the unwanted fear arising out of the excess concern about the disease. The initial phase of the distress was also accompanied with many false claims and fear among the public. The complete restriction of the movements also created some insecurity among the public. The healthcare workers also found this situation very alarming due to such kind of activities and also the fear of contracting the disease to their family members. The respondents from the healthcare field were so much in mental stress and they had some coping mechanism to fight that one. Some were taken as their responsibility to do the job and that had created a sense of responsibility on them during the distress. Some were actively involved in social media to fight against the misinformation and give awareness. The misinformation cannot be fully eliminated but it can be controlled to some extent with the collective effort.

### 7.3.2 Social Media and the Misinformation

The fear arising from social media and other mass media can be alleviated using the same media by broadcasting the positive views. That will give hope to the people already affected and others fearing the disease. Following are the findings from the literature review and the practices followed by government and other responsible organizations like WHO. Many governments had enacted criminal law against spreading the fake news through social media and the government gave a directive to the social media platform to curb the fake news and misinformation. The strict enactment of law can curb the fake news in social media to some extent. It is visible from the analysis of the Twitter data. The study is limited to Twitter data and did not consider other major social media platforms like Facebook and WhatsApp. Similarly, only English texts are used for analysis. A country like India has 22 official languages and other local languages which are used for communication.

### 7.3.3 Metaphors and Health Communication

The Twitter data analysis shows that the 'war' metaphor usage has more negative emotions like anger and fear. It will also enable the system to enforce the hidden agendas in the name of epidemic like situation that is happened in the world. The military and the war metaphors will create soldiers and generals where one group will order and other group will obey without any hesitation or bounding to a set of rules. There should be some sort of psycho-linguistic intervention to control the use of such metaphors in the health communication. Similarly the intervention of cognitive linguistics is needed to study the impact of usage of such metaphors in the patient as well as in the physician.

War and military are the metaphors which are prevalent in the history of human being. They will be co-exist because of the conflicts arising day by day in the human life. The population explosion and the shortage of natural resources are always come together and the need of war and military is inevitable. So these two metaphors will exist in the coming days also. There should be some intervention in the usage of these metaphors in the health communication. The usage of war metaphor in the health communication should be avoided by the political leaders and the government authorities to bring up

the actual situation and condition of prevailing epidemics. Then only the awareness will reach the target population. The study is mainly focused on the Twitter data for a limited period of time. The impact of such media has to be studied in detail to measure the impact of the metaphors in healthcare sector. More studies need to be done to assess the impact of the metaphors in the citizen. The metaphor usage in healthcare communications may have different response on different people. That will vary depending on the socio-cultural background of an individual. A person with fear of war cannot be educated with war metaphor (Semino, 2021). A metaphor can be used positively for health communication at the same time the metaphor can also be used for evoking negative behavior. Social media was flooded with the COVID-19 information and people were confused on different claims and misinformation by the self-proclaimed experts. At the same time the same media was used for the hate speech and that had impacted many people across the globe.

### 7.3.4 Nipah and the Socio-cultural Challenges due to Misinformation

The Nipah infection not only affected the well-being of the people, but also many other aspects of life. The infected people got ostracized from all the places. They even denied of the burial of their kin lost the life. The doctors performed the last ritual due to the ostracism (Press Trust of India, 2018). As per WHO social exclusion conceptual model, social exclusion operates along four dimensions – social, economic, political and cultural, it consists of various levels, mainly individual, household, group, community, country and global regional levels (Jennie Popay et al., 2018). Though the exclusion due to the epidemic is for a short time, the impact of it the human relationship will get affect heavily.

Experts from Government medical college and Institute of Mental Health and Neuro Sciences (IMHANS) center Calicut, India commented that 22 people who had contact with relatives or friends need serious Psychiatric intervention due to the misguided information in social media (The Hindu, 2018). HCPs were also stressed and they also recommended for psychological intervention as they were not experienced such kind of situation earlier.

Sentiment analysis of the mainstream online media and the Social media application(viz.Twitter) shows that the Social media are better platform sharing health information because individuals are always present themselves in a positive well-being. Normally the health information in the newspapers is shared through the social media platform in the form of news link attached to the post shared. The newspaper contains more negative sentiments compared to Twitter. This will reflect in the social media tweet sentiment also.

The health authorities were able to contain the deadly infection without much casualties and spreading other parts of the country by intervening promptly. The efforts were lauded by WHO and other authorities. Government took all the measures to contain the infection as well as the mental health support for the infected patients. Daily briefing and damage control was also done by the ministers through social media and press conferences. Government has set up the help lines and call centers to alleviate the doubts of the citizen. Government issued guidelines for the handling of infected patients and vector control mechanism through government websites, social media platforms and major daily newspaper in Kerala. Government was able to curb the rumors and the fake information by effective intervening. Interaction of many social media groups also helped the government to effectively counter the fake information.

### 7.3.5 Government Information Interchange and Challenges

With the advent of Web 3.0 and the ICT across the globe, the information exchange has increased many folds. The use of SNS for information dissemination has the chance of distortion of information. The information is distorted in the SNS and is conceived as the facts in the real world. The dis-information is also another aspect that is spread purposefully in the SNS to propagate a certain agenda. Social media plays a crucial role in spreading the anti-vaccination campaign across the world. Earlier the anti-vaccination campaign was restricted to a limited group and limited people. It is because the medium to spread the campaign was very limited. With the emergence of social media and web 3.0, the scenario changed and the spread of misinformation got much faster than earlier. The viral nature of social media made it difficult to prevent the spread of misinformation effectively. The GIII process contains three processes by different

stakeholders, viz. Brainstorming, clarifying and formalizing (Luna-Reyes et al., 2007). In these processes, the information integration will be done with all internal and external resistance or minimizing the resistances. The study was focused on the impact of misinformation on vaccination and we observed that the value and weight of the information has relevance in the information integration for the proper execution of healthcare programs.

The study and analysis of consequences and the regulation of the spread of misinformation become much more complicated due to freedom of expression across the world nations. Facebook is now under critical observation and it is controlling the misinformation which is against the vaccination campaign. This has resulted in increased movement of misinformation through WhatsApp as reported by the Wall Street Journal. At the same time the relevance of GIII has increased in the current scenario. SNS plays a crucial role in formulating the policies and disseminating the factual information to the citizens. Healthcare has become more prevalent and people are using SNS for information gathering. Social media is used for corporate lobbying which is a challenge for the e-governance in the health sector (Harris et al., 2014).

To have a high vaccination rate, there should be fairness among government regulatory agencies and manufacturers. This will create faith in the minds of people. If there is any irregularity in the relationship between any of these entities, then the whole process of vaccination will be affected. The regulation of the spread of misinformation in social media and the effective use of vaccination in society needs a collaborative effort from the media, manufacturer, government, and Judiciary. Our research is currently restricted to social media and a detailed study needs to be done with the social media contents to get more factors that are not covered in this study. Our main aim was to find out the reason for the decline in the MR vaccination rate in Kerala especially in some regions of the state. The study reveals that there is a significant decrease in the vaccination rate due to many factors. We are considered Kerala for the case study because it is one of the most literate states and one of the states which are having a history of good health care facilities compared to any other states in India. There should be a good interaction between Government, Manufacturers, Regulatory bodies, and

people. If something adverse happens after vaccination, then the entire process of the vaccination program will be affected and the result will be very tragic. The fear of vaccines came above the fear of vaccine-preventable diseases in all parts of the world. This will not only affect the herd immunity but also the health care programs of WHO and other government organizations.

The privacy and the security of health information is a great concern in this scenario. When we are discussing the GIII, there is always confusion on what information and how much information needs to be disseminated in healthcare. To fight vaccine hesitancy and anti-vaccination campaigns, there should be interdisciplinary interactions in Society. The government should be able to communicate the importance of the vaccination and at the same time, there should be strong action against the anti-vaccination campaigners. The study shows that mere regulatory measurement is not enough to tackle this, and the government should be able to counter their arguments with facts and figures about vaccination. This will create a positive sign on the vaccination rates. The vaccination rate increased after doctors and social workers talked about the importance of vaccination and countering the claims of the anti-vaccination campaigners. The GIII helped to improve the vaccination program in Kerala considerably.

There is relevance in SNS with the diffusion theory. The information shared in the SNS has some purpose. Similarly, the misinformation has some purpose in sharing in the SNS platform. That can be used to influence users in propagating the agenda. The study also revealed that there are not many vaccine hesitancy messages in the SNS during the routine immunization and parents are taking vaccination to their children. The opposition and the hate campaigns are arising during the special vaccination campaign drive announced by the government.

### 7.3.6 IT Professionals and the Social Media Usage

The IT professionals in India and abroad are not new to the work from home job culture. But the pandemic like COVID-19 had created new norms in IT jobs. The IT firms are feared of losing business and the employees are feared of losing jobs. The people solely

depending on the job of one member in the family will be the most affected due to their insecurity. The study was conducted during the initial phase of the lock down and the psychological factors are not affected much. It is mainly due to the fact that the people started to enjoy the work from home in the initial stage as they were with their family and in-laws. The situation has become worse with the fear of job loss and shutting down of all the entertainment zones. In normal situations, the people tackled the stress with some coping mechanisms. During the pandemic, there were little opportunities left with them.

PLS-SEM was used to analyse the data collected from the IT professionals. The structural model analysis can be done with the help of the comprehensive multivariate statistical assessment technique. The psychometric property of the individual latent constructs can be assessed with the help of this technique. A questionnaire was prepared and collected the data from 218 IT professionals during the initial phase of the COVID-19 pandemic in India. The questionnaire was communicated online and took consent prior to attempting the questionnaire. During the analysis, it was observed that the misinformation has created enormous stress among the social media users and that has affected their psychological behaviour. A detailed future study needs to be conducted to assess the secondary influence of the psychological behavioural changes.

The findings of the study necessitated the importance of mitigating the misinformation sharing in social media and its impact on the social media user. Government, NGOs and individual volunteers should take proactive measures during the initial phase of the distress to tackle the misinformation. Because distress is the best time to seek mass attention and spread the political or religious agenda through social media. The people can easily be deceived by the misinformation during this period especially when they are looking for the solutions or solace from the distress.

## 7.4    Efforts of National Health Mission and Suggestions from this Study

The framework for National Health Mission 2012-2017 has mentioned in section 5.5.3 about the behavior change communication (BCC).  It gives the importance of providing space for NGOs and professional and specialized agencies in participating for the

massive communication effort. For securing healthcare practices and measurable changes in the behavior through the mix of media, message and communication. The support of ASHA and Auxiliary Nurse Midwife (ANM)s will provide local communication facilities for extending the healthcare program information among local people and families. For making the communication to be effective the local effort and inter personal communication need to be supported by other visual media for the constant reminder and the creation of favorable cultural environment for change.

Section 5.13 of the NHM framework is discussing about the importance of Health Management Information System (HMIS) in the healthcare sector. It envisages on the dissemination of information from the quality data for the effective decision making. That will be helpful for the decentralized health planning. Integration of information from various health program need to be integrated for the effective data exchange for the comprehensive decision making.

In the roadmap for priority action it it mentions about leveraging of technology for the enhancement of healthcare programs. It also discusses about the importance of ICT technologies in E-Governance. The National Health Policy and National Health Mission documents are mainly focused on the improvement of the healthcare infrastructure and services. Healthcare communications has become an important factor in the age of Web 3.0 and social media has become a major communication media by the large mass of people irrespective of their social and educational background. Health sector is also facing some challenges from these technologies in the form of misinformation and fake news. WHO has identified misinformation as one of the major challenge in the vaccine hesitancy and India faced the challenge during the MR vaccination campaign and it affected the campaign considerably. The infodemics during the COVID-19 was another notable challenge in the healthcare sector and there was many initiatives by different government organizations and also the social media platforms to tackle the infodemics. There should be a clearcut policies for tackling such situations.

The information interchange between different departments will have some impacts in tackling the misinformation. The involvement of IT professionals and the health

professionals required to manage the information overloading in the social media and fight the misinformation. The National health policy need to address the challenges of the misinformation in the social media especially when many health programs had negative impact due to the misinformation. Educating and empowering of both healthcare professionals and the citizen required to fight the misinformation.

## 7.5    Limitations and Future Work

The study is mainly focused on the limited instances of the healthcare sector in India. Though the study can be extended to other domains also, the detailed analysis of every social media is a crucial aspect. India is a highly populated country and there are 22 official languages. These official languages are used for communication. So the data available in social media will be of different languages and different scripts. The study of the data in local scripts will reveal more aspects of the misinformation in the villages. The English speaking population in India is less than 20 percent. So the analysis of social media data using English text is not sufficient to explain completely the depth of misinformation and its impact in India. A detailed analysis is needed in local language data to reveal the exact figure of the misinformation.

Our study is focused on the English editions of the newspapers in India. There are about ten percent of people who can read and write English in India. The data from the regional languages can also be considered for the study. Only Twitter is taken as the sample for the comparison of social media and the traditional media. More detailed analysis will be required to assess the behavioral pattern of social media users during the distress period. We had considered the sentiment for analysis, but there are cases of sarcasm, satire, videos and the images which are also used to spread fake news. Here we used only social media and traditional media texts for analysis.

GIII and sending information through social media will be a challenging process as there is always a possibility of information distortion by the user and forwarding. Such distorted information can be used by the attention seekers or any agenda setting people to make use for their purpose. This study was based on the analysis of engagements in Facebook, Twitter, and blogs. We have not explored social media like WhatsApp which

is one of the major social networking media reaching a large mass. We considered the links shared in social media for the analysis but most often the data shared may be in the form of user generated content. The study focused on the MR vaccination campaign for a stipulated period. The tool used for the data extraction may not be considering the linguistic variation of the search term. The social media platforms support any language for communication and the mobile phones support most of the official languages in India for communication. We had considered only English articles. Considering the multilingualism of India this study is lacking adequate data. The more advanced statistical methods should be employed to cater to the challenges of the limitations in the existing study. The actual impact of social media may not be able to be assessed through the analysis of social media engagement. Because the fake information spread through social media gets leverage by word of mouth also. Most often, the misinformation and resistance comes during the mass healthcare campaigns. This can be mainly due to the attention seeking behaviour of the people behind this. There will be a silent activity to spread the vaccine hesitancy which won't get much attention. That is difficult to assess as the data will be very less. That will be difficult to analyse using the data analytics tool due to the data sparsity.

The study was carried out with the twitter data for a short period. More studies to be carried out using the data from all the social media applications. The social media penetration in India is enormous with the advent of the Information and Communication Technology. There should be some mechanism to prevent the misinformation in the social media to reduce the impact of distress. The distress will affect for a short duration but the mental trauma will last for long. Study must be carried out to measure the impact and the government and the healthcare professionals have to ensure proper assistance to the affected people for the recovery. The health communications should also be an area of focus because of the impact of the vocabulary used in the communication also affects the reader's mental wellbeing. War and military metaphors may always be a burning memory for the people affected with war and other calamities. That may not a problem with people not faced war in their life time. The studies should be focused more on the metaphor of all types to improve the health communication.

# REFERENCES

Abedin, B., Babar, A. & Abbasi, A.(2014). Characterization of the use of social Media in Natural Disasters: A systematic review. In Big Data and Cloud Computing (BdCloud), 2014 I.E. fourth international conference on, 449–454.

Abrahamson, E., Rosenkopf, L. (1997). Social network effects on the extent of innovation diffusion: A computer simulation. Organization science. 8(3). 289-309.

Aceto, G., Persico, A. & Pescapé, A., (2020). Industry 4.0 and Health: Internet of Things, Big Data, and Cloud Computing for Healthcare 4.0. Journal of Industrial Information Integration. 18.100129.https://doi.org/10.1016/j.jii.2020.100129

Achora, S. & Kamanyire, J. K.(2016). Disaster Preparedness: Need for inclusion in undergraduate nursing education. Sultan Qaboos University medical journal, 16(1), e15-9.

Adam, J. M. (2012). Virality in social media: the SPIN Framework. *Web 2.0. Social Media and Creative Consumers – Implications for Public Policy*. 12 (2). 162–169, DOI: 10.1002/pa.1418

Adam, J. M.(2012). Virality in social media: the SPIN Framework. *Web 2.0. Social Media and Creative Consumers – Implications for Public Policy.* 12(2). 162–169

Agnew, R., White, H. R. (1992). An empirical test of general strain theory. *Criminology*. 30(4). 475-500.

Ahmed, W., Vidal-Alaball, J., Downing, J., & López Seguí, F. (2020). COVID-19 and the 5G Conspiracy Theory: Social Network Analysis of Twitter Data. *Journal of medical Internet research*, 22(5), e19458. https://doi.org/10.2196/19458

Ajayi, E. F. G. (2016). Challenges to enforcement of cyber-crimes laws and policy. *Journal of Internet and Information Systems*. 6(1). 1-12

Akash, B. & Sadiq, N.(2020). How Tablighi Jamaat event became India's worst coronavirus vector, Al Jazeera. Accessed on April 11, 2020. https://www.aljazeera.com/news/2020/04/tablighi-jamaat-event-india-worst-coronavirus-vector-200407052957511.html

Akhavan, P., Jafari, M. & Fathian. M. (2005). Exploring Failure-Factors of Implementing Knowledge Management Systems in Organizations. *Journal of Knowledge Management Practice* 6: 1–8.

Akmatov, M. K., & Mikolajczyk, R. T. (2012). Timeliness of childhood vaccinations in 31 low and middle-income countries. *Journal of epidemiology and community health*, 66(7), e14.

Akmatov, M.K & Mikolajczyk, R.T. (2012). Timeliness of childhood vaccinations in 31 low and middle-income countries. *J Epidemiol Community Health*, 66, e14-e24, doi: 10.1136/jech.2010.124651

Alalwan, A. A., Dwivedi, Y. K. & Rana, N. P. (2017). Factors influencing adoption of mobile banking by jordanian bank customers: extending UTAUT2 with trust. *Int. J. Inf. Manage*. 37, 99–110. doi: 10.1016/j.ijinfomgt.2017.01.002

Alam, M. (2007). E-governance: scope and implementation challenges in Bangladesh. *International Conference on Theory and Practice of Electronic Governance*. ICEGOV, Macao

Alessandri, G., Longis, E.D., Golfieri, F. & Crocetti, E. (2021). Can Self-Concept Clarity Protect against A Pandemic? A Daily Study on Self-Concept Clarity and Negative Affect during the COVID-19 Outbreak. *Identity*. 21(1). 6-19, DOI: 10.1080/15283488.2020.1846538

Alhurani, A. S., Dekker, R., Ahmad, M., Miller, J., Yousef, K. M., Abdulqader, B., Salami, I., Lennie, T. A., Randall, D. C., & Moser, D. K. (2018). Stress, cognitive appraisal, coping, and event free survival in patients with heart failure. Heart & lung : *the journal of critical care,* 47(3), 205–210. https://doi.org/10.1016/j.hrtlng.2018.03.008

Alistair, G. S., Jens, F. B., Robin I.M. D. (2018). Activity in social media and intimacy in social relationships. *Computers in Human Behavior*. 85. 227-235.

Allcott, H. & Gentzkow, M. (2017). Social media and fake news in the 2016 election. *Journal of economic perspectives*, 31(2), 211-36.

Alma, H. A. (2015). Religious Pluralism as an Imaginative Practice. *Archive for the Psychology of Religion*. 37(2). 117-140

Alryalat, M., Rana, N. P., Sahu, G. P., Dwivedi, Y. K. & Tajvidi, M.(2017). Use of social Media in Citizen-Centric Electronic Government Services: A literature analysis. *International Journal of Electronic Government Research*, 13(3), 55–79.

Anber, H., Salah, A., El-Aziz, A.A.(2016). A Literature Review on Twitter Data Analysis. *Journal of Computers*. 8(3):241-249

Anderson, J.C. & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *PsychoL Bull*. 103. 411-423.

Anderson, N. H. (1971). Integration theory and attitude change. *Psychological Review*. 78. 171-206.

Anderson, N. H. (1974). Cognitive algebra: Integration theory applied to social attribution. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. 7. 1-101. San Diego, CA: Academic Press.

Angus, T., Karis, R., Gaëlle Vallée-Tourangeau.(2016). The 5As: A practical taxonomy for the determinants of vaccine uptake. *Vaccine*. 34(8), 1018-1024

Anna, M.(2017). The Anti-Vaccination Movement Is Working with the Nation of Islam to Scare Black Families. Available from: https://jezebel.com/the-anti-vaccination-movement-is-working-with-the-natio-1796021231(Mar 14, 2019)

Annas G. J. (1995). Reframing the debate on health care reform by replacing our metaphors. *The New England journal of medicine*, 332(11), 744–747. https://doi.org/10.1056/nejm199503163321112

Anthony J. Onwuegbuzie & Nancy L. L. (2005). On Becoming a Pragmatic Researcher: The Importance of Combining Quantitative and Qualitative Research Methodologies, *International Journal of Social Research Methodology*, 8:5, 375-387, DOI: 10.1080/13645570500402447

Anwar, M., Joshi, J. & Tan, J. (2015). Anytime, anywhere access to secure, privacy-aware healthcare services: Issues, approaches and challenges. *Health Policy and Technology*. 4(4), 299–311

Anwar, M., Joshi, J. & Tan, J. (2015). Anytime, anywhere access to secure, privacy-aware healthcare services: Issues, approaches and challenges. *Health Policy and Technology*. 4(4), 299–311

Armanasco, A. A., Miller, Y. D., Fjeldsoe, B. S., & Marshall, A. L. (2017). Preventive health behavior change text message interventions: a meta-analysis. *American journal of preventive medicine*, 52(3), 391-402.

