



WHAT INDIAN WORKING CLASS IS SAYING ABOUT THE COVID-19 PANDEMIC: CONCERNS AND REACTIONS

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ABSTRACT

This is an exploratory research highlighting the concerns and reactions of Indian working-class people towards the COVID-19. It was observed that most of the Indian working-class people were seriously concerned about the pandemic and responded well to the measures suggested by the Governments and other agencies in a big way. Most of the respondents believed the pandemic will be effectively controlled across the globe within one year. Word cloud and other data visualization techniques were used to analyze the reactions of the Indian working class towards the Central and State government's initiatives to contain COVID-19. In the word cloud of the top 150 popular words for both central and state governments Lockdown, People and Government have taken the central stage. The word streaming analysis suggests the intense relationship among the most frequent words in the dataset. For the central government, it was social distancing and for state government, it was social distancing and relationship between central and state governments. The sentiment analysis for both central and state government was neutral, mostly.



The researchers are of the view that the research will provide a deeper insight into human perception and behavior towards the measures initiated by the Central and State Governments in any similar difficult situations. Further the concerns identified may be taken into consideration by the Government while designing the policy measures and other interventions by the Government.

Keywords: Sentiment; word cloud; text mining; sentiment analysis; COVID-19

1. INTRODUCTION

On the last day of the year 2019, the Chinese authorities have reported to the World Health Organization (China) about the pneumonia-like case in Wuhan city of Hubei province. Some of the people suffering from this were reported to be the dealers and vendors at the Huanan seafood market. On Jan. 3rd, 2020 China reported a total of 44 suspected cases (Muccari et al., 2020).

In January 2020, the outbreak was identified to be caused by a new coronavirus. The common symptoms include fever, cough, fatigue, shortness of breath, loss of smell, and taste. The first death in China was reported on Jan 11, 2020. And since then, it has spread globally. On January 30, 2020, the World Health Organization (WHO) declared the outbreak as the global public health emergency as by then more than 9000 cases were reported.

In February 2020, it reached to Japan, South Korea, Egypt, France, Iran, and other countries. On March 11, 2020, the WHO declared this as pandemic (WHO, 2020), and as per the coronavirus resource center of Johns Hopkins University, the reach of this virus spread across 188 countries as on the date of writing this paper (CSC, 2020).

The impact of COVID 19 is devastating as more than 4.5 million people are reported to be infected and more than 0.3 million people have died of COVID 19. The situation in India is not that great too as more than 90 thousand people are infected, and more than 27 hundred people have lost their lives.

As on date, there is no medication available for COVID-19. To make COVID-19 information widely available, the Government of India has launched a dedicated website <https://www.mygov.in/covid-19>, informing her citizens about its symptoms and preventive measures. There are many myths also doing round about it, to control this and provide accurate information regarding COVID 19, a dedicated App “Arogya Setu” has also been launched by the Government.



Through various addresses to the nation, the Prime Minister of India declared and detailed about the lockdown in the country and advisory around the same were being issued from time to time by various concerned ministries and departments. Understanding the concerns and sentiment of the Indian people during the time of lockdown is at the core of this work. While understanding the concerns and sentiments of Indian working class, this work will pave ways for Government to formulate plans and strategies to mitigate the risks associated with COVID-19 or any other similar event that may occur in future.

The Cambridge dictionary has defined sentiment as “A *thought, opinion, or idea based on a feeling about a situation, or a way of thinking about something*” (Procter, 2001). The touch points for the research are development of word cloud, sentiment analysis and understanding perception about changed health and sanitation behaviour in the light of COVID-19.

2. LITERATURE REVIEW

Any pandemic represents significant risk to humans because of its potential to cause high levels of mortality and to disrupt socially and economically across the globe. In case of outbreak of any pandemic it is essential for public health authorities to be prepared to act. This requires careful planning on the side of public health authorities.

An effective plan should focus on prevention, where possible; prepare the society to meet its health needs; respond quickly to reduce the damage; and contribute to rapid recovery of individuals and communities (August, 2019).

Community perception and sentiments about the associated risk and threat are essential ingredients for an effective pandemic control plan. Most of the information about public perception and response in case of outbreak of a pandemic is available for SARS coronavirus and H5N1 subtype of avian influenza virus (Leung et al., 2003; Lau et al., 2003; Cava et al., 2005).

Kulkarni et al. (2019) found that influenza viruses have capability of causing pandemic because of their unstable nature and a novel virus may result through the exchange of genetic material among viruses from different animal, avian or human hosts.

Research shows that during SARS people’s willingness to comply with risk reducing behavior was associated with perceived urgency and seriousness of threat. In health psychology models risk perceptions have been viewed as one of key drivers of health behavior



modifications (Brewer et al., 2007; Brewer et al., 2004; Weinstein, 1988; Weinstein et al., 2007).

Precaution adoption process has been found to be an orderly sequence of qualitatively different cognitive stages (Weinstein, 1988). Lau et al. (2003) study in Hong Kong focused on likely compliance of public towards protective behavior in case of a potential outbreak of H5N1. It was found that 1/3rd respondents felt that the chances of outbreak were high, and more than half indicated that they were worried of getting themselves or one of the family members getting infected with the same.

De Zwart et al. (2007) compared the risk perception of Asian and European respondents towards the spread of avian flu. The study found that the European respondents perceived a higher risk as compared to the Asian respondents. On an average half of the respondents indicated risk of getting infected. However, there was wide variations in the risk perception of respondents from different countries.

Di Giuseppe et al. (2008) in knowledge and attitude of Italians about getting infected and risk associated with the avian flu. It was observed that 19% respondents reported higher probability of getting infected. It was further observed that people from the lower socio-economic strata indicated a higher probability of getting infected and same were more likely to comply with the hygiene and safety measures suggested.

Ibuka et al. (2010) noted that the perceived risk and precautionary behavior of people in case of spread of pandemic can be dynamic and may change over time. It was observed that there was significant difference between men and women about the perceived risk and precautionary behavior. Females were found to be more concerned as compared to males.

Chew and Eysenbach (2010) did a content analysis of 2 million Twitter posts during H1N1 spread and found that it was an important source of sharing information about pandemic. Xue and Zeng (2019) studied the role of international agency like World Health Organization (WHO) along with the initiatives taken by different national governments in response to the threat of a global influenza pandemic in the past.

Sentiment analysis is also known as opinion mining is aimed at understanding people's sentiment towards some objects or some happenings around them. To gain an overview of the wider public opinion around certain topics use of sentiment analysis is extremely helpful. It has got a strong ability to extract insights from the data. Sentiment analysis comprises a series



of methods and tools aimed at detecting and pulling out opinions from language (Indurkha & Damerau, 2010).

The polarity in the form of positive, neutral, or negative is found out with the help of sentiment analysis for opinion towards something (Dave et al., 2003). Apart from sentiment analysis, text analysis and word cloud have also been used in the study. Analyzing texts from a data set so that machine-readable facts can be drawn from them is the purpose of text analysis. Further, it helps create structured data from free-text content (Ontotext, 2020).

Graphical representation of word having greater significance and frequently appearing into the text is a word cloud. The more common words are depicted with larger visuals in the word cloud. It helps in understanding and identifying which word is frequently appearing in the text is the set of responses (VisionCritical, 2020).

3. RESEARCH METHODOLOGY

The study was conducted in urban India during April 2020 when the county was under lockdown and had not witnessed large scale spread of COVID-19 pandemic. An online survey form was sent to respondents to gather their perception and behavior relating to different dimensions of the COVID-19 pandemic. The survey questionnaire was shared at the beginning among connected networks and the respondents were further requested to pass on the same to people in their network. At the close, a total of 394 valid responses were received.

3.1. Survey content

The survey included questions on demographic characteristics such as gender, age, education, income, profession, and location. One question each was added to measure the respondent's concern and perception about the time that will be needed to control the spread of COVID-19 pandemic across the globe.