Arndt, T. S. (2012). Perceived convenience, compatibility, and media richness contribute significantly to dedicated e-book reader acceptance. *Evidence Based Library and Information Practice,* 7(2), 84-86.

Atkinson, D. M., Rodman, J. L., Thuras, P. D., Shiroma, P. R., & Lim, K. O. (2017). Examining Burnout, Depression, and Self-Compassion in Veterans Affairs Mental Health Staff. *Journal of alternative and complementary medicine (New York, N.Y.),* 23(7), 551–557. https://doi.org/10.1089/acm.2017.0087

Atlani-Duault, L., Ward, J. K., Roy, M., Morin, C., & Wilson, A. (2020). Tracking online heroisation and blame in epidemics. *The Lancet. Public health*, 5(3), e137–e138. https://doi.org/10.1016/S2468-2667(20)30033-5

Avvenuti, M., Cresci, S. Marchetti, A. Meletti, C. & Tesconi, M. (2016). Predictability or early warning: using social media in modern emergency response. *IEEE Internet Computing*, 20(6), 4–6.

Azusa, S. & Joan Costa-i-Font(2013). Social networking for medical information: A digital divide or a trust inquiry?. *Health Policy and Technology*. 2(3), 139–150

Babak, A. & Abdul, B.(2018). Institutional vs. Non-institutional use of Social Media during Emergency Response: A Case of Twitter in 2014 Australian Bush Fire, *Information Systems Frontiers*, 20(4), 729–740

Baeza-Yates, R. (2009). User generated content: how good is it? *WICOW 2009*.

Bakliwal, A., Arora, P., Madhappan, S., Kapre, N., Singh, M. & Varma, V. (2012). Mining sentiments from tweets. *In Proceedings of the 3rd Workshop in Computational Approaches to Subjectivity and Sentiment Analysis* (pp. 11-18).

Balaji, M. S., & Chakrabarti, D. (2010). Student interactions in online discussion forum: Empirical research from'media richness theory'perspective. *Journal of interactive online learning*, 9(1).

Bălău, N. & Utz. (2017). Information sharing as strategic behaviour: the role of information display, social motivation and time pressure. *Behaviour &*

*Information Technology.* 36(6). 589-605, DOI: 10.1080/0144929X.2016.1267263

Balhara, Y., & Chandiok, K. (2020). Can #PlayOurpartTogether help prevent miscommunication?. *Asian journal of psychiatry,* 52, 102123. Advance online publication. https://doi.org/10.1016/j.ajp.2020.102123

Bandura, A. (1986). Social foundations of thought and action. Englewood Cliffs, NJ, 1986.

Baraldi, C. (2008). "Promoting Self-Expression in Classroom Interactions". *Childhood,* 15(2), 239–257. https://doi.org/10.1177/0907568207088425

Barker, P. (1985). Using metaphors in psychotherapy. New York: Brunner.

Barreto, A.M.( 2014). "The Word-of-Mouth Phenomenon in the Social Media Era". *International Journal of Market Research*, 56(5), 631–654

Barreto, J. E. & Whitehair, C. L. (2017). Social Media and Web Presence for Patients and Professionals: Evolving Trends and Implications for Practice. PM & R : *the journal of injury, function, and rehabilitation,* 9(5S), S98–S105. https://doi.org/10.1016/j.pmrj.2017.02.012

Barry G.(2004). Narrative Techniques of Fear Mongering, *Social Research*, Vol. 71, No. 4, Fear: its Political Uses & Abuses (Winter 2004). 819-826

Bas, V. & Jie, S. (2019). Habit and Identity: Behavioral, Cognitive, Affective, and Motivational Facets of an Integrated Self. *Frontiers in Psychology*. 10. 1504

Basch, C. H., Hillyer, G. C., Erwin, Z. M., Mohlman, J., Cosgrove, A., & Quinones, N. (2020). News coverage of the COVID-19 pandemic: Missed opportunities to promote health sustaining behaviors. *Infection, disease & health*, 25(3), 205–209. https://doi.org/10.1016/j.idh.2020.05.001

Basch, C. H., Hillyer, G. C., Meleo- Erwin, Z., Mohlman, J., Cosgrove, A., Quinones, N.(2020). News coverage of the COVID-19 pandemic: Missed opportunities to promote health sustaining behaviors, *Infection, Disease & Health*,, 25(3), 205-209

Bastos, M. T., Travitzki, R. & Puschmann, C. (2012). What sticks with whom? Twitter follower- followee networks and news classification. *Proceedings of 6th International AAAI Conference on Weblogs and Social Media—Workshop on*

*the Potential of Social Media Tools and Data for Journalists in the News Media Industry*.

Batrinca, B. & Treleaven, P.C. ( 2015). Social media analytics: a survey of techniques, tools and platforms. *AI & SOCIETY*. 30(1), 89–116

Baumgaertner, E. (2018). Nipah Virus, Rare and Dangerous, Spreads in India, The New York Times. Available: https://www.nytimes.com (accessed on 3 March 2019).

Begg, N., Ramsay, M., White J. & Bozoky Z. (1998). Media dents confidence in MMR vaccine. *Br. Med. J.* 316:561, doi: https://doi.org/10.1136/bmj.316.7130.561

Begg, N., Ramsay, M., White, J. & Bozoky, Z. (1998). Media dents confidence in MMR vaccine. *Br. Med. J.*316:561, doi: https://doi.org/10.1136/bmj.316.7130.561

Benito-Osorio, D., Peris-Ortiz, M., Armengot, C.R. et al.(2013) Web 5.0: the future of emotional competences in higher education. *Glob Bus Perspect* 1, 274–287. https://doi.org/10.1007/s40196-013-0016-5

Bennett, A. & Elman, C. (2010) Case Study Methods. In C. Reus-Smit and D. Snidal (eds) The Oxford Handbook of International Relations. Oxford University Press: Oxford. Ch. 29.

Bernhardt M., Alber J. & Gold R.S.(2014). A social media primer for professionals: digital do's and don'ts. *Health Promot Pract.* 15(2), 168–172.

Bernhardt, J. M., Alber, J., & Gold, R. S. (2014). A social media primer for professionals: digital dos and don'ts. *Health promotion practice*, 15(2), 168–172. https://doi.org/10.1177/1524839913517235

Bertot, J.C., Jaeger, P.T. & Hansen. D. (2012). The Impact of Policies on Government Social Media Usage: Issues, Challenges, and Recommendations. *Government Information Quarterly* 29: 30–40.

Bhan, N., Rao, K. D. & Kachwaha, S. (2016). Health inequalities research in India: a review of trends and themes in the literature since the 1990s. *International journal for equity in health*, 15(1), 166.

Bhaumik S. (2013). Missing the target -- infant mortality in India. *CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne*, *185*(1), E49. https://doi.org/10.1503/cmaj.109-4366

Bianco, A., Mascaro, V., Zucco, R., & Pavia, M. (2019). Parent perspectives on childhood vaccination: How to deal with vaccine hesitancy and refusal?. *Vaccine*, 37(7), 984–990.

Biesta, G. J. J., & Burbules, N. C. (2003). *Pragmatism and Educational Research.* (Philosophy, Theory, and Educational Research Series). Rowman & Littlefield.

Biksegn, A., Kenfe, T., Matiwos, S., & Eshetu, G. (2016). Burnout Status at Work among Healthcare Professionals in a Tertiary Hospital. *Ethiopian journal of health sciences*, 26(2), 101–108. https://doi.org/10.4314/ejhs.v26i2.3

Bilal, Latif, F., Bashir, M. F., Komal, B., & Tan, D. (2020). Role of electronic media in mitigating the psychological impacts of novel coronavirus (COVID-19). *Psychiatry research*, 289, 113041. Advance online publication. https://doi.org/10.1016/j.psychres.2020.113041

Black, D. & Whitehead, M. (1988). Inequalities in Health: The Black Report the Health Divide.

Black, D., Morris, J. N., Smith, C., Townsend, P., Davidson, N., & Whitehead, M. (1980). The black report: inequalities in health. London: DHSS.

Blenkinsopp, A., Wilkie, P. & Wang, P. A.(2007). Patient reporting of suspected adverse drug reactions: a review of published literature and international experience. *British Journal of Clinical Pharmacology.* , 63(2), 148-156

Blenkinsopp, A., Wilkie, P., Wang, M., & Routledge, P. A. (2007). Patient reporting of suspected adverse drug reactions: a review of published literature and international experience. *British journal of clinical pharmacology*, 63(2), 148–156.

Bolmsjö I. (2000). Existential issues in palliative care--interviews with cancer patients. *Journal of palliative care*, 16(2), 20–24.

Bonyadi, A. & Samuel, M. (2013). Headlines in newspaper editorials: A contrastive study. *Sage Open*, 3(2), 2158244013494863.

Borras-Morell, J. E. (2015). Data mining for pulsing the emotion on the web. *In Data Mining in Clinical Medicine*. 123-130. Humana Press, New York, NY.

Boyd, P. (2014). Learning conversations: teacher researchers evaluating dialogic strategies in early years settings. *International Journal of Early Years Education*. 22(4). 441-456

Boylstein, C., Rittman, M., & Hinojosa, R. (2007). Metaphor shifts in stroke recovery. *Health communication*, 21(3), 279–287. https://doi.org/10.1080/10410230701314945

Brand, M., Wegmann, E., Stark, R., Muller, A., Wolfling, K., Robbins, T.W. & Potenza, M.N. (2019). The interaction of person-affect-cognition-execution (I-PACE) model for addictive behaviors: update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. *Neurosci. Biobehav. Rev*. 104, 1–10.

Brian, M. (1993). Everywhere You Want to Be: Introduction to Fear. in Brian Massumi (ed.), *The Politics of Everyday Fear*, Minneapolis, MN: Minnesota UP.

Brouwer, T. (2016). Potential of twitter derived flood maps: Comparing interpolation methods and assessing uncertainties. Master's thesis, University of Twente.

Bruce, R. G. (2009). Disaster Preparedness and Disaster Management: The Development and Piloting of a Self-Assessment Survey to Judge the Adequacy of Community-Based Physician Knowledge. *American Journal of Clinical Medicine*, 6(3), 32-40

Bruns, A. & Stieglitz, S. (2013). Towards more systematic Twitter analysis: Metrics for tweeting activities. *International Journal of Social Research Methodology*. 16(2). 91-10.

Bruwer, R. Hendrik J., & Rudman, R. (2015). Web 3.0: Governance, Risks and Safeguards. *Journal of Applied Business Research (JABR),* 31(3), 1037-1056. https://doi.org/10.19030/jabr.v31i3.9241

Burkhardt. (2017). How Fake News Spreads: Word of Mouth, Combating Fake News in the Digital Age. 53(8). 10-13

Burki, T. (2019). Vaccine misinformation and social media. *The Lancet*, 1(6), E258-E259

Byrne, A., Ellershaw, J., Holcombe, C., & Salmon, P. (2002). Patients' experience of cancer: evidence of the role of 'fighting' in collusive clinical

communication. *Patient    education    and    counseling*, 48(1),    15–21. https://doi.org/10.1016/s0738-3991(02)00094-0

Byström, E., Lindstrand, A., Bergström, J., Riesbeck, K., & Roth, A. (2020). Confidence in the National Immunization Program among parents in Sweden 2016 - A cross-sectional survey. *Vaccine*, 38(22), 3909–3917. https://doi.org/10.1016/j.vaccine.2020.01.078

Caitlin, J., Rose, W., Maureen, O., Elisabeth, E. & Heidi J. L. (2015). Strategies for addressing vaccine hesitancy – A systematic review. *Vaccine*, 33(34), 4180-4190

Campbell, A. T. , Eisenman, S. B. , Lane, N. D. , Miluzzo, E. , Peterson, R. A. , Lu, H. , … Ahn, G. S. (2008). The rise of people–centric sensing. *IEEE Internet Computing*, 12, 12–21.

Campbell, D. T., Fiske, D. W. (1959). Convergent and discriminant validity by the multi-trait, multi-method matrix. *Psychological Bulletin*, 56, 81-105.

Campedelli, G. M., Aziani, A., & Favarin, S. (2020). Exploring the effect of 2019-nCoV containment policies on crime: The case of los angeles. *arXiv* preprint arXiv:2003.11021.

Cao, X., MacNaughton, P., Deng, Z., Yin, J., Zhang, X. & Allen, J. (2018). Using twitter to better understand the spatiotemporal patterns of public sentiment: a case study in Massachusetts, USA. *International journal of environmental research and public health*, 15(2), 250.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American psychologist*, 54(3), 165.

Carvalho, S. & White, H.(1997). Combining the quantitative and qualitative approaches to poverty measurement and analysis: The practice and the potential. *World Bank Technical Paper* 366. Washington, D.C: World Bank.

Casagrande, M., Favieri, F., Tambelli, R. & Forte, G.(2020). The enemy who sealed the world: Effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep Medicine*. https://doi.org/10.1016/j.sleep.2020.05.011

Casarett, D., Pickard, A., Fishman, J. M., Alexander, S. C., Arnold, R. M., Pollak, K. I., & Tulsky, J. A. (2010). Can metaphors and analogies improve communication with seriously ill patients?. *Journal of palliative medicine,* 13(3), 255–260. https://doi.org/10.1089/jpm.2009.0221

Caulfield, T. (2019). In an era of misinformation, alternative medicine needs to be regulated. The Globe and Mail. Retrieved 10 September 2019 From: https://www.theglobeandmail.com/opinion/article-in-an-era-of-misinformation-alternative-medicine-needs-to-be/?utm_medium=Referrer%3A+Social+Network+%2F+Media&utm_campaign=Shared+Web+Article+Links&fbclid=IwAR0iVya5QrmIYFbS8IO9ndavJ5-jxoqOL-ffN8GQG7mRjQ6RrnYwB29Ae_0

Celine K., Tilo H. & Enny D.(2019). Fear-Mongering or Fact-Driven? Illuminating the Interplay of Objective Risk and Emotion-Evoking Form in the Response to Epidemic News, *Health Communication*, 34:1, 74-83. DOI: 10.1080/10410236.2017.1384429

Centers for Disease Control and Prevention. (2019). Signs and Symptoms. Available at: https://www.cdc.gov/vhf/nipah/symptoms/index.html (accessed 13 May 2019).

Centers for Disease Control and Prevention. (2020). Coronavirus Diseae (COVID-19): stigma and resilence. Retrieved from https://www.cdc.gov/coronavirus/2019-ncov/about/related- stigma.html .

Ceron, A. (2015). Internet, News and Political Trust: The Difference Between Social Media and Online Media Outlets. *Journal of Computer-Mediated Communication* 20 (5): 487–503.

Ceron, A., & Negri, F. (2016). The "Social Side" of Public Policy: Monitoring Online Public Opinion and Its Mobilization During the Policy Cycle. *Policy & Internet*, 8(2), 131–147. doi:10.1002/poi3.117

Chakraborty, S. (2018). Nipah virus scare: Fruit and vegetables from Kerala banned in Gulf, The Business Standard. Available: https://www.business-standard.com (accessed on 2 March 2019).

Chan, M. (2015). Multimodal connectedness and quality of life: Examining the influences of technology adoption and interpersonal communication on well-being across the life span. *Journal of Computer-Mediated Communication*, 20(1), 3-18.

Chan, W.S. & Leung, A. Y. (2018). Use of Social Network Sites for Communication Among Health Professionals: Systematic Review. *J Med Internet Res*. 20(3). e117.

Chao, C.M. (2019). Factors Determining the Behavioral Intention to Use Mobile Learning: An Application and Extension of the UTAUT Model. *Front. Psychol.* 10:1652. doi: 10.3389/fpsyg.2019.01652

Charalabidis, Y., Loukis, E., Alexopoulos, C. & Lachana, Z. (2019) The Three Generations of Electronic Government: From Service Provision to Open Data and to Policy Analytics. In: Lindgren I. et al. (eds) Electronic Government. EGOV 2019. *Lecture Notes in Computer Science*. 11685. Springer, Cham.

Chauhan, B., George, R. & Coffin, J.(2012). Social media and you: what every physician needs to know. *J Med Pract Manage*. 28(3), 206–209. [PubMed]

Chen, X., Sin, S.J., Theng, Y. & Lee, C.H., (2015). Why Students Share Misinformation on Social Media: Motivation, Gender, and Study-level Differences, *The Journal of Academic Librarianship,*41(5), 583-592

Cheng, Y. & Luo, Y. (2020). The presumed influence of digital misinformation: examining US public's support for governmental restrictions versus corrective action in the COVID-19 pandemic. *Online Information Review*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/OIR-08-2020-0386

Chew, C. & Eysenbach, G. (2010). Pandemics in the age of Twitter: content analysis of Tweets during the 2009 H1N1 outbreak. *PloS one*, 5(11), e14118.

Chiappetta, M. Valeria, D., Cristina, S., Rosario, A. C. & Giuseppe, L. T. (2018). Stress management interventions among healthcare workers using mindfulness: a systematic review, *Senses Sci,* 5(2), 517-549

Childs, L.M. & Martin, C.Y. (2012). Social media profiles: striking the right balance. *Am J Health System Pharm*. 69(23), 2044–2050.

Chin, W.W. (1998). The Partial Least Squares Approach to Structural Equation Modelling. In: *Modem Methods for Business Research*, Markoulides, G A (Ed). Lawrence Erlbaum, Mahwah, NJ.? USA.,p: 95-336.

Chisholm, A., Byrne-Davis, L., Peters, S., Beenstock, J., Gilman, S. & Hart, J. (2020). Online behaviour change technique training to support healthcare staff 'Make Every Contact Count'. *BMC Health Serv Res.* 20(1). 390. doi: 10.1186/s12913-020-05264-9. PMID: 32380982; PMCID: PMC7206818.

Choi, M., Adams, K. B., & Mezuk, B. (2012). Examining the aging process through the stress-coping framework: application to driving cessation in later life. *Aging & mental health*, 16(1), 75–83. https://doi.org/10.1080/13607863.2011.583633

Chretien, K. C., & Kind, T. (2013). Social media and clinical care: ethical, professional, and social implications. *Circulation*, 127(13), 1413–1421. https://doi.org/10.1161/CIRCULATIONAHA.112.128017

Christ, T. W. (2009). Designing, teaching and evaluating two complementary mixed methods research courses. *Journal of Mixed Methods Research*, 3, 292-325.

Clark, J. L., Algoe, S. B., & Green, M. C. (2018). Social Network Sites and Well-Being: The Role of Social Connection. *Current Directions in Psychological Science*, 27(1), 32–37. https://doi.org/10.1177/0963721417730833

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum.

Cohen, L. , Manion, L. & Morrison, K. (2000). Research methods in education. *Brit J Educ Stud.* 48:446.

Collins, B., Hoang, D. T., Nguyen, N. T. & Hwang, D. (2020). Trends in combating fake news on social media – a survey, *Journal of Information and Telecommunication*, DOI: 10.1080/24751839.2020.1847379

Columb, D., & O'Gara, C. (2018). A national survey of online gambling behaviours. *Irish journal of psychological medicine,* 35(4), 311–319. https://doi.org/10.1017/ipm.2017.64

Comtesse, H., Powell, S., Soldo, A., Hagl, M. & Rosner, R.(2019). Long-term psychological distress of Bosnian war survivors: an 11-year follow-up of former displaced persons, returnees, and stayers. *BMC psychiatry*. 19(1). 1

Cordioli, Dezolina Franciele Cardin, Cordioli Junior, João Roberto, Gazetta, Claudia Eli, Silva, Albertina Gomes da, & Lourenção, Luciano Garcia. (2019). Occupational stress and engagement in primary health care workers. *Revista Brasileira de Enfermagem,* 72(6), 1580-1587. Epub October 21, 2019.https://doi.org/10.1590/0034-7167-2018-0681

Correspondent H. T. (2018).  Nipah virus outbreak: Death toll rises to 14 in Kerala, two more cases identified. Available at: https://www.hindustantimes.com/india-news/nipah-virus-outbreak-death-toll-rises-to-14-in-kerala-two-more-cases-identified/story-f4QenFXeOtJnWhw7NrVawJ.html (accessed 16 May 2019).

Council, NST. (2005). Grand challenges for disaster reduction: a report of the subcommittee on disaster reduction. Washington, D.C.: National Science and Technology Council, Executive Office of the President, https://www.sdr.gov/docs/SDRGrandChallengesforDisasterReduction.pdf(Mar . 14, 2019)

Creswell, J. W. (1994). Research design: Qualitative and quantitative approaches. *Thousand Oaks*, CA: Sage.