Twelve questions captured the respondent's behaviour modifications/ initiatives to handle COVID-19 challenges. Two questions captured the respondent's satisfaction and confidence in the Union and State Government's measures to contain COVID-19 spread. Further two open-ended questions captured suggestions from the respondents to the Union and State Governments in terms of measures to be taken in short, medium, and long term.

3.2. Sample Description

The research intends to understand the perception and behavior of the Indian working class towards the COVID-19 pandemic. In the survey, 272 (69 percent) respondents were male



and 122 (31 percent) were female. Since the age of working class in India, usually comprises of people above 20, the respondents were divided into two groups: first representing the age from 20 to 40 and the second having responses from people of age 41 and more. 49.5 percent (195) respondents represent the first group whereas 50.5 percent (199) were from the second group.

Qualification wise maximum respondents (53.8 percent) have master's degrees followed by bachelor's degree (35.53 percent) and the least around 1 percent were having completed their 10th standard whereas, those completed their 10+2/diploma was 5.83 percent and respondents having doctorate qualification represented 3.80 percent in the sample. When it comes to income 48.22 percent of respondents were earning less than INR 25,000 and 9.13 percent were reported in the maximum bracket earning more than one lakh INR.

People earning between 50001-75000 and 25000 to 50000 were also represented significantly taking a pie of 17.76 percent and 16.49 percent. The geographical spread of the sample was divided as 86 percent belonging from urban places and 14 percent were from rural places. The demographic details of the respondents are presented in Figure 1.



Figure 1: Sample Description

4. DATA ANALYSIS AND DISCUSSION

4.1. Concern about COVID-19 Pandemic

Due to widespread publicity almost, everyone was aware of the spread of the pandemic COVID-19. In all mediums of mass communication, it had grabbed a large media timeshare and the mindshare of the masses. The researcher attempted to gauge the concerns of the respondents regarding the spread of the pandemic. It was observed that more than 80 percent of respondents were following the information about COVID-19 because they were seriously concerned about the consequences and spread. 17.2 percent of respondents indicated that they were having only some concerns and so were not very serious about the pandemic. Only 2.1 percent of respondents reported that they were not paying much attention and so were not following information about COVID-19.

As most of the respondents were concerned about the spread and consequences of the pandemic, it was expected that they will also adopt some behavioural modification to deal with the same. The table: 2 presents different voluntary behavioural measures taken by respondents to deal with COVID-19 spread. It can be observed from the table that most respondents adopted common safety measures suggested in the media. The adoption of suggested measures by the respondents is very high. The measures are from categories like avoiding access to public places and possible contact with a COVID-19 carrier; higher levels of personal hygiene like washing hands and using face masks; actively collecting more information and the inherent risks and community protection.

Table 1: Descriptive Statistics

Behavioural Practices New	N	Yes %	No %
Avoided crowded places such as shopping centres, public parks, or public transportation.	394	98.98	1.02
Wash your hands more often or use hand sanitizers, and avoid direct contact with your mouth, nose, etc.	394	98.98	1.02
Avoided contact with people returning from infected or high-risk areas.	394	98.22	1.78
Cover your mouth and nose with a handkerchief, tissue or arm when coughing and sneezing.	394	97.97	2.03
Avoided contact with people who have travelled abroad in recent months.	394	97.97	2.03
Avoided contact with people returning from other cities in India	394	97.72	2.28
If symptoms are suspected or confirmed, be at home or at a designated hospital for 14 days.	394	96.45	3.55
If there are suspected symptoms, you are willing to take the initiative to go to the hospital or health station in time for the examination.	394	94.67	5.33
Bought a certain number of masks to wear while going to public places.	394	88.07	11.93
Arranged enough food and drinking water in your home for half a month to a month.	394	85.79	14.21
Discussed with a doctor or a friend about the health topic of the COVID-19 pandemic.	394	79.70	20.30
Sanitized/ventilated my locality or surroundings.	394	78.43	21.57



Thus, for individual behaviours, the modification indicated by the respondents was around 90 percent. However, it was indicated lowest at 78.43 percent for concerns about the neighbourhood and society by sanitizing locality or surroundings. The same is in line with the general behaviour reported for the Indian community which is more concerned about self rather the community. Respondents also reported lower at 79.70 percent on discussing with doctors or a friend about the health topic relating to the COVID-19. The same also reflects the general human tendency of discounting events and risks that seem distanced in the future.