Criddle, W.D. (1971). The physical presence of other individuals as a factor in social facilitation. *Psychon Sci* 22, 229–230. https://doi.org/10.3758/BF03332585

Cristina, G., Martina D. M., Fortunato, D. &. Barbara, D. M. (2015).  Actions improving HPV vaccination uptake – Results from a national survey in Italy. *Vaccine*. 33(21), 2425-2431

Croasmun, J. T. & Ostrom, L. (2011). Using Likert-Type Scales in the Social Sciences. *Journal of Adult Education,* 40(1). 19-22

Crooks, A. Croitoru, A.& Stefanidis, A. (2013). #earthquake: Twitter as a distributed sensor system. *Transactions in GIS*, 17(1), 124–147.

Dabbagh, A.(2020). The role of Instagram in public health education in COVID-19 in Iran. *Journal of Clinical Anesthesia*. 65. 109887

Danielle, T., Bert, M., Anne, S. & Job K. (2004). Different formats for communicating surgical risks to patients and the effect on choice of treatment. *Patient Education and Counseling.*;54(3):255-263. DOI:10.1016/S0738-3991(03)00238-6

Dash, S.P. (2020). The Impact of IoT in Healthcare: Global Technological Change & The Roadmap to a Networked Architecture in India. *J Indian Inst Sci*. 100. 773–785

Daszak, P. (2012). Anatomy of a pandemic. The Lancet, 380(9857), 1883-1884.

Datta, R., Yadav, A. K., Singh, A., Datta, K. & Bansal, A. (2020). The infodemics of COVID-19 amongst healthcare professionals in India, *Medical Journal Armed Forces India*, In press, corrected proof, https://doi.org/10.1016/j.mjafi.2020.05.009

Davey, G. C. (2016). Social media, loneliness, and anxiety in young people. Psychology Today, December, 15.

Davis, C. P. (2019). Nipah virus infection (NiV) facts. Available at: https://www.medicinenet.com/nipah_virus_infection/article.htm#nipah_virus_infection_niv_facts (accessed 13 May 2019).

Davison, H. K., Bing, M. N., Kluemper, D. H., & Roth, P. L. (2016). Social Media as a Personnel Selection and Hiring Resource: Reservations and Recommendations. *Social Media in Employee Selection and Recruitment*, 15–42. doi:10.1007/978-3-319-29989-1_2

Deibert, R.J. (2019). The Road to Digital Unfreedom: Three Painful Truths About Social Media. *Journal of Democracy*. 30(1), 25-39. doi:10.1353/jod.2019.0002.

Delcker, J., BRown, S. (2020). Europe shares code for new coronavirus warning app, Politico, (1 April 2020), https://www.politico.eu/article/europe-cracks-code-for-coronavirus-warning-app/, Accessed 12 July 2020.

Denzin, N.K. (1970). The research act: A theoretical introduction to sociological methods. New Jersey: Transaction Publishers.

Depoux, A. Martin, S. Karafillakis, E. Bsd RP. Preet, R. Wilder-Smith, A. & Larson, H. (2020). The pandemic of social media panic travels faster than the COVID-19 outbreak, *Journal of Travel Medicine,* taaa03. https://doi.org/10.1093/jtm/taaa03

Derickson, D. & Müller, M. (2008). Fundamentals of Digital Communications Systems. Available at:

http://www.informit.com/articles/article.aspx?p=1157195 (accessed 13 May 2019).

Dewett, T., Denisi, A.S. (2004). Exploring scholarly reputation: It's more than just productivity. *Scientometrics* . 60. 249–272. https://doi.org/10.1023/B:SCIE.0000027796.55585.61

Dewey, D. R., & Lu, K. H. (1959). A Correlation and Path-Coefficient Analysis of Components of Crested Wheatgrass Seed Production1. *Agronomy Journal*, 51(9), 515.

Dey, A. & Nidhi R. N. (2014). Rising burden of geriatric mental illness—Need for more specialized training. *Journal of Clinical Gerontology and Geriatrics*, 5(4). 143-144.

Dhama, K., Khan, S., Tiwari, R., Sircar, S., Bhat, S., Malik, Y. S., Singh, K. P., Chaicumpa, W., Bonilla-Aldana, D. K., & Rodriguez-Morales, A. J. (2020). Coronavirus Disease 2019-COVID-19. *Clinical microbiology reviews*, 33(4), e00028-20. https://doi.org/10.1128/CMR.00028-20

Diamond, J. C. (1999). Because cowards get cancer too. Vermillion.

Dillard, J. P., Li, R., Meczkowski, E., Yang, C. & Shen, L. (2017). Fear responses to threat appeals, functional form, methodological considerations, and correspondence between static and dynamic data. *Communication Research*, 44, 997–1018.

Donald, P. F. (2010). Successes and failures: Worldwide vaccine development and application. Biologicals. 38(5), 523-8

Donald, P. F. (2010). Successes and failures: Worldwide vaccine development and application. *Biologicals*. 38 (5). 523-8

Dor, D. (2003). On newspaper headlines as relevance optimizers. *Journal of Pragmatics,* 35(5), 695-721.

Dubé, E. & Noni, E.M.(2017). Vaccination resilience: Building and sustaining confidence in and demand for vaccination. *Vaccine*. 35(32). 3907-3909. doi: 10.1016/j.vaccine.2017.06.015

Dubé, E.(2017). Addressing vaccine hesitancy: the crucial role of healthcare providers. Clinical Microbiology and Infection. 23(5), 279-280, doi: 10.1016/j.cmi.2016.11.007

Dubé, E., Dominique, G. & Emily, N., Stanley Jeram & Melanie Schuster(2014). vaccine hesitancy—Country-specific characteristics of a global phenomenon. *Vaccine*.32, 6649–6654, doi: 10.1016/j.vaccine.2014.09.039

Dubey, S., Biswas, P., Ghosh, R., Chatterjee, S., Dubey, M. J., Chatterjee, S., Lahiri, D., & Lavie, C. J. (2020). Psychosocial impact of COVID-19. *Diabetes & metabolic syndrome,* 14(5), 779–788. Advance online publication. https://doi.org/10.1016/j.dsx.2020.05.035

Duffy, B. E., Pruchniewska, U. & Scolere, L., (2017). Platform-Specific Self-Branding: Imagined Affordances of the Social Media Ecology. In *Proceedings of the 8th International Conference on Social Media & Society (#SMSociety17).* Association for Computing Machinery, New York, NY, USA, Article 5, 1–9. DOI:https://doi.org/10.1145/3097286.3097291

Duggan, M. & Smith, A.(2016). The political environment on social media. Pew Research Centre, https://www.pewinternet.org/2016/10/25/the-political-environment-on-social-media/ (May 15, 2018)

Duke, E. & Montag, C., (2017). Smartphone addiction, daily interruptions and self-reported productivity. *Addict. Behav*. Rep. 6, 90–95.

Dunwoody, S. & Peters, H. P.(1992). Mass media coverage of technological and environmental risks: A survey of research in the United States and Germany. *Public Understanding of Science*, 1, 199–230. doi:10.1088/0963-6625/1/2/004

Dyda, A., King, C., Dey, A., Leask, J., & Dunn, A. G. (2020). A systematic review of studies that measure parental vaccine attitudes and beliefs in childhood vaccination. *BMC public health*, 20(1), 1253. https://doi.org/10.1186/s12889-020-09327-8

Dyer, O.(2018). Vaccine safety: Russian bots and trolls stoked online debate. research find. *BMJ*, 362, k3739

Eagleton Institute of Politics. (2014, October 8). New Jerseyans concerned about possibility of U.S. Ebola outbreak. Author. Retrieved from http://eagletonpoll.rutgers.edu/rep-ebola-concerns/

El Khamali, R., Mouaci, A., Valera, S., Cano-Chervel, M., Pinglis, C., Sanz, C. & D'Anna, F. (2018). Effects of a multimodal program including simulation on job strain among nurses working in intensive care units: a randomized clinical trial. *Jama*, 320(19), 1988-1997.

Elhai, J. D., Yang, H., McKay, D., & Asmundson, G. J. G. (2020). COVID-19 anxiety symptoms associated with problematic smartphone use severity in Chinese adults. *Journal of Affective Disorders*, 274. https://doi.org/10.1016/j.jad.2020.05.080

Express Webdesk. (2018). 483 dead in Kerala floods and landslides, losses more than annual plan outlay: Pinarayi Vijayan. https://indianexpress.com/article/india/483-dead-in-kerala-floods-and-landslides-losses-more-than-annual-plan-outlay-pinarayi-vijayan-5332306/(Mar.13, 2019)

Eysenbach G. (2020). How to Fight an Infodemic: The Four Pillars of Infodemic Management. *Journal of medical Internet research*, 22(6), e21820. https://doi.org/10.2196/21820

Faasse, K., Chatman, C. J., & Martin, L. R. (2016). A comparison of language use in pro- and anti-vaccination comments in response to a high profile Facebook post. *Vaccine*, 34(47), 5808–5814.

Falk, R. F., & Miller, N. B. (1992). A primer for soft modeling. Akron, OH: The University of Akronn Press.

Falls, A.D. (2013). Brand management in social media environments: An institutional theory perspective. *Doctoral dissertation*, University of Ulster, uk.bl.ethos.603532

Fani, M., Teimoori, A. & Ghafari, S. (2020). Comparison of the COVID-2019 (SARS-CoV-2) pathogenesis with SARS-CoV and MERS-CoV infections. *Future Virol.* https://doi.org/10.2217/fvl-2020-0050.

Farnan, J.M., Snyder. S.L., Worster, B.K., et al.(2013). Online medical professionalism: patient and public relationships: policy statement from the American College of Physicians and the Federation of State Medical Boards. *Ann Intern Med*. 158(8), 620–627.

Fielding, N. G. (2012). Triangulation and Mixed Methods Designs: Data Integration With New Research Technologies. *Journal of Mixed Methods Research*, 6(2), 124–136. https://doi.org/10.1177/1558689812437101

Fitzpatrick, M. (2007). Vaccine: The Controversial Story of Medicine's Greatest Lifesaver. *Journal of the Royal Society of Medicine*. 100 (5).241.

Fitzpatrick, M.(2007). Vaccine: The Controversial Story of Medicine's Greatest Lifesaver. *Journal of the Royal Society of Medicine*.;100(5):241.

Flynn D, Nyhan B & Reifler J. (2017). The nature and origins of misperceptions: understanding false and unsupported beliefs about politics. *Adv. Political Psychol*. 38:127–50

Flyvbjerg, B. (2006) 'Five Misunderstandings about Case-Study Research', *Qualitative Inquiry*, 12, 2, 219-245.

Fogelson, N.S., Rubin, Z.A. & Ault, K.A.(2013). Beyond likes and tweets: an in-depth look at the physician social media landscape. *Clin Obstet Gynecol*. 56(3), 495–508

Folkman, S. (2010). Stress, Health, and Coping: Synthesis, Commentary, and Future Directions. The Oxford Handbook of Stress, *Health, and Coping*. Oxford University Press

Fomell, C. & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *J. Mar. Res.*, 18. 39-50.

Fox, J., Cruz, C. & Lee, J. Y. (2015). Perpetuating online sexism offline: Anonymity, interactivity, and the effects of sexist hashtags on social media, *Computers in Human Behavior*. 52. 436-442

Freelon, D., McIlwain, C. & Clark, M. (2018). Quantifying the power and consequences of social media protest. *New Media & Society*, 20(3), 990-1011.

Freimuth, V. (1985). Developing the public service advertisement for nonprofit marketing. In: Belk RW, editor. *Advances in nonprofit marketing: a research manual*. New York: JAI Press Inc., 55-93.

Freimuth, V., Linnan, H. W. & Potter, P(2000). Communicating the Threat of Emerging Infections to the Public. *Emerging Infectious Diseases*. 6(4), 337-347. https://dx.doi.org/10.3201/eid0604.000403.

Freimuth, V., Linnan, H. W. & Potter, P. (2000). Communicating the threat of emerging infections to the public. *Emerging infectious diseases*, 6(4), 337-347.

Fuks, A. (2010). The Military Metaphors of Modern Medicine. *In The Meaning Management Challenge: Making Sense of Health, Illness and Disease.* Leiden, The Netherlands: Brill. doi: https://doi.org/10.1163/9781848880238_006

Gabarron, E., Dorronzoro, E., Rivera-Romero, O. & Wynn, R. (2018). Diabetes on Twitter: A Sentiment Analysis. *Journal of diabetes science and technology*, 1932296818811679.

Gagliano, A., Paul, E., Booten, K. & Hearst, M. A. (2016). Intersecting word vectors to take figurative language to new heights. In Proceedings of the Fifth *Workshop on Computational Linguistics for Literature.* NAACL-HLT 2016. 20 –31, San Diego, CA: Association for Computational Linguistics.

Gao, H., Barbier, G. & Goolsby, R.(2011). Harnessing the crowdsourcing power of social media for disaster relief. *IEEE Intelligent Systems*, 26.3, 10–14.

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H. & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLoS One* 15, e0231924.

Garfin, D.R., Silver, R.C. & Holman, E.A. (2020). The novel coronavirus (COVID-2019) outbreak: amplification of public health consequences by media exposure. *Health Psychol.* 39 (5), 355–357. https://doi.org/10.1037/hea0000875.

Gath, S.J. & Kulkarni, R.V. (2014). A Review: expert system for diagnosis of myocardial infarction. *arXiv preprint arXiv*:1401.0245.

Gatignon, H. & Robertson, T. S. (1986). An Exchange Theory Model of Interpersonal Communication. in *NA - Advances in Consumer Research*. 13, eds. Richard J. Lutz, Provo, UT : Association for Consumer Research, 534-538.

Gefen, D., Straub, D. & Boudreau, M. (2000). Structural equation modeling and regression-Guidelines for research practice. Commun. *Assoc. Inform. Syst*, 7. 1-78.

George D.R., Rovniak L.S. & Kraschnewski J.L. (2013). Dangers and opportunities for social media in medicine. *Clin Obstet Gynecol*. 56(3):453-62.

Gerjo, K., Gjalt-Jorn, Y. P., Loes, T. E. Kessels, G. A. Ten, H. & Robert, A. C. R.(2018). Ignoring theory and misinterpreting evidence: the false belief in fear appeals. *Health Psychology Review*. 12(2). 111-125., DOI: 10.1080/17437199.2017.1415767

Gibbs, R. W., Jr, & Franks, H. (2002). Embodied metaphor in women's narratives about their experiences with cancer. *Health communication*, 14(2), 139–165. https://doi.org/10.1207/S15327027HC1402_1

Giri, A.K.& Rana, D.R.S.J.B.(2020). Charting the challenges behind the testing of COVID-19 in developing countries: Nepal as a case study, *Biosafety and Health*, In press. https://doi.org/10.1016/j.bsheal.2020.05.002

Glaser, B., Strauss, A. (1967). The discovery of grounded theory. Chicago, IL: Aldine.

Godbole, N., Srinivasaiah, M. & Skiena, S. (2007). Large-Scale Sentiment Analysis for News and Blogs. *Icwsm*, 7(21), 219-222.

Goering, E. M.(2015). Metaphors as mirrors into what it means to be diabetic. In M.Antón & E. M.Goering (Eds.), *Understanding patients' voices. A multi-method approach to health discourse.* 71–86. Amsterdam, The Netherlands: John Benjamins.

Goeuriot, L., Na, J. C., Min Kyaing, W. Y., Khoo, C., Chang, Y. K., Theng, Y. L. & Kim, J. J. (2012, January). Sentiment lexicons for health-related opinion mining. *In Proceedings of the 2nd ACM SIGHIT International Health Informatics Symposium*. 219-226. ACM.

Goldschmidt K. (2020). The COVID-19 Pandemic: Technology use to Support the Wellbeing of Children. *Journal of pediatric nursing*, 53, 88–90. https://doi.org/10.1016/j.pedn.2020.04.013

Gomber, S., Arora, S. K., Das, S., & Ramachandran, V. G. (2011). Immune response to second dose of MMR vaccine in Indian children. *The Indian journal of medical research*, 134(3), 302–306.

Goncalves, J., Liu, Y. Xiao, B., Chaudhry, S., Hosio, S. & Kostakos. V. (2015). Increasing the Reach of Government Social Media: A Case Study in Modeling Government-Citizen Interaction on Facebook. *Policy and Internet* 7 (1): 80–102.

Goodell J. W. (2020). COVID-19 and finance: Agendas for future research. *Finance research letters,* 35, 101512. https://doi.org/10.1016/j.frl.2020.101512

Gordon, J.G., & Asmundson, T. S. (2020). Coronaphobia: Fear and the 2019-nCoV outbreak, *Journal of Anxiety Disorders*, 70, 102196

Gorwa, R. (2019) What Is Platform Governance?. *INFO, COMM.&SOC'Y*. 22. 854

Grabe, M. E., Lang, A. & Zhao, X. (2003). News content and form: Implications for memory and audience evaluations. *Communication Research*, 30, 387–413. doi:10.1177/0093650203253368

Gradmann, C. (2000). Invisible enemies: bacteriology and the language of politics in Imperial Germany. *Science in Context.* 13 :1. 9-30.

Greaves, F., Ramirez-Cano, D., Millett, C., Darzi, A. & Donaldson, L. (2013). Use of sentiment analysis for capturing patient experience from free-text comments posted online. *Journal of medical Internet research,* 15(11), e239.

Grech V. (2017). Fake news and post-truth pronouncements in general and in early human development. *Early human development,* 115, 118–120. https://doi.org/10.1016/j.earlhumdev.2017.09.017

Greenwood, B. (2014). The Contribution of Vaccination to Global Health: Past, Present and Future. *Philosophical Transactions of the Royal Society B: Biological Sciences.*369(1645), 20130433.

Greenwood, B. (2014). The Contribution of Vaccination to Global Health: Past, Present and Future. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 369 (1645). 20130433.

Grindrod, K., Forgione, A., Tsuyui, R.T. et al. (2014). Pharmacy 2.0: a scoping review of social media use in pharmacy. *Res Social Adm Pharm.* 10(1), 256–270.

Grover, S., Dua, D., Sahoo, S., Mehra, A., Nehra, R., & Chakrabarti, S. (2020). Why all COVID-19 hospitals should have mental health professionals: The importance of mental health in a worldwide crisis!. *Asian journal of psychiatry*, 51, 102147. Advance online publication. https://doi.org/10.1016/j.ajp.2020.102147

Gruzd, A., Lannigan, J. & Quigley, K. (2018). Examining government cross-platform engagement in social media: Instagram vs Twitter and the big lift project. *Government Information Quarterly*, 35(4), 579–587.

Gu, Z., Badger, P., Su, J., Zhang, E., Li, X. & Zhang, L. A. (2018). vaccine crisis in the era of social media. *Natl. Sci. Rev.*, 5, 8–10

Guillaume, B. (2018). Mathematical models and vaccination strategies. *Vaccine.;* 36(36): 5366-5372. doi: 10.1016/j.vaccine.2017

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414-433.

Hallam, L., De Backer, C. J., & Walrave, M. (2019). Taking it to the next level: The negligible role of trust when online dating goes offline. *Computers in Human Behavior*, 90, 259-264.

Harari, G. M., Vaid, S. S., Müller, S. R., Stachl, C., Marrero, Z., Schoedel, R., Bühner, M., & Gosling, S. D. (2020). Personality Sensing for Theory Development and Assessment in the Digital Age. *European Journal of Personality*, 34(5), 649–669. https://doi.org/10.1002/per.2273

Harit, A. K., Ichhpujani, R. L., Gupta, S. & Gill, K. S. (2006). Nipah/Hendra virus outbreak in Siliguri, West Bengal, India in 2001. *Indian Journal of Medical Research*, 123(4), 553.

Harris, J. K., Moreland-Russell, S., Choucair, B., Mansour, R., Staub, M., & Simmons, K. (2014). Tweeting for and against public health policy: response to the Chicago Department of Public Health's electronic cigarette Twitter campaign. *Journal of Medical Internet Research*, 16(10), e238.

Hartley, K. & Vu, M.K. (2020). Fighting fake news in the COVID-19 era: policy insights from an equilibrium model. *Policy Sci* 53, 735–758. https://doi.org/10.1007/s11077-020-09405-z

Hartley, K., & Vu, M. K. (2020). Fighting fake news in the COVID-19 era: policy insights from an equilibrium model. *Policy sciences*, 1–24. Advance online publication. https://doi.org/10.1007/s11077-020-09405-z

Haufler, v. (2001). A public role for the private sector: industry self regulation in a global economy. *Carnegie Endowment for International Peace*. 8.

Hayman, D. T., & Johnson, N. (2014). Nipah Virus: A Virus with Multiple Pathways of Emergence. *In the Role of Animals in Emerging Viral Diseases*. 293-315. Academic Press.

Heena, S. & Sharma, H. (2020). Role of social media during the COVID-19 pandemic: Beneficial, destructive, or reconstructive?. *International Journal of Academic Medicine*. 6(2). 70-75

Heidi, J. Larson., Caitlin Jarrett., William S. Schulz., Mohuya Chaudhuri. Yuqing Zhou. Eve Dube. Et al.(2015). The SAGE Working Group on Vaccine Hesitancy, Measuring vaccine hesitancy: The development of a survey tool. 33(34), 4165-4175, doi: 10.1016/j.vaccine.2015.04.037

Heidi, J.L., Caitlin, J., Elisabeth, Eckersberger. David, M.D. & Smith, Pauline Paterson (2014). Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature 2007–2012. *Vaccine*.32(19). 2150-215

Helm, C. & Jones, R. (2010). Brand governance: the new agenda in brand management. *Brand Management*, 17, 545–547.

Hemsley, J., Jacobson, J., Gruzd, A., & Mai, P. (2018). Social Media for Social Good or Evil: An Introduction. *Social Media + Society*. https://doi.org/10.1177/2056305118786719

Hennessy, C. M., Smith, C. F., Greener, S., & Ferns, G. (2019). Social media guidelines: a review for health professionals and faculty members. *The clinical teacher*, 16(5), 442–447. https://doi.org/10.1111/tct.13033

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The Use of Partial Least Squares Path Modeling in International Marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.), *Advances in International Marketing*. 20. 277-320. Bingley: Emerald

Hernández-García I. & Giménez-Júlvez T. (2020). Assessment of health information about COVID-19 prevention on the internet: infodemiological study. *JMIR Public Health Surveill.* 6 (2), e18717. https://doi.org/10.2196/18717

Heymann, D.L. & Shindo, N.(2020). COVID-19: what is next for public health? *Lancet* (London, England) 395(10224.542–5.

High, A. C., & Buehler, E. M. (2019). Receiving supportive communication from Facebook friends: A model of social ties and supportive communication in social network sites. *Journal of Social and Personal Relationships*, 36(3), 719-740.

Hiltz, S.R. Kushma, J. A. & Plotnick, L. (2014). Use of social media by US public sector emergency managers: barriers and wish lists. In Proceedings of The 11th *International Conference on Information Systems for Crisis Response and Management* (ISCRAM 2014, pp. 602–611). Pennsylvania, USA: University Park.

Hodgkin P. (1985). Medicine is war: and other medical metaphors. *British medical journal (Clinical research ed.)*, 291(6511), 1820–1821. https://doi.org/10.1136/bmj.291.6511.1820

Hoffman, K. E., McCarthy, E. P., Recklitis, C. J., & Ng, A. K. (2009). Psychological distress in long-term survivors of adult-onset cancer: results from a national survey. *Archives of internal medicine*, 169(14), 1274–1281. https://doi.org/10.1001/archinternmed.2009.179

Hoffman, S. J., Mansoor, Y., Natt, N., Sritharan, L., Belluz, J., Caulfield, T., Freedhoff, Y., Lavis, J. N., & Sharma, A. M. (2017). Celebrities' impact on health-related knowledge, attitudes, behaviors, and status outcomes: protocol for a systematic

review, meta-analysis, and meta-regression analysis. *Systematic reviews,* 6(1), 13.

Hoffman, Steven, J. Mansoor. Yasmeen, Natt. Navneet, Sritharan. Lathika, Belluz. Et al(2017). Celebrities' impact on health-related knowledge, attitudes, behaviors, and status outcomes: protocol for a systematic review, meta-analysis, and meta-regression analysis. *Systematic Reviews*, 6(1), 13

Holt, D., Bouder, F., Elemuwa, C. et al. (2016). The importance of the patient voice in vaccination and vaccine safety—are we listening? *Clinical Microbiology and Infection,* 22(5), S146-S153. doi: 10.1016/j.cmi.2016.09.027

Holyoak, K. J., & Stamenković, D. (2018). Metaphor comprehension: A critical review of theories and evidence. *Psychological bulletin*, 144(6), 641–671. https://doi.org/10.1037/bul0000145

Hossain, M.T., Ahammed, B., Chanda, S.K., Jahan, N., Ela, M.Z. & Islam, M.N. (2020). Social and electronic media exposure and generalized anxiety disorder among people during COVID-19 outbreak in Bangladesh: A preliminary observation. *PLoS ONE* 15(9): e0238974.

Hosseinpoor, A. R., Bergen, N., Schlotheuber, A. & Boerma, T. (2018). National health inequality monitoring: current challenges and opportunities. *Global health action*. 11(sup1), 70-74.

Househ, M. (2013). The use of social media in healthcare: organizational, clinical, and patient perspectives. *Stud Health Technol Inform*. 183, 244–248.

https://www.facebook.com/search/top/?q=Nipah%2B%20Bangladesh&epa=SEARCH_BOX, Retrieved on June 3, 2018

Huang, J. & Liu, R. (2020). Xenophobia in America in the Age of Coronavirus and Beyond, *J Vasc Interv Radiol* 2020; 1–2, https://doi.org/10.1016/j.jvir.2020.04.020

Huiqi, Z., Ram D., João W. & Cangussu. (2011). Socioscope: Human Relationship and Behavior Analysis in Social Networks. *IEEE Transactions on Systems,* Man, and Cybernetics—Part A: Systems and Humans, 41( 6), 1122-1143

Humphries, R. (2015). Integrated health and social care in England–Progress and prospects. *Health Policy*, 119(7), 856-859.

IFEG.(2015). Interoperability Framework for e-Governance (IFEG). Department of Electronics and Information Technology (DeitY), Ministry of Communications & Information Technology (MCIT), Government of India (GoI), 1. http://egovstandards.gov.in/sites/default/files/Interoperability%20Framework%20For%20e-Governance%20(IFEG)%20Ver.1.0.pdf

IHRA. (2016). "New World Order And Depopulation In India, International Human Rights Association News", Youtube. Available from: https://www.youtube.com/watch?v=Z8jr6on6FvY&t=121s (Mar. 14, 2019)

Imran, M. Mitra, P. Castillo, C.(2016). Twitter as a Lifeline: Human-annotated Twitter Corpora for NLP of Crisis-related Messages. arXiv:1605.05894 [cs.CL]

Inna, L., Svetlana, B. & Svetlana, R. (2015). Impact Government Ict Strategy On India`S Growth. *International Journal of Business and Management Studies*. 04(02):145–156

Institute of Medicine (US) Forum on Microbial Threats. (2006). Ending the War Metaphor: The Changing Agenda for Unraveling the Host-Microbe Relationship. Washington (DC): National Academies Press (US); *The National Academies Collection: Reports funded by National Institutes of Health*. DOI: 10.17226/11669

Ishii, K., Lyons, M. M., & Carr, S. A. (2019). Revisiting media richness theory for today and future. *Human Behavior and Emerging Technologies*, 1(2), 124-131.

Jack, C. (2017). Lexicon of lies: Terms for problematic information. *Data & Society*, 3.

Jaeger, P. T. & Thompson, K. M. (2003) E-government around the world: Lessons, challenges, and future directions, *Government Information Quarterly* (20), 389 - 394.

Jain, M.A. (2020). Use of War Metaphors For COVID Divides People, Spreads Fear, *Indiaspend*, 2020, Retrieved from: https://www.indiaspend.com/use-of-war-metaphors-for-covid-divides-people-spreads-fear/.

Jeffrey, H. (2008). English in India. Facts and Details, Available from: http://factsanddetails.com/india/People_and_Life/sub7_3b/entry-4146.html, (Mar. 14, 2019)

Jelinek, A. (2020), European Data Protection Board, 'Statement on the Processing of Personal Data in the Context of the COVID-19 Outbreak. Adopted on 19 March 2020' https://edpb.europa.eu/sites/edpb/files/files/file1/edpb _ statement _ 2020 _ processingpersonaldataandcovid-19 _ en.pdf

Jensen, M. J. & Bang, H. P. (2013). Occupy Wall Street: A new political form of movement and community?. *Journal of Information Technology & Politics*, 10(4), 444-461.

Jeong, H., Yim, H. W., Song, Y. J., Ki, M., Min, J. A., Cho, J. & Chae, J. H. (2016). Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiology and health*, 38, e2016048. https://doi.org/10.4178/epih.e2016048

Jessica Castner(2020), Infection Control and Vaccine Hesitancy in the Emergency Department, Journal of Emergency Nursing, 46(6), 731-738

Ji, X., Chun, S. A. & Geller, J. (2012, April). Epidemic outbreak and spread detection system based on twitter data. *In International Conference on Health Information Science* (pp. 152-163). Springer, Berlin, Heidelberg.

Jieun, S., Lian, J., Kevin, D. & François B. (2018). The diffusion of misinformation on social media: Temporal pattern, message, and source. *Computers in Human Behavior,* 83, 278-287

Jing-Schmidt, Z. & Peng, X. (2017). Winds and tigers: metaphor choice in China's anti-corruption discourse. *lingua. sin.* 3, 2. https://doi.org/10.1186/s40655-016-0017-9

Jockers, M. (2017). Introduction to the Syuzhet Package. Available: https://cran.r-project.org/web/packages/syuzhet/vignettes/syuzhet-vignette.html (accessed on 26 May 2019).

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14–26. https://doi.org/10.3102/0013189X033007014

Jones, N.M., Thompson, R. R., Dunkel S. C. & Silver, R. C. (2017). Distress and rumor exposure on social media during a campus lockdown. *Proceedings of the*

*National Academy of Sciences of the United States of America,* 114(44), 11663–11668.

Jones-Bitton, A., Best, C., MacTavish, J. et al. (2020)Stress, anxiety, depression, and resilience in Canadian farmers. *Soc Psychiatry Psychiatr Epidemiol* 55, 229–236. https://doi.org/10.1007/s00127-019-01738-2

Joon Jang, S. (2007). Gender differences in strain, negative emotions, and coping behaviors: A general strain theory approach. *Justice Quarterly*, 24(3), 523-553.

Joppe, M. (2000). The research process. 2000. https://www.researchgate.net/publication/44286439_Reliability_and_Validity_of_Qualitative_and_Operational_Research_Paradigm.

Jung, Y. (2011). Understanding the Role of Sense of Presence and Perceived Autonomy in Users' Continued Use of Social Virtual Worlds. *Journal of Computer-Mediated Communication.* 16 (4). 492–510, https://doi.org/10.1111/j.1083-6101.2011.01540.x

Kabra, G., Ramesh, A., Akhtar, P. & Dash, M. K. (2017). Understanding behavioural intention to use information technology: insights from humanitarian practitioners. *Telematics Inform.* 34, 1250–1261. doi: 10.1016/j.tele.2017.05.010

Kaewkitipong, L., Chen, C.C. & Ractham, P.(2016). A communitybased approach to sharing knowledge before, during, and after crisis events: a case study from Thailand. *Computers in Human Behavior*, 54, 653–666.

Kamyabniya, A., Lotfi, M.M. Naderpour & Yuehwern Yih(2018). Robust Platelet Logistics Planning in Disaster Relief Operations Under Uncertainty: a Coordinated Approach. *Inf Syst Front,* 20(4),759-782. https://doi.org/10.1007/s10796-017-9788-5

Kaniasty, K., (2020). Social support, interpersonal, and community dynamics following disasters caused by natural hazards, *Current Opinion in Psychology*, 32, 105-109.

Kankanhalli, A., Hahn, J., Tan, S. & Gao, G. (2016). Big data and analytics in healthcare: introduction to the special section. *Information Systems Frontiers*, 18(2), 233–235.

Kapoor, K.K., Tamilmani, K., Rana, N.P., Patil, P., Dwivedi, Y.K. & Nerur, S. (2017). Advances in social media research: Past, Present and Future. *Information Systems Frontiers*, 20(3), 531-558.

Karasneh, R., Al-Azzam, S., Muflih, S., Soudah, O., Hawamdeh, S. & Khader, Y.(2020). Media's effect on shaping knowledge, awareness risk perceptions and communication practices of pandemic COVID-19 among pharmacists. *Res Social Adm Pharm.*.S1551-7411(20).30430-7. doi:10.1016/j.sapharm.2020.04.027

Kareem, P.A(2016). mujahideen vedhiyile vaccine virudha prasangam. Youtube. Available from: https://www.youtube.com/watch?v=Gpl-bZE-89s(Mar. 14, 2019)

Karin, Hardt. Paolo, Bonanni, Susan, King. Jose Ignacio Santos. Mostafa El-Hodhod. Gregory D.Zimet. & Scott Preiss(2016). Vaccine strategies: Optimising outcomes. *Vaccine,* 34(52), 6691-6699

Karlsson, F., Frostenson, M., Prenkert, F., Kolkowska, E., & Helin, S. (2017). Inter-organisational information sharing in the public sector : A longitudinal case study on the reshaping of success factors. *Government Information Quarterly*, 567–577.

Kate, F., Casey J., Chatman. & Leslie R.Martin(2016). comparison of language use in pro- and anti-vaccination comments in response to a high profile Facebook post. *Vaccine,* 34(47), 5808-5814. doi: 10.1016/j.vaccine.2016.09.029

Kaufman N. (2010). Internet and information technology use in treatment of diabetes. *International journal of clinical practice*. Supplement, (166), 41–46. https://doi.org/10.1111/j.1742-1241.2009.02277.x

Keer, M., Van Den Putte, B. & Neijens, P.(2010). The role of affect and cognition in health decision making. *British Journal of Social Psychology*, 49, 143–153. doi:10.1348/014466609X425337

Kelly, S, Truong, M., Earp, M., Reed, L., Shahbaz, A. & Greco-Stoner, A. (2013). Freedom on the net 2013. A Global Assessment of Internet and Digital Media. https://freedomhouse.org/sites/default/files/resources/FOTN%202013_Full%20Report_0.pdf

Kelly, Y., Zilanawala, A., Booker, C., & Sacker, A. (2019). Social Media Use and Adolescent Mental Health: Findings From the UK Millennium Cohort Study. *E Clinical Medicine*, 6, 59–68. https://doi.org/10.1016/j.eclinm.2018.12.005

Kendal, D., Ford, R.M., Anderson, N.M. & Farrar, A.(2015). The VALS: a new tool to measure people's general valued attributes of landscapes. *J. Environ. Manage*, 163, 224-233.

Kermack W.O. & McKendrick A.G. (1927). A Contribution to the Mathematical Theory of Epidemics. *Proceedings of the Royal Soceity A*, 115 -700, DOI: 10.1098/rspa.1927.0118

Khadeeja, M. (2014). Rubella vaccine kuttikale ingane pedippikkano. Mathrubhumi, http://archives.mathrubhumi.com/online/malayalam/news/story/3173913/2014 -10-04/kerala (Mar. 14, 2019)

Khalid, I., Khalid, T. J., Qabajah, M. R., Barnard, A. G., & Qushmaq, I. A. (2016). Healthcare Workers Emotions, Perceived Stressors and Coping Strategies During a MERS-CoV Outbreak. *Clinical medicine & research*, 14(1), 7–14. https://doi.org/10.3121/cmr.2016.1303

Khan, M. T. & Khalid, S. (2016). Sentiment analysis for health care. In Big Data: Concepts, Methodologies, *Tools, and Applications* (pp. 676-689). IGI Global.

Khoury, J. E., Atkinson, L., Bennett, T., Jack, S. M., & Gonzalez, A. (2021). COVID-19 and mental health during pregnancy: The importance of cognitive appraisal and social support. *Journal of Affective Disorders,* 282, 1161–1169. https://doi.org/10.1016/j.jad.2021.01.027

Kietzmann, J.H., Hermkens, K., McCarthy, I.P. & Silvestre, B.S. (2011) Social media? Get serious! Understanding the functional building blocks of social media, *Business Horizons.* 54(3). 241-251

Kim, E. H. J., Jeong, Y. K., Kim, Y., Kang, K. Y. & Song, M. (2016). Topic-based content and sentiment analysis of Ebola virus on Twitter and in the news. *Journal of Information Science,* 42(6), 763-781.

Kim, H.S. & Sherman, D.K. (2007). Express Yourself": Culture and the Effect of Self-Expression on Choice. *Journal of Personality and Social Psychology*, 92(1), 1-11. http://dx.doi.org/10.1037/0022-3514.92.1.1

Kim, S. & K. Cho. (2005). Achieving Administrative Transparency Through Information Systems: A Case Study in the Seoul Metropolitan Government. In *Electronic Government*. Berlin Heidelberg: Springer, 113–23. http://link.springer.com/chapter/10.1007%2F11545156_11#page-1

Klausen, J. (2015). Tweeting the Jihad: Social media networks of western foreign fighters in Syria and Iraq. *Studies in Conflict & Terrorism*, 38(1), 1-22. http://dx.doi.org/10.1080/1057610X.2014.974948

Kok, G., Gottlieb, N. H., Peters, G.-J. Y., Mullen, P. D., Parcel, G. S., Ruiter, R. A. C. & Bartholomew, L. K.(2016). A taxonomy of behavior change methods; an intervention mapping approach. *Health Psychology Review*. 10(3). 297–312. doi: 10.1080/17437199.2015.1077155

Kolleck, N. (2013). Social network analysis in innovation research: using a mixed methods approach to analyze social innovations. *European Journal of Futures Research*, 1(1), 25.

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the Effectiveness of Work Groups and Teams. *Psychological Science in the Public Interest*, 7(3), 77–124.

Krasnova, H., Günther, O., Spiekermann, S. & Koroleva, K.(2009). Privacy concerns and identity in online social networks. *Identity in the Information Society*, 2, 39–63.

Kryvasheyeu, Y., Chen, H., Obradovich, N., Moro, E., Van Hentenryck, P., Fowler, J. & Cebrian, M. (2016). Rapid assessment of disaster damage using social media activity. *Science Advances*, 2(3), e1500779.

Kryvasheyeu, Y., Chen, H., Obradovich, N., Moro, E., Van Hentenryck, P., Fowler, J. & Cebrian, M. (2016). Rapid assessment of disaster damage using social media activity. *Science Advances*, 2(3), e1500779.

Kuhn, T.S. (1993). Metaphor in science. In Metaphor and Thought (Ortony, A., ed.), 533–542. Cambridge University Press.

Kuiken, J., Schuth, A., Spitters, M., & Marx, M. (2017). Effective headlines of newspaper articles in a digital environment. *Digital Journalism*, 5(10), 1300-1314.

Kulkarni, D. D., Tosh, C., Venkatesh, G., & Kumar, D. S. (2013). Nipah virus infection: current scenario. *Indian Journal of Virology*, 24(3), 398-408.

Kumar, A., Gupta, P. K., & Srivastava, A. (2020). A review of modern technologies for tackling COVID-19 pandemic. *Diabetes & metabolic syndrome*, 14(4), 569–573. https://doi.org/10.1016/j.dsx.2020.05.008

Kümpel, A. S., Karnowski, V. & Keyling, T. (2015). News Sharing in Social Media: A Review of Current Research on News Sharing Users, Content, and Networks. *Social Media + Society*. https://doi.org/10.1177/2056305115610141

Kyza, E. A., Varda, C., Panos, D., Karageorgiou, M., Komendantova, N., Perfumi, S. C., Shah, S. I. H. & Hosseini, A. S. (2020). Combating misinformation online: re-imagining social media for policy-making. *Internet Policy Review*, 9(4). https://doi.org/10.14763/2020.4.1514

Laal, M. L. & Ghodsi, S. M., (2012). Benefits of collaborative learning, *Procedia - Social and Behavioral Sciences*, 31, 486-490, ISSN 1877-0428.

Lake, B. M., Salakhutdinov, R., & Tenenbaum, J. B. (2015). Human-level concept learning through probabilistic program induction. Science (New York, N.Y.), 350(6266), 1332–1338. https://doi.org/10.1126/science.aab3050

Lakoff, G. & Johnson, M. (2003). Metaphors We Live By. Chicago: University of Chicago Press

Lambert, A. (2016). Intimacy and social capital on Facebook: Beyond the psychological perspective. *New Media & Society*, 18(11), 2559-2575.

Lambert, K.M., Barry, P. & Stokes, G. (2012). Risk management and legal issues with the use of social media in the healthcare setting. *J Healthc Risk Manag.* 31(4), 41-7.

Landau, M. J., Meier, B. P., & Keefer, L. A. (2010). A metaphor-enriched social cognition. *Psychological bulletin*, 136(6), 1045–1067. https://doi.org/10.1037/a0020970

Lane, H. P., McLachlan, S., & Philip, J. (2013). The war against dementia: are we battle weary yet?. *Age and ageing,* 42(3), 281–283. https://doi.org/10.1093/ageing/aft011

Laniado, D., Volkovich, Y., Scellato, S., Mascolo, C. & Kaltenbrunner, A. (2017). The impact of geographic distance on online social interactions. *Information Systems Frontiers,* 1–16. https://doi.org/10.1007/s10796-017-9784-9.

Lathia, N. , Pejovic, V. , Rachuri, K. K. , Mascolo, C. , Musolesi, M., & Rentfrow, P. J. (2013). Smartphones for large–scale behavior change interventions. *IEEE Pervasive Computing,* 12, 66–73.

Lazarus, R. S. & Folkman, S. (1984). Stress, appraisal, and coping. New York: Springer Publishing.

Lederman, R., Fan, H., Smith, S. & Chang, S(2014). Who can you trust? Credibility assessment in online health forums. *Health Policy and Technology*, 3(1), 13–25

Lee S, Chan L.Y., Chau, A.M., Kwok, K.P. & Kleinman, A. (2005). The experience of SARS-related stigma at Amoy Gardens. *Soc Sci Med*. 2005 Nov;61(9):2038-46.

Lee, J., Agrawal, M. & Rao, H. R. (2015). Message diffusion through social network service: The case of rumor and non-rumor related tweets during Boston bombing 2013. *Information Systems Frontiers,* 17(5), 997–1005.

Lee, J., Agrawal, M. & Rao, H. R. (2015). Message diffusion through social network service: The case of rumor and non-rumor related tweets during Boston bombing 2013. *Information Systems Frontiers*, 17(5), 997–1005.

Lee, J.J., Kang, K.A., Wang, M.P., Zhao, S.Z., Wong, J.Y.H., O'Connor, S., Yang, S.C. & Shin, S. (2020). Associations Between COVID-19 Misinformation Exposure and Belief With COVID-19 Knowledge and Preventive Behaviors: Cross-Sectional Online Study. *J Med Internet Res*. 22(11):e22205

Leigh-Hunt, N., Bagguley, D., Bash, K., Turner, V., Turnbull, S., Valtorta, N. & Caan, W. (2017). An overview of systematic reviews on the public health consequences of social isolation and loneliness, *Public Health*, 152. 157-171,

Li, X., Xie, H., Chen, L., Wang, J. & Deng, X. (2014). News impact on stock price return via sentiment analysis. *Knowledge-Based Systems*, 69, 14-23.

Liang, Wu, Fred Morstatter, Xia Hu & Huan Liu(2016). Mining Misinformation in Social Media. In: My T. Thai, Weili Wu, Hui Xiong Big Data in Complex and Social Networks. New York: Chapman and Hall/CRC;. 125-152

Limaye, R. J., Sauer, M., Ali, J., Bernstein, J., Wahl, B., Barnhill, A., & Labrique, A. (2020). Building trust while influencing online COVID-19 content in the social media world. *The Lancet. Digital health*, 2(6), e277–e278. Advance online publication. https://doi.org/10.1016/S2589-7500(20)30084-4

Lin, X., Kishore, R. (2021). Social Media-Enabled Healthcare: A Conceptual Model of Social Media Affordances, Online Social Support, and Health Behaviors and Outcomes. *Technological Forecasting and Social Change*, 166 1-15

Lin, Y. R. & Margolin, D. (2014). The ripple of fear, sympathy and solidarity during the Boston bombings. *EPJ Data Science*, 3(1), 31.

Lindsay, B. R. (2010). Social media and disasters: current uses, future options, and policy considerations. *Journal of Current Issues in Media & Telecommunications,* 2(4), 287–297.

Lindsay, B. R. (2011). Social media and disasters: Current uses, future options, and policy considerations.

Ling, A. E. (1999). Lessons to be learnt from the Nipah virus outbreak in Singapore. *Singapore medical journal*, 40(5), 331.

Lingzi, H., Cheng Fu, Jiahui Wu & Vanessa Frias-Martinez. (2018). Information Needs and Communication Gaps between Citizens and Local Governments Online during Natural Disaster. *Inf Syst Front,* 20(5), 1027-1039. https://doi.org/10.1007/s10796-018-9832-0

Liu, F., Burton-Jones, A. & Xu, D. (2014). Rumors on social media in disasters: Extending transmission to retransmission. *In PACIS*, 49.

Liu, L., Preotiuc-Pietro, D., Riahi Samani, Z., Moghaddam, M.E. & Ungar, L.(2016). Analyzing personality through social media profile picture choice. *In Tenth international AAAI conference on web and social media*, 211-220

Liu, L., Preotiuc-Pietro, D., Samani, Z. R., Moghaddam, M. E. & Ungar, L. (2016, March). Analyzing personality through social media profile picture choice. *In Tenth international AAAI conference on web and social media.*

Löckenhoff, C. E., & Carstensen, L. L. (2004). Socioemotional selectivity theory, aging, and health: The increasingly delicate balance between regulating emotions and making tough choices. *Journal of personality*, 72(6), 1395-1424.

Loeb, S., Sengupta, S., Butaney, M., Macaluso, J.N. Jr, Czarniecki, S.W., Robbins, R., Braithwaite, R.S., Gao, L., Byrne, N., Walter, D., Langford, A. (2018). Dissemination of Misinformative and Biased Information about Prostate Cancer on YouTube. *Eur Urol*. 75(4). 564-567. doi: 10.1016/j.eururo.2018.10.056.

Lombard. M. & Ditton. T., (1997). At the Heart of It All: The Concept of Presence. Journal of Computer-Mediated Communication. 3(2). *JCMC321*, https://doi.org/10.1111/j.1083-6101.1997.tb00072.x

Lorenz, N., Heim, E., Roetger, A., Birrer, E., & Maercker, A. (2019). Randomized Controlled Trial to Test the Efficacy of an Unguided Online Intervention with Automated Feedback for the Treatment of Insomnia. *Behavioural and cognitive psychotherapy*, 47(3), 287–302. https://doi.org/10.1017/S1352465818000486

Louise, C. H. & John, T. C. (2010). Loneliness Matters: A Theoretical and Empirical Review of Consequences and Mechanisms. *Annals of Behavioral Medicine*.40(2). 218–227, https://doi.org/10.1007/s12160-010-9210-8

Lu, Y., & Zhang, L. (2020). Social media WeChat infers the development trend of COVID-19. *The Journal of infection*, 81(1), e82–e83. https://doi.org/10.1016/j.jinf.2020.03.050

Luarn, P., Lin, Y.-F. and Chiu, Y.-P. (2015). Influence of Facebook brand-page posts on online engagement. *Online Information Review*, 39(4). 505-519. https://doi.org/10.1108/OIR-01-2015-0029

Luarn, P., Yang, J. C., & Chiu, Y. P. (2014). The network effect on information dissemination on social network sites. *Computers in Human Behavior*, 37, 1-8.

Luna-Reyes, L. F., Andersen, D. F., Richardson, G. P., Pardo, T. A. & Cresswell. A. M. (2007). Emergence of the governance structure for information integration across governmental agencies: a system dynamics approach. In Proceedings of the 8th annual international conference on Digital government research: bridging disciplines & domains (dg.o '07). *Digital Government Society of North America*, 47–56

Luna-Reyes, L. F., Gil-Garcia, J. R. & Cruz, C. B. (2007). Collaborative digital government in Mexico: Some lessons from federal Web-based

interorganizational information integration initiatives, *Government Information Quarterly* (24), 808-826.

Mackenbach, J. P. (2012). The persistence of health inequalities in modern welfare states: the explanation of a paradox. *Social science & medicine*, 75(4), 761-769.

Mackenbach, J.P.(2012). The persistence of health inequalities in modern welfare states: Explanation of a paradox. *Social sciences and Medicine*, 75, 761-769

Mailath, G. J. (2001), Who wants a good reputation?. *Review of Economic Studies*. 68. 415–441

Makri, A. (2019). Bridging the digital divide in health care. *Digital Health*. 1(5). E204-E205

Malayalam Troll. (2018). Nipah Virus | Mohanan Vaidyar | malayalam troll, Available: https://www.youtube.com/watch?v=-sLUPt-m-Nc&t=27s (accessed on 21 May 2018).

Malgieri, G.(2020), Data protection and research: A vital challenge in the era of COVID-19 pandemic, *computer law & security review*. 37. 105431

Malm H. (2016). Military Metaphors and Their Contribution to the Problems of Overdiagnosis and Overtreatment in the "War" Against Cancer. *The American journal of bioethics* : AJOB, 16(10), 19–21. https://doi.org/10.1080/15265161.2016.1214331

Mao, Y., Xiao, H., Ding, C. et al. (2020). The role of attention in the relationship between early life stress and depression. *Sci Rep.* 10. 6154.

Margolin, D. & Liao, W. (2018). The emotional antecedents of solidarity in social media crowds. *new media & society*, 20(10), 3700-3719.

Margolis, E. (2020). These self-appointed coronavirus experts really need to pipe down, The Guardian. Accessed on May 13, 2020; https://www.theguardian.com/commentisfree/2020/mar/10/coronavirus-experts-donald-trump-nigel-farage-twitter

Marian. (2012). Anti-Vaccination Movement and Parental Refusals of Immunization of Children in USA. *Pediatria polska*, 87, 381–385, https://doi.org/10.1016/j.pepo.2012.05.003

Marjolijn, L. A., Tates, K. & Theodoor, E. N. (2013). Patients' and health professionals' use of social media in health care: motives, barriers and expectations. *Patient education and counseling*. 92(3). 426-431

Marunadan TV. (2018). Jacob Vadakkanchery about nipah virus, Available: https://www.youtube.com/watch?v=H6Q6EWPxDJk&t=109s (accessed on 21 May 2018).

Marwick, A., & Lewis, R. (2017). Media manipulation and disinformation online. New York: *Data & Society Research Institute*. [white paper].

Mattoni, A. (2017). A situated understanding of digital technologies in social movements. Media ecology and media practice approaches, *Social Movement Studies,* 16(4), 494-505, DOI: 10.1080/14742837.2017.1311250

Maxwell, J. A. (2010). Using numbers in qualitative research. *Qualitative Inquiry*, 16, 475-482.

Mazzoni, S. E., Brewer S. E., Pyrzanowski J. L., et al. (2016). Effect of a multi-modal intervention on immunization rates in obstetrics and gynecology clinics. *Am J Obstet Gynecol,* 214(617), e1-7.

Mazzoni, S. E., Brewer, S. E., Pyrzanowski, J. L., Durfee, M. J., Dickinson, L. M., Barnard, J. G., Dempsey, A. F., & O'Leary, S. T. (2016). Effect of a multi-modal intervention on immunization rates in obstetrics and gynecology clinics. *American journal of obstetrics and gynecology*, 214(5), 617.e1–617.e6177.

Mbituyumuremyi, A., Van Nuil, J. I., Umuhire, J., Mugabo, J., Mwumvaneza, M., Makuza, J. D., Mwumvaneza, M., Makuza, J. D., Umutesi, J., Nsanzimana, S. & Gupta, N. (2018). Controlling hepatitis C in Rwanda: a framework for a national, 96, 51-58

McCartney M. (2014). The fight is on: military metaphors for cancer may harm patients. BMJ (*Clinical research ed.*), 349, g5155. https://doi.org/10.1136/bmj.g5155

McCartney, G., Collins, C. & Mackenzie, M. (2013). What (or who) causes health inequalities: theories, evidence and implications?. *Health Policy*, 113(3), 221-227.

McClure, C. C., Cataldi, J. R., & O'Leary, S. T. (2017). Vaccine Hesitancy: Where We Are and Where We Are Going. *Clinical therapeutics*, 39(8), 1550–1562.

McClure, Catherine C.Cataldi. Jessica R. O'Leary & Sean T.(2017). Vaccine Hesitancy: Where We Are and Where We Are Going. *Clinical Therapeutics*. 39(8), 1550 – 1562

McGuire, M. & Dowling, S. (2013). Cyber-crime: A review of the evidence Summary of key findings and implications Home Office Research Report 75, Home Office, United Kingdom, October. 30p.

McIntosh, E., David G., Janda. Jan., Ehrich. Jochen H.H., et al(2016). Vaccine Hesitancy and Refusal. *The Journal of Pediatrics*.175:248 - 249.e1

McKay, D., Heisler, M., Mishori, R., Catton, H., & Kloiber, O. (2020). Attacks against health-care personnel must stop, especially as the world fights COVID-19. *Lancet* (London, England), 395(10239), 1743–1745. https://doi.org/10.1016/S0140-6736(20)31191-0

McTigue, K. M. & Hess, R. (2011). What role can the internet play in preventing diabetes?. *Diabetes Manage*. 1(1), 9–12

Mehmet, M., Roberts, R., & Nayeem, T. (2020). Using digital and social media for health promotion: A social marketing approach for addressing co-morbid physical and mental health. *The Australian journal of rural health*. 28(2), 149–158. https://doi.org/10.1111/ajr.12589

Meity. (2010). Framework & Guidelines for Use of Social Media for Government organisations. Department of Electronics and Information Technology Ministry of Communications & Information Technology Government of India. Accessed from https://ssb.nic.in/WriteReadData/LINKS/Social%20Media%20%20Guidelines 96092595-b7c0-42ff-9468-e808f4e2325d.pdf. Accessed on March 01, 2021

Melanie, S., Juhani, E. & Philippe D.(2015). Review of vaccine hesitancy: Rationale, remit and methods. *Vaccine*. 33(34), 4157-4160

Melanie, S., Juhani, E. & Philippe, D. (2015). The SAGE Working Group on Vaccine Hesitancy, Review of vaccine hesitancy: Rationale, remit and methods. *Vaccine*. 33(34), 4157-4160, https://doi.org/10.1016/j.vaccine.2015.04.035

Mena, P., Barbe, D., & Chan-Olmsted, S. (2020). Misinformation on Instagram: The Impact of Trusted Endorsements on Message Credibility. *Social Media + Society*.

Mendoza, M., Poblete, B. & Castillo, C. (2010). Twitter under crisis:Can we trust what we RT? 1st workshop on social media. *Proceedings of SOMA '10 Proceedings of the First Workshop on Social Media Analytics*, 71-79

Merchant, R. M., & Asch, D. A. (2018). Protecting the Value of Medical Science in the Age of Social Media and "Fake News". *JAMA*, 320(23), 2415–2416. https://doi.org/10.1001/jama.2018.18416

Mertens, D. M. (2010). Transformative mixed methods research. Qualitative Inquiry, 16, 469-474.

Merton, R. (1938). Social Structure and Anomie. *American Sociological Review*. 3 (5): 672–682

Michael, S. Deiner. Cherie Fathy. Jessica Kim. et al(2017). "Facebook and Twitter vaccine sentiment in response to measles outbreaks", *Health Informatics Journal*. In press. doi: 10.1177/1460458217740723

Michel, A. I. G., Ruggiero, T. E., & Yang, K. C. (2016). How Public Relations Practitioners Perceive Social Media Platforms?: A Media Richness Perspective. In Managing Public Relations and Brand Image through Social Media (pp. 1-19). *IGI Global.*

Michelle, L.L., Honey. Trudi J., Aspden. et al. (2018). Patients' internet use in New Zealand for information about medicines: Implications for policy and practice, *Health Policy and Technology*. In Press, 1–6

Michelle, M., Hughes. Joanne Katz., Janet A., Englund., Subarna K., Khatry. et al. (2016). Infant vaccination timing: Beyond traditional coverage metrics for maximizing impact of vaccine programs, an example from southern Nepal. *Vaccine*, 34(7), 933-941, doi: 10.1016/j.vaccine.2015.12.061

Miles S.H. & Kaci Hickox. (2015). public health and the politics of fear. *Am J Bioeth*. 15(4):17-9. doi: 10.1080/15265161.2015.1010994.

Miller, M. & Hagan, E. (2017). Integrated biological–behavioural surveillance in pandemic-threat warning systems. *Bulletin of the World Health Organization*, 95(1), 62-68.

Minu, I.(2017). Fourteen Years Later, The Story of the Kerala Vaccine Scam That Affected 206 Children Ends with a Bizarre Twist. Outlook Magazines. Available from: https://www.outlookindia.com/website/story/fourteen-years-later-the-kerala-vaccine-scam-saga-that-affected-206-children-end/298738 (Mar. 14, 2019)

Mishra, S. & Mohanty, S.K.(2019). Out-of-pocket expenditure and distress financing on institutional delivery in India. *Int J Equity Health.* 18. 99. https://doi.org/10.1186/s12939-019-1001-7

Mitchell, M. & Kan, L. (2019). Digital Technology and the Future of Health Systems. *Health Systems & Reform.* 5(2). 113-120, DOI: 10.1080/23288604.2019.1583040

Mittal, A. & Goel, A. (2012). Stock prediction using twitter sentiment analysis. Standford University, CS229 (2011 http://cs229. stanford. edu/proj2011/GoelMittal-StockMarketPredictionUsingTwitterSentimentAnalysis. pdf), 15.

Mohammad, A. H., Yogesh, K. D., Caroline, C., Craig, S, & Abdus-Samad, O. (2018). Sharing Political Content in Online Social Media: A Planned and Unplanned Behaviour Approach. Inf Syst Front 20(3), 485 -501. https://doi.org/10.1007/s10796-017-9820-9

Mohuya, C. (2013). The sad story of a good vaccine. The Hindu, Available from: https://www.thehindu.com/opinion/op-ed/the-sad-story-of-a-good-vaccine/article5160984.ece(Mar. 14, 2019)

Moïsi, J.C., Kabuka, J., Mitingi, D., Levine, O.S. & Scott, J.A.G.(2012). Spatial and socio-demographic predictors of time-to-immunization in a rural area in Kenya: is equity attainable?. *Vaccine,* 28, 5725-5730, doi: 10.1016/j.vaccine.2010.06.011

Moon, B., & Morash, M. (2017). Gender and general strain theory: A comparison of strains, mediating, and moderating effects explaining three types of delinquency. *Youth & Society,* 49(4), 484-504.

Moorhead, S.A., Hazlet D.E., Harrison, L. et al.(2013). "A new dimension of health care: systemic review of the uses, benefits, and limitations of social media for health care professionals", *J Med Internet Res.* 15(4), e85.

Morgan, D. L. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative Health Research*, 3, 362-376.

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research*, 40, 120-123.

Mose, O. F., Johana K., Sigey. J. A., Okello. J. M., Okwoyo, G. J. & Kang'ethe. (2014). Mathematical Modeling on the Control of Measles by Vaccination: Case Study of KISII County, Kenya. *The SIJ Transactions on Computer Science Engineering & its Applications*. 3(3), 61-69

Muhlen, M., Lucila, & Ohno-Machado(2012). Reviewing social media use by clinicians. Journal of the American Medical Informatics Association, 19(5), 777–781, https://doi.org/10.1136/amiajnl-2012-000990

Munawar, K., & Choudhry, F. R. (2020). Exploring stress coping strategies of frontline emergency health workers dealing Covid-19 in Pakistan: A qualitative inquiry. *American journal of infection control*, S0196-6553(20)30638-6. Advance online publication. https://doi.org/10.1016/j.ajic.2020.06.214

Nadai, M.D., Lepri, B., & Oliver, N. (2020). Understanding individual behaviour: from virtual to physical patterns. *ArXiv,* abs/2002.05500.

Naeem, S. B., Bhatti, R., & Khan, A. (2020). An exploration of how fake news is taking over social media and putting public health at risk. *Health information and libraries journal,* 10.1111/hir.12320. Advance online publication. https://doi.org/10.1111/hir.12320

Nam, T., (2016). Government 3.0 in Korea: A country study, *Information Polity*, 21(4). 411-420

Ndou, V.D. (2004). E-government for developing countries: opportunities and challenges. *The Electronic Journal of Information Systems in Developing Countries*. 18(1). 1-24

Neukircher, H. (2016). Application of the LIT Model to General Strain Theory, Situational Anger, and Social Networks. *Aisthesis: Honors Student Journal*, 7, 34-37.

Neuman, W. R., Just, M. R. & Crigler, A. N. (1992). Common knowledge: News and the construction of political meaning. *University of Chicago Press*.

Newman, N., Fletcher, R., Kalogeropoulos, A., Levy, D. A. L. & Kleis Nielsen, R.(2017). Reuters Institute Digital News Report 2017. *Reuters Institute for the Study of Journalism*, University of Oxford, Oxford, https://reutersinstitute.politics.ox.ac.uk/sites/default/files/Digital%20News%20Report%202017%20web_0.pdf (Mar. 14, 2019)

Nguyen, N.P., Yan, G., Thai, M.T. & Eidenbenz, S. (2012). Containment of misinformation spread in online social networks, *Proceed. 3rd Ann. ACM Web Sci. Conf. WebSci '12*. 213–222, https://doi.org/10.1145/2380718.2380746

Nick, M.(2009). Viral terrorism and terrifying viruses: the homological construction of the war on terror and the avian flu pandemic, *International Journal of Media & Cultural Politics*. 5(3). 199-216

Nicola, L. B., Abdulla, Watad. Howard, Amital. Yehuda & Shoenfeld. (2017). Debate on vaccines and autoimmunity: Do not attack the author, yet discuss it methodologically. *Vaccine*. 35(42), 5522-5526, doi: 10.1016/j.vaccine.2017.08.018

Nie, J. B., Gilbertson, A., de Roubaix, M., Staunton, C., van Niekerk, A., Tucker, J. D., & Rennie, S. (2016). Healing Without Waging War: Beyond Military Metaphors in Medicine and HIV Cure Research. The American journal of bioethics : AJOB, 16(10), 3–11. https://doi.org/10.1080/15265161.2016.1214305

Nie, J.B. (1996). The physician as general. Journal of American Medical Association, 279:13.

Nijeesh. T. P.(2017). 37.5 % children in Malappuram still out of MR vaccination coverage. Kozhikode: Times of India. Available from: https://timesofindia.indiatimes.com/city/kozhikode/37-5-children-in-malappuram-still-out-of-mr-vaccination-coverage/articleshow/61798917.cms (Mar. 14, 2019)

Nir, Y., Paz, A., Sabo, E. & Israel P. (2003). Fear of Injections in young adults: Prevalence and associations. *Am. J. Trop. Med. Hyg*., 68(3), 341–344

Noble, H. & Heale, R. (2019). Triangulation in research, with examples. *Evidence Based Nursing*. 22. 67-68.

Norberg Boysen, G., Nyström, M., Christensson, L., Herlitz, J., & Wireklint Sundström, B. (2017). Trust in the early chain of healthcare: lifeworld hermeneutics from the patient's perspective. *International journal of qualitative studies on health and well-being,* 12(1), 1356674. https://doi.org/10.1080/17482631.2017.1356674

O'Reilly T (2005) What Is Web 2.0: Design Patterns and Business Models for the Next Generation of Software. http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html, Zugriff am 10.06.2007

O'Reilly, C. A. (1978). The Intentional Distortion of Information in Organizational Communication: A Laboratory and Field Investigation. *Human Relations*, 31(2), 173–193.

Ohid, Y., Sophie, Castle-Clarke, Nick S. & Joanna C. (2014). Attitudes to vaccination: A critical revie. *Social Science & Medicine*.;112:1-11

Okan O, et al. (2020). Coronavirus-Related Health Literacy: A Cross-Sectional Study in Adults during the COVID-19 Infodemic in Germany. *Int J Environ Res Public Health*. 17(15):5503. https://doi.org/10.3390/ijerph17155503.

O'Keeffe, G. S., Clarke-Pearson, K. & Council on Communications and Media (2011). The impact of social media on children, adolescents, and families. *Pediatrics*. 127(4), 800–804. https://doi.org/10.1542/peds.2011-0054

Olanrewaju, A. S. T., & Ahmad, R. (2018). Examining the Information dissemination process on social media during the Malaysia 2014 floods using Social Network Analysis (SNA). *Journal of ICT*, 17(1), 141-166.

Oliveira, G. H. M., & Welch, E. W. (2013). Social media use in local government: Linkage of technology, task, and organizational context. *Government Information Quarterly*, 30(4), 397–405.

Olteanu, A., Vieweg, S. & Castillo, C.(2015). What to expect when the unexpected happens: social media communications across crises. In Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing 994–1009

Omer, Z. B., Hwang, E. S., Esserman, L. J., Howe, R., & Ozanne, E. M. (2013). Impact of ductal carcinoma in situ terminology on patient treatment preferences. JAMA internal medicine, 173(19), 1830–1831. https://doi.org/10.1001/jamainternmed.2013.8405

Othman, S.H. & Beydoun, G.(2011). A disaster management Metamodel (DMM) evaluated in 11th international workshop on knowledge management and Acquisition for Smart Systems and Services. 2PKAW 2010. LNCS (LNAI), 6232, 111–125

Pai, R. R., & Alathur, S. (2020). Social media games: insights from Twitter analytics. *International Journal of Web Based Communities*, 16(1), 34-50.

Panda, S., Das, A. & Samanta, S., (2014). Synthesizing Evidences for Policy Translation: A Public Health Discourse on Rotavirus Vaccine in India. *Vaccine.* 32S. A162-A170, doi: 10.1016/j.vaccine.2014.03.037

Pandey, A., Ploubidis, G. B., Clarke, L. & Dandona, L. (2018). Trends in catastrophic health expenditure in India: 1993 to 2014. *Bulletin of the World Health Organization*, 96(1), 18.

Pantic I. (2014). Online social networking and mental health. *Cyberpsychology, behavior and social networking*, 17(10), 652–657. https://doi.org/10.1089/cyber.2014.0070

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare

workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, behavior, and immunity,* 88, 901–907. Advance online publication. https://doi.org/10.1016/j.bbi.2020.05.026

Parashar, U.D. Hummelman, E.G. Bresee, J.S. Miller, M.A. & Glass, R.I.(2003). Global illness and deaths caused by rotavirus disease in children. *Emerging Infectious Disease*. 9(5), 565-572, DOI: 10.3201/eid0905.020562

Pardo, T. A., & Tayi, G. K. (2007). Interorganizational information integration: A key enabler for digital government. *Government Information Quarterly*. 24(4), 691–715.

Patton, M. Q. (1990). Qualitative evaluation and research methods (2nd ed.). Newbury Park, CA: Sage

Peck, J. L. (2014). Social media in nursing education: responsible integration for meaningful use. *Journal of Nursing Education*, 53(3), 164-169.

Pelčić, G., Karačić, S., Mikirtichan, G. L., Kubar, O. I., Leavitt, F. J., Cheng-Tek Tai, M., Morishita, N., Vuletić, S., & Tomašević, L. (2016). Religious exception for vaccination or religious excuses for avoiding vaccination. *Croatian medical journal*, 57(5), 516–521. https://doi.org/10.3325/cmj.2016.57.516

Peng, W., Adikari, A., Alahakoon, D. & Gero, J. (2019). Discovering the influence of sarcasm in social media responses. *Wires Data Mining and Knowledge Discovery*. 9(6).e1331

Pennebaker, J.W.(1997). Writing about emotional experiences as a therapeutic process. *Psychological Science.* 8, 162–166.

Pennycook, G. & Rand, G.D.(2019). Fighting misinformation on social media using crowdsourced judgments of news source quality. *Proceedings of the National Academy of Sciences.* 116 (7). 2521-2526. DOI: 10.1073/pnas.1806781116

Pennycook, G., & Rand, D. G. (2019). Fighting misinformation on social media using crowdsourced judgments of news source quality. *Proceedings of the National Academy of Sciences of the United States of America*, 116(7), 2521–2526. https://doi.org/10.1073/pnas.1806781116

Perrigo, B. (2020). It Was Already Dangerous to Be Muslim in India. Then Came the Coronavirus. Time. Retrieved from: https://time.com/5815264/coronavirus-india-islamophobia-coronajihad/.

Peters, A., Tartari, E., Lotfinejad, N., Parneix, P., & Pittet, D. (2018). Fighting the good fight: the fallout of fake news in infection prevention and why context matters. *The Journal of hospital infection*, 100(4), 365–370. https://doi.org/10.1016/j.jhin.2018.08.001

Petryszak, N. (1977). The Frankfurt School's Theory of Manipulation. *Journal of communication*, 27(3), 32-40

Petryszak, N.(1977). The Frankfurt school's theory of manipulation. *Journal of communication*. 27(3). 32-40

Phosaard, S. & Posawang, P. (2011). Facebook vs. Moodle: The Learning Effectiveness of Students Exposed to Daily Quizzes on Computer Programming Course. In C. Ho & M. Lin (Eds.), *Proceedings of E-Learn 2011--World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 832-839). Honolulu, Hawaii, USA: Association for the Advancement of Computing in Education (AACE).

Pieh, C., O´Rourke, T., Budimir. S., Probst, T. (2020). Relationship quality and mental health during COVID-19 lockdown. *PLoS ONE* 15(9): e0238906. https://doi.org/10.1371/journal.pone.0238906

Pirraglia, P.A. & Kravitz, R.L.(2012). Social media: new opportunities, new ethical concerns. *J Gen Intern Med.* 28(2),165–166.

Pollacci, L., Sîrbu, A., Giannotti, F., Pedreschi, D., Lucchese, C. & Muntean, C. I. (2017, November). Sentiment spreading: an epidemic model for lexicon-based sentiment analysis on twitter. *In Conference of the Italian Association for Artificial Intelligence.* 114-127. Springer, Cham.

Poorvaprabha, P. (2018). Disaster response: Learnings from Kerala Floods. *Health Information For All*, https://www.hifa.org/dgroups-rss/disaster-response-learnings-kerala-floods (Mar. 14, 2019)

Popay, J. (2010). Understanding and tackling social exclusion. *Journal of Research in Nursing*, 15(4), 295–297. https://doi.org/10.1177/1744987110370529

Popoola, A., Krasnoshtan, D., Toth, A.P. Naroditskiy, V., Castillo, C., Meier, P. et al. (2013). Information verification during natural disasters. In Proceedings of the 22nd International Conference on World Wide Web, 1029-1032, doi:10.1145/2487788.2488111.

Prasad, N.P.(2017). children vaccination schedule are good or bad mmr dpt polio penta valant in kerala hospital. http://vaccinationkerala.blogspot.in/2017/06/kerala-after-vaccination-dangerous-side.html(Mar. 14, 2019)

Press Trust of India. (2018). Nipah virus: UAE bans import of fruits, vegetables from Kerala, Economic Times, Available: https://economictimes.indiatimes.com (accessed on 3 March 2019).

Press Trust of India.(2017). Less than one doctor for 1000 population in India: Government to Lok Sabha, Economic Times, July 21, 2017, https://economictimes.indiatimes.com, Accessed on March 2, 2019

Psychologenie & Buzzle. (2020). Explanation of the Socioemotional Selectivity Theory With Examples. Available: https://psychologenie.com/socioemotional-selectivity-theory-explanation-examples (Accessed 21 July 2020).

Pulido, C. M., Ruiz-Eugenio, L., Redondo-Sama, G., & Villarejo-Carballido, B. (2020). A New Application of Social Impact in Social Media for Overcoming Fake News in Health. *International journal of environmental research and public health*, 17(7), 2430. https://doi.org/10.3390/ijerph17072430

Rafael, O. Ketan, C., Chris, M., Warren, F., Jeffrey, B., Michael, G., & Ellyn, O.(2009). Achieving polio eradication: a review of health communication evidence and lessons learned in India and Pakistan. *Bull World Health Organ*, 87: 624-630, doi:10.2471/BLT.08.060863

Raja Lexshimi, R., Tahir, S. & Santhna, L. (2007). Prevalence of stress and coping mechanism among staff nurses in the intensive care unit. *Med Health*. 2. 146-153

Rajkumar, R. P. (2020). COVID-19 and mental health: A review of the existing literature. *Asian journal of psychiatry*, 52, 102066. Advance online publication. https://doi.org/10.1016/j.ajp.2020.102066

Ransing, R., Adiukwu, F., Pereira-Sanchez, V., Ramalho, R., Orsolini, L., Teixeira, A. L. S., Gonzalez-Diaz, J. M., Pinto da Costa, M., Soler-Vidal, J., Bytyçi, D. G., El Hayek, S., Larnaout, A., Shalbafan, M., Syarif, Z., Nofal, M., & Kundadak, G. K. (2020). Mental Health Interventions during the COVID-19 Pandemic: A Conceptual Framework by Early Career Psychiatrists. *Asian Journal of Psychiatry*, 51, 102085. https://doi.org/10.1016/j.ajp.2020.102085

Raymond, E. S. (2014). On the Use of the Concept of "Fairness" in the World of Vaccines and Vaccination. *Procedia in Vaccinology*. 8, 5-11, https://doi.org/10.1016/j.provac.2014.07.002

Rebekah, G., Mohammad, H., Hal, R., Alfa Y., David C. & Brittany, S.(2017). Vaccine Hesitancy and Online Information: The Influence of Digital Networks. *Health Education & Behavior*. 45(4), 599-606

Rhymer, W. & Speare, R. (2017). Countries' response to WHO's travel recommendations during the 2013–2016 Ebola outbreak. *Bulletin of the World Health Organization*, 95(1), 10-17

Ringle, C. M., Wende, S. & Becker, J.-M. (2015). "SmartPLS 3." Boenningstedt: SmartPLS GmbH, http://www.smartpls.com.

Robert, I. Ogie, H. F., Rodney J. C. & Pascal P.(2018). Participation Patterns and Reliability of Human Sensing in Crowd-Sourced Disaster Management. *Inf Syst Front* 20(4), 713-728. https://doi.org/10.1007/s10796-017-9790-y

Robin L. N. & Jessica G.M.(2019). Uplifting Fear Appeals: Considering the Role of Hope in Fear-Based Persuasive Messages. *Health Communication*. 34(4), 463-474. DOI: 10.1080/10410236.2017.1422847

Robison, S. G. & Liko, J. 2017. The timing of pertussis cases in unvaccinated children in an outbreak year: Oregon 2012. *The Journal of pediatrics*. 183. 159-163

Rochefort, A. (2020). Regulating Social Media Platforms: A Comparative Policy Analysis. *Communication Law and Policy,* 25(2), 225–260.

Rory, W. (2018). MEPs devise strategy to tackle vaccine hesitancy among public. *British Medical Journal*., 360, k1378

Rosenberger, M., Lehrer, C. & Jung, R.(2016). Integrating data from user activities of social networks into public administrations. Information Systems Frontiers, 19(2), 1–14.

Ross, J. W. (1986). Ethics and the language of AIDS. Federation Review, 9: 3. 15-19

Rost, A. D., Wilson, K., Buchanan, E., Hildebrandt, M. J., & Mutch, D. (2012). Improving psychological adjustment among late-stage ovarian cancer patients: Examining the role of avoidance in treatment. Cognitive and Behavioral Practice, 19(4), 508–517. https://doi.org/10.1016/j.cbpra.2012.01.003

Rothbauer, P.(2008). Triangulation. Given L , ed. *The SAGE encyclopedia of qualitative research methods*: Sage Publications. 892–4.

Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian journal of psychiatry*, 51, 102083. Advance online publication. https://doi.org/10.1016/j.ajp.2020.102083

Rubinelli, S., Myers, K., Rosenbaum, M., & Davis, D. (2020). Implications of the current COVID-19 pandemic for communication in healthcare. *Patient education and counseling,* 103(6), 1067–1069. https://doi.org/10.1016/j.pec.2020.04.021

Ruijs, W. L., Hautvast, J. L., van IJzendoorn, G., van Ansem, W. J., Elwyn, G., van der Velden, K., & Hulscher, M. E. (2012). How healthcare professionals respond to parents with religious objections to vaccination: a qualitative study. *BMC health services research,* 12, 231. https://doi.org/10.1186/1472-6963-12-231

Sadanandan, R. (2018). NIPAH: After the outbreak. Available at: https://frontline.thehindu.com/the-nation/public-health/article24200872.ece (accessed 16 May 2019).

Salathé, M., Vu, D. Q., Khandelwal, S. & Hunter, D. R. (2013). The dynamics of health behavior sentiments on a large online social network. *EPJ Data Science*, 2(1), 4.

Sallam, M., Dababseh, D., Yaseen, A., Al-Haidar, A., Taim, D., Eid, H., Ababneh, N.A., Bakri, F. G., Mahafzah, A. (2020). COVID-19 misinformation: Mere harmless delusions or much more? A knowledge and attitude cross-sectional

study among the general public residing in Jordan. *PLoS ONE.* 15(12): e0243264.

Samiran, P., Aritra, D. & Saheli, S.(2014). Synthesizing Evidences for Policy Translation: A Public Health Discourse on Rotavirus Vaccine in India. *Vaccine*. 32S, A162-A170, doi: 10.1016/j.vaccine.2014.03.037

Sanchita, S. (2018). India's measles elimination campaign rocked by rumours, fake alerts before launch. New Delhi, Hindustan Times. https://www.hindustantimes.com/health-and-fitness/india-s-measles-elimination-campaign-rocked-by-rumours-fake-alerts-before-launch/story-EGhh5fl1Ivv3VY2GqDSRKP.html (Mar. 14, 2019 )

Sani, G., Janiri, D., Di Nicola, M., Janiri, L., Ferretti, S., & Chieffo, D. (2020). Mental health during and after the COVID-19 emergency in Italy. *Psychiatry and clinical neurosciences,* 74(6), 372. https://doi.org/10.1111/pcn.13004

Santarone, K., McKenney, M., & Elkbuli, A. (2020). Preserving mental health and resilience in frontline healthcare workers during COVID-19. *The American journal of emergency medicine,* 38(7), 1530–1531. https://doi.org/10.1016/j.ajem.2020.04.030

Sasitha J. M.A. (2021). Youth Perception on Hate Crimes, Hate Speeches and Nationalism in Contemporary India. In: Kury H., Redo S. (eds) *Crime Prevention and Justice in 2030.* Springer, Cham. https://doi.org/10.1007/978-3-030-56227-4_3

Sato, A. & Costa-i-Font, J., (2013). Social networking for medical information: A digital divide or a trust inquiry?. *Health Policy and Technology*. 2 (3). 139–150

Sbarra, D. A., & Coan, J. A. (2018). Relationships and Health: The Critical Role of Affective Science. *Emotion Review*, 10(1), 40–54. https://doi.org/10.1177/1754073917696584

Scheufele, D. A., & Krause, N. M. (2019). Science audiences, misinformation, and fake news. *Proceedings of the National Academy of Sciences of the United States of America*, 116(16), 7662–7669. https://doi.org/10.1073/pnas.1805871115

Schindler, L.A., Burkholder, G.J., Morad, O.A. et al. (2017). Computer-based technology and student engagement: a critical review of the literature. *Int J Educ Technol High Educ* 14, 25. https://doi.org/10.1186/s41239-017-0063-0

Schmitt, R. (2005). Systematic Metaphor Analysis as a Method of Qualitative Research. *The Qualitative Report*, 10, 358-394.

Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: psychological, behavioral, and biological determinants. *Annual review of clinical psychology*, 1, 607–628. https://doi.org/10.1146/annurev.clinpsy.1.102803.144141

Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: psychological, behavioral, and biological determinants. *Annual review of clinical psychology*, 1, 607–628. https://doi.org/10.1146/annurev.clinpsy.1.102803.144141

Schon, D.A. (1993). Generative metaphor: a perspective on problem-setting in social policy. In *Metaphor and Thought* (Ortony, A., ed.). 137–163. Cambridge University Press.

Schudson, M. (2008). Why Democracies Need an Unlovable Press. Polity. Chapter Two: Six or Seven Things News Can Do For Democracy. Available at: https://books.google.co.uk/ books?id=hmYGMe9ecKUC&printsec=frontcover&dq=schduson+michael+6 +or+seven+ways&hl=en&sa=X&ved=0ahUKEwju_ ZGI6ozZAhWELsAKHc0vBlUQ6AEIKTAA - v=onepage&q&f=false

Schuster, R., Hammitt, W. E., Moore, D., (2006). Stress Appraisal and Coping Response to Hassles Experienced in Outdoor Recreation Settings. *Leisure Sciences*. 28(2). 97-113, DOI: 10.1080/01490400500483919

Schwartz, H. A., Eichstaedt, J. C., Kern, M. L., Dziurzynski, L., Ramones, S. M., Agrawal, M., Shah, A., Kosinski, M., Stillwell, D., Seligman, M.E. & Ungar, L. H. (2013). Personality, gender, and age in the language of social media: The open-vocabulary approach. *PloS one*, 8(9), e73791.

Schwartz, S.H.(2012). An overview of the schwartz theory of basic values. *Read. Psych. Cult* 2, 1e18.

Seawright, J. & Gerring, J. (2008). Case Selection Techniques in Case Study Research: A Menu of Qualitative and Quantitative Options. *Political Research Quarterly*. 61(2). 294-308.

Sell, T. K., Hosangadi, D., & Trotochaud, M. (2020). Misinformation and the US Ebola communication crisis: analyzing the veracity and content of social media messages related to a fear-inducing infectious disease outbreak. *BMC public health*, 20(1), 550. https://doi.org/10.1186/s12889-020-08697-3

Sellnow, T.L. & Seeger, M.W. (2013). Theorizing crisis communication. John Wiley & Sons. Hoboken, 4.

Semino E. (2021). Not Soldiers but Fire-fighters - Metaphors and Covid-19. *Health communication*, 36(1), 50–58. https://doi.org/10.1080/10410236.2020.1844989

Semino, E., Demjén, Z., Demmen, J., Koller, V., Payne, S., Hardie, A., & Rayson, P. (2017). The online use of Violence and Journey metaphors by patients with cancer, as compared with health professionals: a mixed methods study. *BMJ supportive & palliative care*, 7(1), 60–66. https://doi.org/10.1136/bmjspcare-2014-000785

Semino, E., Demjén, Z., Hardie, A., Payne, S. & Rayson, P. (2018). Metaphor, cancer and the end of life: A corpus-based study. London, UK:Routledge.

Serrão, C., Duarte, I., Castro, L., & Teixeira, A. (2021). Burnout and Depression in Portuguese Healthcare Workers during the COVID-19 Pandemic-The Mediating Role of Psychological Resilience. *International journal of environmental research and public health,* 18(2), 636. https://doi.org/10.3390/ijerph18020636

Servick, K.(2020). Cellphone Tracking Could Help Stem the Spread of Coronavirus. Is Privacy the Price?. *Science AAAS* (22 March 2020), https://www.sciencemag.org/news/2020/03/cellphone-tracking-could-help-stem-spread-coronavirus-privacy-price, accessed 12 July 2020;

Shaw, F., Burgess, J., Crawford, K. & Bruns, A.(2013). Sharing news, making sense, saying thanks. *Australian Journal of Communication*, 40(1), 23-39.

Shaw, M., Smith, G. D. & Dorling, D. (2005). Health inequalities and New Labour: how the promises compare with real progress. *BMJ*, 330(7498), 1016-1021.

Sheikh, A., Halani, L., Bhopal, R., Netuveli, G., Partridge, M., Car, J., et al. (2009). Facilitating the Recruitment of Minority Ethnic People into Research: Qualitative Case Study of South Asians and Asthma. *PLoS Med*. 6 (10): 1-11

Shemin J.(2020). Coronavirus: Case against youth connected with Tablighi Jamaat for spitting at doctor in quarantine facility. Deccan Herald. Accessed on 10 April, 2020. https://www.deccanherald.com/national/north-and-central/coronavirus-case-against-youth-connected-with-tablighi-jamaat-for-spitting-at-doctor-in-quarantine-facility-822989.html

Shiau, W.L., Dwivedi, Y.K., & Yang, H.S. (2017). Co-citation and cluster analyses of extant literature on social networks. *International Journal of Information Management,* 37(5), 390 – 399. https://doi.org/10.1016/j.ijinfomgt.2017.04.007.

Shin J, Jian L, Driscoll K & Bar F. (2017). Political rumoring on Twitter during the 2012 US presidential election: rumor diffusion and correction. *New Media Soc*. 19:1214–35

Shivani, B.K. & Gupta, M.D.(2020) Healing the healer, *Indian Heart Journal*, In Press, https://doi.org/10.1016/j.ihj.2020.05.001

Signore, O., Chesi, F. & Pallotti M. (2005). E-government: challenges and opportunities, *CMG Italy – XIX Annual Conference*.

Silva, S.C., Feitosa, W., Duarte, P. & Vasconcelos, M. (2020), How to increase engagement on social media using the honeycomb model: A case study in a Portuguese HR company. *Revista de Gestão*, 27(2), 153-167

Simon, T., Goldberg, A., Aharonson Daniel, L., Leykin, D. & Adini, B.(2014). Twitter in the cross fire - the use of social media in the Westgate mall terror attack in Kenya. *PloS One*, 9, 1–11.

Sinclaire, J.K. & Vogus, C.E. (2011). Adoption of social networking sites: an exploratory adaptive structuration perspective for global organizations. *Inf Technol Manag* 12, 293–314. https://doi.org/10.1007/s10799-011-0086-5

Sinemus K. (2007). Talking with the public--challenging the public scare. *Biotechnology journal*. 2(9), 1047.

Sinemus, K., & Egelhofer, M. (2007). Transparent communication strategy on GMOs: will it change public opinion?. *Biotechnology journal*, 2(9), 1141–1146.

Singh, P., Dwivedi, Y.K., Kahlon, K.S. et al. (2020). Smart Monitoring and Controlling of Government Policies Using Social Media and Cloud Computing. *Inf Syst Front* 22, 315–337. https://doi.org/10.1007/s10796-019-09916-y

Singhal, K., Agrawal, B. & Mittal, N. (2015). Modeling Indian general elections: sentiment analysis of political Twitter data. *In Information Systems Design and Intelligent Applications*. 469-477. Springer, New Delhi.

Sinnenberg, L., Mancheno, C., Barg, F. K., Asch, D. A., Rivard, C. L., Horst-Martz, E., Buttenheim, A., Ungar, L., & Merchant, R. (2018). Content Analysis of Metaphors About Hypertension and Diabetes on Twitter: Exploratory Mixed-Methods Study. *JMIR diabetes*, 3(4), e11177. https://doi.org/10.2196/11177

Smith, S. W., Rosenman, K. D., Kotowski, M. R., Glazer, E., McFeters, C., Keesecker, N. M. & Law, A. (2008). Using the EPPM to create and evaluate the effectiveness of brochures to increase the use of hearing protection in farmers and landscape workers. *Journal of Applied Communication Research*. 36, 200–218. doi:10.1080/00909880801922862

Sontag, S. (1989). AIDS and its metaphors. Farrar, Straus and Giroux, New York

Sourjya, B. (2012). "Rampant Corruption Just One Challenge In India's Healthcare Struggle", *IndiaSpend,* https://archive.indiaspend.com/sectors/rampant-corruption-just-one-challenge-in-indias-healthcare-struggle-53144, (Apr. 02, 2019)

Spence, P.R., Lachlan, K.A., Lin, X., & del Greco, M.(2015). Variability in Twitter content across the stages of a natural disaster: implications for crisis communication. *Communication Quarterly*, 63(2), 171– 186.

Staff Reporter. (2018). "Handling public anxiety over Nipah was tough: psychiatrists", The Hindu, https://www.thehindu.com/(Mar. 2, 2019)

Stahl J.P., Cohen R., Denis F., Gaudelus J., Martinot A., Lery T. & Lepetit H. (2016). The impact of the web and social networks on vaccination. New challenges and

opportunities offered to fight against vaccine hesitancy. *Médecine et maladies infectieuses.* 46 (3). 117-22,  doi: 10.1016/j.medmal.2016.02.002

Stahl, J.P.,  Cohen, R., Denis, F., Gaudelus, J., Martinot, A., Lery, T. & Lepetit H. (2016). The impact of the web and social networks on vaccination. New challengesand opportunities offered to fight against vaccine hesitancy. *Médecine et maladies infectieuses*. 46(3), 117-22, doi: 10.1016/j.medmal.2016.02.002

Starbird, K. & Palen, L. (2012). (How) will the revolution be retweeted?: Information diffusion and the 2011 Egyptian uprising. In: *Proceedings of the ACM 2012 conference on computer supported cooperative work*, 7–16

Steffens, M. S., Dunn, A. G., Leask, J., & Wiley, K. E. (2020). Using social media for vaccination promotion: Practices and challenges. *DIGITAL HEALTH.*

Stine, R. A. (2019). Sentiment Analysis. *Annual review of statistics and its application*, 6, 287-308.

Su, Z., McDonnell, D., Wen, J. et al. (2021). Mental health consequences of COVID-19 media coverage: the need for effective crisis communication practices. *Global Health* 17, 4 https://doi.org/10.1186/s12992-020-00654-4

Subramanian, S. (2018). Inside the Mace-donian Fake-News Complex, Wired. Available: https://www.wired.com (accessed on 3 March 2019).

Suri, M. (2018).  10 confirmed dead from Nipah virus outbreak in India, including nurse treating patients. Available at: https://edition.cnn.com/2018/05/22/health/nipah-virus-death-toll-rises-intl/index.html (accessed 16 May 2019).

Susan, Goldstein, Noni E, MacDonald & Sherine Guirguis(2015). The SAGE working group on vaccine hesitancy, Health Communication and vaccine hesitancy. *Vaccine*, 33, 4212-4214, https://doi.org/10.1016/j.vaccine.2015.04.042

Svalastog, A. L., Allgaier, J., Martinelli, L., & Gajovic, S. (2014). Distortion, confusion, and impasses: could a public dialogue within Knowledge Landscapes contribute to better communication and understanding of innovative knowledge?. *Croatian medical journal*, 55(1), 54–60. https://doi.org/10.3325/cmj.2014.55.54

Swire-Thompson, B. & Lazer, D. (2020). Public Health and Online Misinformation: Challenges and Recommendations. *Annual Review of Public Health*. 41(1). 433-451

Sword-Daniels, V., Eriksen, C., Hudson-Doyle, E.E., Alaniz, R., Adler, C., Schenk, T. & Vallance, S.(2016). Embodied uncertainty: Living with complexity and natural hazards. *Journal of Risk Research*, 1–18.

Sylvia Chou, W. Y., Gaysynsky, A., & Cappella, J. N. (2020). Where We Go From Here: Health Misinformation on Social Media. *American journal of public health*, 110(S3), S273–S275. https://doi.org/10.2105/AJPH.2020.305905

Szmuda, T., Özdemir, C., Ali, S., Singh, A., Syed, M. T., & Słoniewski, P. (2020). Readability of online patient education material for the novel coronavirus disease (COVID-19): a cross-sectional health literacy study. *Public health*, 185, 21–25. Advance online publication. https://doi.org/10.1016/j.puhe.2020.05.041

Tafuri, S., Gallone, M.S., Cappelli, M.G., Martinelli, D., Prato, R. & Germinario, C. (2014). Addressing the anti-vaccination movement and the role of HCWs. *Vaccine*. 32(38), 4860-4865

Talwar, S., Dhir, A., Singh, D., Virk, G. S., & Salo, J. (2020). Sharing of fake news on social media: Application of the honeycomb framework and the third-person effect hypothesis. *Journal of Retailing and Consumer Services*. 57, 102197. doi:10.1016/j.jretconser.2020.102197

Tamal, M., Prithviraj, P., Indrajit, B., Naiwrita, B. & Saptarshi, G. (2018). Analysis and Early Detection of Rumors in a Post Disaster Scenario. *Inf Syst Front*. 20(5): 961-979. https://doi.org/10.1007/s10796-018-9837-8

Tandon, A., Murray, C.J.L., Lauer, J. & Evans, D. (2000). Measuring overall health system performance for 191 countries. Geneva: *World Health Organization*, (Global programme on evidence for health policy discussion paper No 30). https://www.who.int/healthinfo/paper30.pdf(March 27, 2020)

Taquet, M., Quoidbach, J., de Montjoye, Y.A. Desseilles, M. & Gross, J.J.(2016). Hedonism and the choice of everyday activities. *Proceedings of the National Academy of Sciences of the United States of America*. 113(35), 9769-73.

Tate, J.E., Burton, A.H., Boschi-Pinto, C. et al(2012). estimate of worldwide rotavirus-associated mortality in children younger than 5 years before the introduction of universal rotavirus vaccination programmes: a systematic review and meta-analysis. *Lancet Infectious Disease.* 12(2), 136-141, DOI: https://doi.org/10.1016/S1473-3099(11)70253-5

Teoh D. (2019). The Power of Social Media for HPV Vaccination-Not Fake News!. American Society of Clinical Oncology educational book. American Society of Clinical Oncology. *Annual Meeting*, 39, 75–78. https://doi.org/10.1200/EDBK_239363

Terpstra, T., De Vries, A., Stronkman, R. & Paradies, G.L. (2012). Towards a realtime Twitter analysis during crises for operational crisis management. *International Conference on Information Systems for Crisis Response and Management, ISCRAM 2012*, Burnaby: Simon Fraser University, 1–9

Thacker, N. (2018). Fight the infectious disease in the air — 'fake news', The Hindu-Business Line. Available: https://epaper.thehindubusinessline.com. (accessed on 3 March 2019).

Thimbleby H. (2013). Technology and the future of healthcare. *Journal of public health research*, 2(3), e28. https://doi.org/10.4081/jphr.2013.e28

Thomas, M.A., Narayan, P.R. & Christian C.(2012). Mitigating gaps in reproductive health reporting in outlier communities of Kerala, India—A mobile phone-based health information system. *Health Policy and Technology*. 1(2), 69–76

Trachsel M. (2016). Killing the Pain and Battling the Lethargy: Misleading Military Metaphors in Palliative Care. *The American journal of bioethics : AJOB,* 16(10), 24–25. https://doi.org/10.1080/15265161.2016.1214310

Treharne, T., & Papanikitas, A. (2020). Defining and detecting fake news in health and medicine reporting. *Journal of the Royal Society of Medicine*. 113(8), 302–305. https://doi.org/10.1177/0141076820907062

Tsui, E., Rao R.C., Carey, A.R., Feng, M.T. & Provencher, L.M.(2020). Using Social Media to Disseminate Ophthalmic Information During the #COVID19 Pandemic, *Ophthalmology*, doi:https://doi.org/10.1016/j.ophtha.2020.05.048.

Tsur, O. & Rappoport, A.(2012). What's in a Hashtag? Content based prediction of spread of ideas in microblogging communities. *Proceedings of the Fifth ACM international Conference on Web Search and Data Mining*. 643–652. ACM New York, NY, USA.

Tuarob, S. & Tucker, C. S. (2015). Quantifying product favorability and extracting notable product features using large scale social media data. *Journal of Computing and Information Science in Engineering*, 15(3), 031003.

Tucci, V., Moukaddam, N., Meadows, J., Shah, S., Galwankar, S.C. & Kapur, G.B.(2017) The Forgotten Plague: Psychiatric Manifestations of Ebola, Zika, and Emerging Infectious Diseases, *J. Glob. Infect. Dis.* 9 (4) 151–156, https://doi.org/10.4103/jgid.jgid_66_17.

Tuija, L., Ulrike, B., Peter, S., Jukka, O., & Heini S. (2017). Impact of five years of rotavirus vaccination in Finland – And the associated cost savings in secondary healthcare. *Vaccine*. 35(42), 5611-5617, doi: 10.1016/j.vaccine.2017.08.052

Tursunbayeva, A., Franco, M., & Pagliari, C. (2017). Use of social media for e-Government in the public health sector: A systematic review of published studies. *Government Information Quarterly.* 34(2), 270–282. doi:10.1016/j.giq.2017.04.001

Tzu, S. (1963). The art of war. Oxford, UK: Oxford University Press.

US Department of Homeland security. (2018). Countering False Information on Social Media in Disasters and Emergencies. https://www.preventionweb.net/publications/view/57823 (Mar. 10, 2019)

Usborne, E., & Taylor, D. M. (2010). The Role of Cultural Identity Clarity for Self-Concept Clarity, Self-Esteem, and Subjective Well-Being. *Personality and Social Psychology Bulletin*. 36(7), 883–897. https://doi.org/10.1177/0146167210372215

Vandana, G., Pradeep, H., Kumar, A. M., Kumar, D.M., Ashish, C., John, M.et al. (2018). Improving vaccination coverage in India: lessons from Intensified Mission Indradhanush, a cross-sectoral systems strengthening strategy. *BMJ.* 363 :k4782

Vayena, E., Dzenowagis, J., Brownstein, J. S. & Sheikh, A. (2018). Policy implications of big data in the health sector. *Bulletin of the World Health Organization*, 96(1), 66-68

Veh, A., Göbel, M. & Vogel, R. (2019). Corporate reputation in management research: a review of the literature and assessment of the concept. *Bus Res.* 12. 315–353. https://doi.org/10.1007/s40685-018-0080-4

Velavan,T.P. & Meyer, C.G. (2020). The COVID-19 epidemic. *Trop Med Int Health*. 25(3).278–80.

Vento, S., Cainelli, F. & Vallone, A. (2020). Violence Against Healthcare Workers: A Worldwide Phenomenon With Serious Consequences. *Frontiers in public health*, 8, 570459. https://doi.org/10.3389/fpubh.2020.570459

Ventola, C.L. (2014). Social media and health care professionals: benefits, risks, and best practices. *P & T: A peer-reviewed journal for formulary management*. 39(7), 491-520.

Vieira, C. M., Franco, O. H., Restrepo, C. G. & Abel, T., (2020). COVID-19: The forgotten priorities of the pandemic, *Maturitas,* 136, 38-41.https://doi.org/10.1016/j.maturitas.2020.04.004. http://www.sciencedirect.com/science/article/pii/S0378512220302346

Vishwanath, A. (2015). Diffusion of deception in social media: social contagion effects and its antecedents. *Information Systems Frontiers*, 17, 1353–1367.

Von Muhlen, M. & Ohno-Machado, L. (2012). Reviewing social media use by clinicians. *Journal of the American Medical Informatics Association*, 19(5), 777-781.

Von, M., & Ohno-Machado, L. (2012). Reviewing social media use by clinicians. *Journal of the American Medical Informatics Association : JAMIA*, 19(5), 777–781. https://doi.org/10.1136/amiajnl-2012-000990

Waal, D.F.B. (2008). Putting the altruism back into altruism: the evolution of empathy. *Annu. Rev. Psychol*. 59 279–300. 10.1146/annurev.psych.59.103006.093625

Wakefield, M. A. Barbara L., Robert C. & Hornik. (2010). Use of Mass Media Campaigns to Change Health Behaviour. *Lancet*. 376(9748), 1261–1271.

Wakefield, M. A., Loken, B., & Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *Lancet (London, England),* 376(9748), 1261–1271.

Wallis, P., & Nerlich, B. (2005). Disease metaphors in new epidemics: the UK media framing of the 2003 SARS epidemic. *Social science & medicine* (1982), 60(11), 2629–2639. https://doi.org/10.1016/j.socscimed.2004.11.031

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S. & Ho, R.C., (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health*. 17, 1729

Wang, X., Zhang, J., Wang, X., & Liu, J. (2020). Intervening paths from strain to delinquency among high school and vocational school students in China. *International journal of offender therapy and comparative criminology*, 64(1), 22-37.

Wang, Y., McKee, M., Torbica, A., & Stuckler, D. (2019). Systematic Literature Review on the Spread of Health-related Misinformation on Social Media. *Social science & medicine* (1982), 240, 112552. https://doi.org/10.1016/j.socscimed.2019.112552

Ward, R. (2013). The application of technology acceptance and diffusion of innovation models in healthcare informatics. *Health Policy and Technology*, 2(4), 222-228.

Waszak, Przemyslaw M. Wioleta Kasprzycka-Waszak, Alicja Kubanek(2018). "The spread of medical fake news in social media – The pilot quantitative study". *Health Policy and Technology*, 7(2), 115 - 118

Watkins D. C. (2019). Improving the Living, Learning, and Thriving of Young Black Men: A Conceptual Framework for Reflection and Projection. *International journal of environmental research and public health*, 16(8), 1331. https://doi.org/10.3390/ijerph16081331

Weimann, G. (1994). The influentials. People who influence people. Albany: State University of New York Press.

West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: contributors, consequences and solutions. *Journal of internal medicine*, 283(6), 516–529. https://doi.org/10.1111/joim.12752

Wester, M. & Giesecke, J.(2019). Ebola and healthcare worker stigma.*Scand J Public Health*. 2019 Mar;47(2):99-104. doi: 10.1177/1403494817753450.

WHO. (2018). Nipah virus – India. Available at: https://www.who.int/csr/don/07-august-2018-nipah-virus-india/en/ (accessed 16 May 2019).

WHO. (2018). Six common misconceptions about immunization. Global Vaccine Safety.
http://www.who.int/vaccine_safety/initiative/detection/immunization_misconc eptions/en/index1.html (May 30, 2018)

WHO. (2018). World Health Organization in South-East Asia.New Delhi: WHO SEAR. 'Big 6' countries of WHO South-East Asia Region meet to close measles' immunity gap, accelerate elimination efforts. http://www.searo.who.int/mediacentre/releases/2018/1679/en/ (Mar. 03, 2019)

WHO. (2019). Surveillance and outbreak alert. Available at: http://www.searo.who.int/entity/emerging_diseases/links/nipah_virus_outbreaks_sear /en/ (accessed 13 May 2019).

WHO. (2020). Novel Coronavirus(2019-nCoV) Situation Report - 13. World Health Organization Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf [Accessed May 1, 2020]

WHO. Geneva. (August 2018). Six common misconceptions about immunization. Global Vaccine Safety. Retrieved 27 September 2019 from: http://www.who.int/vaccine_safety/initiative/detection/immunization_misconc eptions/en/index1.html

WHO.(2005). World Health Organization, International Health Regulations (2005), Second Edition (May 17, 2018)

WHO.(2018). Immunization coverage. Fact sheet. http://www.who.int/news-room/fact-sheets/detail/immunization-coverage (Mar. 02, 2019)

Wiedermann, U. Erika, G. & Angelika W. (2016). Primary Vaccine Failure to Routine Vaccines: Why and What to Do?. *Human Vaccines & Immunotherapeutics* 12(1), 239–243

Wilder-Smith, A., Chiew, C.J. & Lee, V.J. (2020). Can we contain the COVID-19 outbreak with the same measures as for SARS? *Lancet Infect Dis*. 20(5):e102–7.

Will, W.K. Ma, & Albert, C.(2014). Knowledge sharing and social media: Altruism, perceived online attachment motivation, and perceived online relationship commitment. *Computers in Human Behavior*, 39, 51-58

Williams, S.E. Rothman. R.L. Offit, P.A. Schaffner, W. Sullivan, M. & Edwards, K.M.(2013). A randomized trial to increase acceptance of childhood vaccines by vaccine-hesitant parents: a pilot study. *Acad Pediatr*., 13, 475–80.

Wilson, K. & Keelan, J.(2013). Social media and the empowering of opponents of medical technologies: The case of anti-vaccinationism. *Journal of Medical Internet Research*, 15, e103.

Wilson, S.L. & Wiysonge, C. (2020). Social media and vaccine hesitancy. *BMJ Global Health*. 5:e004206.

Wireklint, S. B., & Dahlberg, K. (2011). Caring assessment in the Swedish ambulance services relieves suffering and enables safe decisions. *International emergency nursing,* 19(3), 113–119. https://doi.org/10.1016/j.ienj.2010.07.005

Witte, K. & Allen, M.(2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior*, 27, 591–615. doi:10.1177/109019810002700506

Witztum, E., Onno, V. H. & Barbara F. (1988). The use of metaphors in psychotherapy. *Journal of Contemporary Psychotherapy,* 18(4), 270-290

Wolfe, S. & R. Flewitt. (2010). New Technologies, New Multimodal Literacy Practices and Young Children's Metacognitive Development. *Cambridge Journal of Education*. 40 (4). 387–399.

Wolfsfeld, G., Avraham, E. & Aburaiya, I. (2000). When Prophesy Always Fails: Israeli Press Coverage of the Arab Minority's Land Day Protests, *Political Communication*, 17(2), 115-131, DOI: 10.1080/105846000198431

Wolfsfeld, G., Segev, E. & Sheafer, T. (2013). Social media and the Arab Spring: Politics comes first. *The International Journal of Press/Politics*, 18(2), 115-137.

Woodford, C. (2019). Analog and digital. Available at: https://www.explainthatstuff.com/analog-and-digital.html (accessed 13 May 2019).

Woodward, A. & Kawachi, I. (2000). Why reduce health inequalities?. *Journal of Epidemiology & Community Health*, 54(12), 923-929.

World Health Organization (WHO). (2018). Nipah virus. Available at: https://www.who.int/news-room/fact-sheets/detail/nipah-virus (accessed 13 May 2019).

World Health Organization, International Health Regulations (2005), Second Edition.

World Health Organization. (2015). WHO report on global surveillance of epidemic-prone infectious disease—Introduction. Retrieved from: http://www.who.int/csr/resources/publications/ introduction/en/index1.html.

Worthington, R. P., & Gogne, A. (2011). Cultural aspects of primary healthcare in india: A case- based analysis. *Asia Pacific family medicine*, 10(1), 8. https://doi.org/10.1186/1447-056X-10-8

Wright, K. B., Rains, S. & Banas, J. (2010). Weak-tie support network preference and perceived life stress among participants in health-related, computer-mediated support groups. *Journal of Computer-Mediated Communication,* 15(4), 606-624.

Wu, Z., Pi, D., Chen, J., Xie, M., Cao, J. (2020). Rumor Detection Based On Propagation Graph Neural Network With Attention Mechanism, *Expert Systems with Applications*, doi: https://doi.org/10.1016/j.eswa.2020.113595

Xiang, Y., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T. & Ng, C. H. (2020). Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry*. 7(3). 228-229,

Xiao, H., Zhang, Y., Kong, D., Li, S., & Yang, N. (2020). The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. Medical science monitor. *International medical journal of experimental and clinical research*, 26, e923549. https://doi.org/10.12659/MSM.923549

Xu, X., Li, Y., Tao, J. & Liu, X. (2012). Automatic parsing of the metaphor polarity for opinion mining. *International Conference on Speech Database and Assessments.* 13-17. doi:10.1109/icsda.2012.6422465

Yang, T.-M., Zheng, L., & Pardo, T. (2012). The boundaries of information sharing and integration: A case study of Taiwan e-government. *Government Information Quarterly*, 29(Suppl. 1), S51–S60.

Yao, H.(2020). The more exposure to media information about COVID-19, the more distressed you will feel. *Brain, Behavior, and Immunity*, 87, 167-169

Yaqub, U., Chun, S., Atluri, V. & Vaidya, J. (2017, June). Sentiment based analysis of tweets during the us presidential elections. *In Proceedings of the 18th annual international conference on digital government research.* 1-10. ACM.

Yates, D. & Paquette, S.(2011). "Emergency knowledge management and social media technologies: A case study of the 2010 Haitian earthquake". *International Journal of Information Management,* 31(1), 6–13.

Yin, R. K. (2009). Case Study Research: Design and Methods. SAGE Publications Ltd: London. 14-15.

Yin, R. (1994). Case study research: design and methods. 2. Thousand Oaks, CA: Sage Publishing.

Yin, R.K. (2009). Case study research, design and method. 4. London: Sage Publications Ltd.

Yogesh, K. D., Gerald, K., Marijn, J., Nripendra, P. R., Emma, L. S. & Marc C. (2018). Social Media: The Good, the Bad, and the Ugly. *Information Systems Frontiers*, 20, 419–423

Yuen, Y. C., Ho, Y. C., Helen Y. L. C. & Wai T. C. (2020). COVID-19 pandemic, infodemic and the role of eHealth literacy. *International Journal of Nursing Studies*, 108, 103644

Yusuf, I., Yahaya, S. & Qabli, S.(2015). Role of media in portraying Ebola in and outside Africa. *Journal of Tropical Diseases*. 3(152), 1–2. doi:10.4172/2329-891X.1000152

Zachrisson, J. & Boks, C. (2012). Exploring behavioural psychology to support design for sustainable behaviour research. *J. of Design Research (JDR)*, 10(½)

Zaman, M. (2020) The Pandemic Blame Game, Magzter. Accessed on May 13, 2020 from https://www.magzter.com/article/News/Northeast-Today/The-Pandemic-Blame-Game

Zarocostas, J. (2020), How to fight an infodemic, *The Lancet*, 395, 676, https://doi.org/10.1016/S0140-6736(20)30461-X

Zhang, A., & Lin, X. (2018). Towards Secure and Privacy-Preserving Data Sharing in e-Health Systems via Consortium Blockchain. *Journal of medical systems*, 42(8), 140. https://doi.org/10.1007/s10916-018-0995-5

Zhang, W. R., Wang, K., Yin, L., Zhao, W. F., Xue, Q., Peng, M., Min, B. Q., Tian, Q., Leng, H. X., Du, J. L., Chang, H., Yang, Y., Li, W., Shangguan, F. F., Yan, T. Y., Dong, H. Q., Han, Y., Wang, Y. P., Cosci, F., & Wang, H. X. (2020). Mental Health and Psychosocial Problems of Medical Health Workers during the COVID-19 Epidemic in China. *Psychotherapy and psychosomatics*, 89(4), 242–250. https://doi.org/10.1159/000507639

Zhao, X., Lampe, C. & Ellison, N. B. (2016). The Social Media Ecology: User Perceptions, Strategies and Challenges. *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 89–100. DOI:https://doi.org/10.1145/2858036.2858333

Zhao, Z. Resnick, P. & Mei, Q.(2015). Enquiring minds: Early detection of rumors in social media from enquiry posts. *In Proceedings of the 24th International Conference on World Wide Web*, 1395–1405.

Zhou, X., Snoswell, C.L., Harding, L.E., Bambling, M., Edirippulige, S., Bai, X. & Smith, A.C. (2020). The role of telehealth in reducing the mental health burden from COVID- 19. *Telemed. E-health*. https://doi.org/10.1089/tmj.2020.0068. tmj.2020.0068.

Zikmund-Fisher, B. J., Fagerlin, A., & Ubel, P. A.(2010). Risky feelings: Why a 6% risk of cancer does not always feel like 6%. *Patient Education and Counseling*, 81, S87–S93. doi:10.1016/j.pec.2010.07.041

Zillmann, D.(2006). Exemplification effects in the promotion of safety and health. *Journal of Communication*, 56, 221–237. doi:10.1111/j.1460-2466.2006.00291.x

Zyl, A.S.(2009). "The impact of social networking 2.0 on organizations", *The Electronic Library*, 27, 906–918.

# APPENDICES

**Appendix I – Questionnaire on Healthcare and Social media- After flood**

| | |
|---|---|
| 1 | My consent to participating in this study<br>Yes<br>No |
| 2 | Age range<br>18-25<br>26-30<br>31-35<br>36-40<br>41-45<br>46-50<br>51-55<br>56+ |
| 3 | Gender<br>Male<br>Female<br>Prefer not to say |
| 4 | Marital Status<br>Married<br>Single<br>Separated<br>Engaged<br>Widow<br>Other |
| 5 | Physically Disabled?<br>Yes<br>No |
| 6 | No of years in this profession<br>less than 1 year<br>1-3<br>4-7<br>7-10<br>11-15<br>16-20<br>21-30<br>More than 30 |
| 7 | Place of work(State or city) |

| 8 | I was a volunteer in COVID-19 period<br>Yes<br>No | | | | | |
|---|---|---|---|---|---|---|
| 9 | I was staying away from home<br>Yes<br>No | | | | | |

| Depression | | | | | | |
|---|---|---|---|---|---|---|
| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
| 10 | I get angry too often | | | | | |
| 11 | I lost interest in activities | | | | | |
| 12 | I felt sadness more than usual | | | | | |
| 13 | I had a mood change quite often | | | | | |
| 14 | My appetite was not proper | | | | | |

| Stress | | | | | | |
|---|---|---|---|---|---|---|
| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
| 15 | I felt restlessness during this period | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | My mind was agitated more than as usual | | | | | |
| 17 | I could not concentrate on my activities in full | | | | | |
| 18 | I often go over thoughts | | | | | |
| 19 | I lost focus on work | | | | | |
| 20 | I felt overwhelmed | | | | | |
| 21 | I had a change in sexual behaviour | | | | | |
| 22 | I had stomach upset than usual | | | | | |
| 23 | I smoked or thought of using some drugs I had over-reacted than usual | | | | | |
| 24 | I was anxious than usual | | | | | |
| 25 | I got muscle pain than usual | | | | | |
| 26 | Sometimes my blood pressure level increased during this period | | | | | |

| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|
| | | | | Anxiety | | |
| 27 | I got unwanted thoughts than usual | | | | | |
| 28 | My thoughts were racing than usual | | | | | |
| 29 | I felt irritated than usual | | | | | |
| 30 | I sweat more than usual | | | | | |
| 31 | My thought filled with fear than usual | | | | | |
| 32 | I worried excessively than usual | | | | | |
| | | | | Misinformation | | |
| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
| 33 | Misinformation in the social media made me more depressed | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 34 | My anxiety was increased by reading the COVID-19 reports | | | | | |
| 35 | My stress increased with the onset of COVID-19 and the lock-down | | | | | |
| 36 | I shared the COVID-19 reports after verifying its genuineness | | | | | |
| 37 | I believe social media is a major platform spreading misinformation | | | | | |
| Social Media Behaviour | | | | | |
| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
| 38 | Social media was a relief during lock-down | | | | | |

| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
|---|---|---|---|---|---|---|
| 39 | I suggest long term work from home every year for the IT professionals | | | | | |
| 40 | Most used social media Application (In the order of most using app)<br>Facebook<br>WhatsApp<br>Linkedin<br>Twitter<br>Instagram<br>Others | | | | | |
| | Social Media Behaviour | | | | | |
| | | Strongly disagree | Moderately disagree | Neither agree nor disagree | Moderately agree | Strongly agree |
| 41 | I am regularly using the social media | | | | | |
| 42 | I am proud to tell that I am using social media | | | | | |
| 43 | Social media is part of my daily routine | | | | | |
| 44 | I feel restless when I am out of social media | | | | | |
| 45 | I will be sorry if social media is banned | | | | | |

| 46 | I feel I am part of social media community | | | | | | |
|---|---|---|---|---|---|---|---|
| 47 | How many friends you got in your favorite social media platform? <br> 10 or less <br> 11 to 100 <br> 101-200 <br> 201-300 <br> 301-400 <br> 400 or more | | | | | | |

**Appendix 2 : Questionnaire for Qualitative Analysis**

| # | Questions |
|---|---|
| 1 | **My consent to participating in this study**<br>Yes<br>No |
| 2 | **Gender**<br>Male<br>Female<br>Transgender<br>Do not wish to disclose |
| 3 | **I am working in**<br>Urban<br>Rural<br>Difficult Rural |
| 4 | **My Profession in healthcare sector**<br>Doctor<br>Nursing Assistant<br>Supporting Staff<br>Other |
| 5 | **My Age range**<br>18-25<br>26-30<br>31-35<br>36-40<br>41-45<br>46-50<br>50-55<br>56+ |
| 6 | What are the moods you are undergone when you were working during COVID-19 infection? (like anxiety, apathy, general discontent, guilt, hopelessness, loss of interest, loss of interest or pleasure in activities, mood swings, or sadness, etc) |

| 7 | What are the behavioural changes you have undergone during COVID-19 infection? (like agitation, excessive crying, irritability, restlessness, or social isolation, etc) |
|---|---|
| 8 | What are the sleep patterns during the during COVID-19 infection? (like early awakening, excess sleepiness, insomnia, or restless sleep) |
| 9 | What are the impacts on your whole body during the COVID-19 infection? (like excessive hunger, fatigue, or loss of appetite, etc...) |
| 10 | What were the changes in your cognitive behaviour during this period? (like lack of concentration, slowness in activity, or thoughts of suicide) |
| 11 | What is your opinion about social media reports on COVID-19 during this period? |
| 12 | What are the impacts of the COVID-19 reporting in the social media in you? |
| 13 | What is your opinion about people posting misinformation in the social media? (like they have agenda, they may posted it unknowingly, or any other reason) |
| 14 | What are your suggestions to government in curbing misinformation in social media? |
| 15 | What are your suggestions to social media user who is receiving and/or forwarding misinformation on health care? |
| 16 | What are your suggestions to the enforcement agencies in curbing misinformation on health care? |
| | Strongly Disagree –1<br>Disagree          - 2<br>Neutral          - 3<br>Agree          - 4<br> Strongly Agree   - 5 |
| 17 | I am regularly using the social media<br><br>1      2      3      4      5 |
| 18 | I am proud to tell that I am using social media |

| | |
|---|---|
| | 1    2    3    4    5 |
| 19 | Social media is part of my daily routine<br><br>1    2    3    4    5 |
| 20 | I feel restless when I am out of social media<br><br>1    2    3    4    5 |
| 21 | I will be sorry if social media is banned<br><br>1    2    3    4    5 |
| 22 | I feel I am part of social media community<br><br>1    2    3    4    5 |
| 23 | How many friends you got on your favorite social media platform?<br><br>10 or less<br><br>11-100<br><br>101-200<br><br>201-300<br><br>301-400<br><br>401 or more |

# BIO–DATA

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**Employment History**

- October 2005 -  Till Date, Centre for Development of Advanced computing(C-DAC), Trivandrum, Joint Director/Scientist E, Centre for Development of Advanced Computing(C-DAC), Thiruvananthapuram

- June 2004 - March 2005, College of Applied Science Cheemeni.Kasaragod, Lecturer in Electronics.

- June 2003 - March 2004, Model Polytechnic College Kallyasseri.Kannur, Lecturer in Electronics.

- November 2002 - May 2003, College of Applied Science Cheemeni.Kasaragod, Lecturer in Electronics.

**Academic Qualification**

- PhD(Doing) from School of Management, National Institute of Technology, Surathkal, Karnataka, India

- MTech in System Analysis and Computer Applications, National Institute of Technology, Surathkal, Karnataka, India, 2015

- Post Graduate Diploma in "Intellectual Property Rights", IGNOU& World Intellectual Property Organization Geneva, 2014

- BTech in Electronics and Communication Engineering, LBS College of Engineering Kasaragod, Kannur University, 2001

- 10+2 Science Group, Jawahar Navodaya Vidyalaya Kasaragod, Kerala, CBSE, 1997
- 10<sup>th</sup> , Jawahar Navodaya Vidyalaya Kasaragod, Kerala, CBSE, 1995

## Publications Accepted

1. Jayan V, Sreejith Alathur, Rajesh Pai, Sentiment Analysis of an Epidemic: A case of Nipah Virus in India, International Journal of Medical Engineering and Informatics, 14(2), pp.105 – 114, 2022

2. Jayan V, Sreejith Alathur, Challenges in Government Inter-Organizational Information Integration in the Context of Measles Rubella Vaccination in India, International Journal of Electronic Government Research (IJEGR), 18(2), pp 21, 2022

3. Jayan V, Sreejith Alathur. Misinformation in Social Media during Disaster: A Case study of Flood in Kerala, India during 2018; **Journal**: International Journal of Information Systems and Social Change (IJISSC), 2022

4. Jayan V, Sreejith Alathur, Vaccination Drive and Cyber Threats in India, International Conference on Theory and Practice of Electronic Governance(ICEGOV 2020)

5. Jayan V, Sreejith Alathur, Health Fear Mongering Make People More Sicker: Twitter Analysis in the Context of Corona Virus Infection, IFIP WG8.6 Working Conference

6. Jayan V, Sreejith Alathur. Military & War Metaphor during Covid-19 in India. Conference: International Conference on Computing, Communication and Security (ICCCS-2021)

7. Jayan V, Sreejith Alathur, Vaccine Hesitancy to Vaccine hope in India: Comparison of MR Vaccine and COVID Vaccine Trends in India, International Conference on Cognitive & Intelligent Computing(ICCIC-2021), Hyderabad, India

**Awards and Honours**

1. United Nations University Scholarship for presenting the paper in the International Conference on Theory and Practice of E-Governance(ICEGOV 2020) held at Athens, Greece.

2. Dr. P C Ganesh Sundaram Award for the works in Machine Translation, Dravidian Linguistics Association, 2019

3. International Institute of Organized Research(I2OR) - Bright Researcher Award 2018 for remarkable contribution in the field of Language Technology

4. Received best paper award for the paper titled "Transliteration from English to Indian Languages based on AnglaMT Machine Translation Perspective" presented at the "National Conference on Recent Advances in Computer Science and Engineering, Applied Electronics and Power Engineering" in the National Conference on Recent Advances in Computer Science and Engineering, Applied Electronics and Power Engineering" held at Mohandas College of Engineering during 19-20 April 2017.

5. IEEE Senior Member, April 2016

6. Received best paper Award on Computer and Language for the paper "Computational Approach for Translation of Texts" from Prof. Maheshwaraiah, Vice Chancellor, Central University Karnataka, during the 43rd Conference of Dravidian Linguists held at Annamalai University Chidambaram, Pondicheri, India during June 18-20, 2015

7. Best paper award for Young Scientists for the paper titled "vivarthanam kampyutariloote: oru patanam" in the swadeshi science congress held at Tirur, Kerala, India during 6-8 December 2014.

**Research and Projects**

1. *Modernization, Operation and Management of State Data Centre Jammu*
This project is aimed at the development of State Data Centre for the Jammu & Kashmir Government. The total project cost is 12466 Lakhs. This is funded by Govt. of Jammu & Kashmir

2. *Development of Publishing Tools for Malayalam- 2017-2020*

This project is aimed at developing the software tools like spell checker, Grammar checker, etc. for Malayalam as an aid for Malayalam Desktop publishing. The project is funded by Kerala Bhasha Institute, Government of Kerala. The total estimated cost is 50 Lakhs.

3. *Development of e-Academy at KEPA(Phase I)-2017-2018*

This project aimed at developing the infrastructure facility as part of the revamping of Kerala Police Academy as state of the art e-Academy. The project cost is 150 Lakhs

4. *Machine Aided Translation (AnglaMT Phase II) -- 2011-2015*

This project is aimed at the improvisation of phase I system. This is a Rs. 254 Lakhs project funded by DIT.

5. *Malayalam Parser  2010 – 2013*

This project is aimed at the development of a Parser for Malayalam language. The total project cost is Rs. 75 Lakhs funded by DIT, Govt. of India. The main objective of the project is to develop a syntactic parser for Malayalam.

6. *Machine Aided Translation (AnglaMT) -- 2007-2010*

This project is aimed at the development of machine aided translation from English to Malayalam by using the AnglaBharati technology. This is 93 Lakh project funded by DIT, Govt. of India. The system is available online in the TDIL website.

7. *Speech Corpora Resource Centre for South Indian Language - 2005-2007*

This project is aimed at the development of annotated speech corpora for speech research and speech technology for south Indian languages. The major activities include the development of speech corpus in four south Indian languages viz. Malayalam, Tamil, Kannada and Telugu, Annotating the corpus and corpus management. This is a DIT funded project costing Rs. 90 Lakhs.

**Other Activities**

1. Visiting Faculty at Central University of Kerala, Delivered lecture to the MA linguistics students on the course Computational Linguistics

2. Visiting faculty at Thunjath Ezhuthachan Malayalam University, Tirur, Delivered lecture to the MA Linguistics on the course Computational Linguistics.

3. Visiting Faculty at Central Institute of Indian Languages(CIIL), Mysore

4. Technical Programme Committee member, Second International Conference on Advanced Computational and Communication Paradigms  (ICACCP-2019)

5. Technical Program Committee member and reviewer of International Conference on Computer Engineering and Information System (CEIS2016)

6. Chaired two sessions in IEEE international Conference on Contemporary Computing and Informatics(1C3I 2014) held at SJCE Mysore 2014

7. Program Committee member of Sixth International Conference on Computer Science and Information Technology(CCSIT 2016) held at Zurich, Switzerland during January 2016

8. Editor, The International Journal of Artificial Intelligence & Applications (IJAIA)

## PERSONAL PROFILE

| | |
|---|---|
| Name: | : Jayan V |
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| Nationality | : Indian |

## DECLARATION:

I hereby declare that the above-mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above-mentioned particulars.

**Date**:

**Place**: Trivandrum                                                                 **Jayan V**