Table 2: perception About COVID-19 Control

Globally, how long do you think the COVID 19 outbreak will take to be effectively controlled?				
Duration	Frequency	percent	Valid percent	Cumulative percent
2-3 Month	111	28.1726	28.1726	28.1726
About 6 Months	165	41.8782	41.8782	70.0508
About 12 Months	73	18.5279	18.5279	88.5787
More than a Year	45	11.4213	11.4213	100

Further, the researchers explored the respondent’s perception regarding the maximum timeframe by which the pandemic will be effectively controlled globally. The table presents the respondents' views regarding the time it will take to contain the COVID-19 pandemic globally. It is indicated that most respondents with 42.3 percent think that it will take around six months to control the pandemic around the globe. Only 10.5 percent of respondents are of the view that it will take more than a year to control the COVID-19 outbreak globally. Around 90 percent of the respondents believe that the pandemic will be controlled globally in around 12 months.

4.2. Exploring Sentiments with Text Analytics

Researchers also collected the respondent’s views and suggestions regarding the consequences of the COVID-19 pandemic. To explore the same three methods were used. First, a text analysis was conducted to identify the most frequent words in the concerns and suggestions made by the respondents. Second, a Word Streaming was conducted to identify not only the most frequently occurring words but also understand their association with the other frequently discussed words. Third, a Sentiment analysis was done to understand their sentiments regarding the COVID-19 pandemic. The section below presents the same to have a deeper understanding of the perception of the Indian working class towards COVID-19.

4.3. Word Cloud

The dataset for the Union and State governments were analysed separately by breaking “Dataset” into “Text Corpus” (a collection of texts with each response being treated as one



document) and then the frequency of words were obtained by making a “Term Document Matrix” which is a matrix where the number of rows indicates the number of distinct words and number columns represents the number of different documents/responses (Table” 4). Final rankings of words were obtained by calculating “tf-idf” values for each term and each document. The resulting “Word cloud” was hence made based upon the ranking of words-frequency for four scenarios for both the dataset (Union Government & State Government) on “R-Programming” software Frequently occurring 50 words, Frequently occurring 100 words, Frequently occurring 150 words, and Frequently occurring 200 words.

Word clouds are the graphical representation of the unstructured data in the form of text. It presents frequently occurring words in a document or set of documents. The larger the size of a word in a word cloud, the higher the frequency of the word in the text under analysis. It is easy to use and inexpensive method of visualizing the data. In the context of the COVID-19 pandemic, the word cloud may represent people’s pain points or issues of concern. For analysis researchers used Word Cloud with frequently occurring 150 words.

From the Word Clouds of the Union government, it can be observed that the respondents were most frequently discussing words like ‘lockdown’, ‘people’, ‘government’, ‘testing’, ‘distancing’, ‘medical’, ‘increase’, ‘pandemic’, etc. Thus, it may be concluded that the respondents are concerned about things like ‘lockdown and its duration (increase)’, ‘government action’, ‘social distancing’, ‘medical testing’, ‘medical testing of people’, social distancing by people’, etc. These issues are of concern and being discussed by the people about the Union government.

Table 3: Depiction of 2-D "Term Document Matrix" (values indicate the number of times that term was present in document)

TERMS →	DOCUMENTS →					
		Response-1	Response- 2	Response- 3	Response- 4
“awesome”		0	2	1	0
“business”		0	0	0	1	
“yes”		1	0	2	0
.....	



Figure 2: Word Cloud from Central Government Dataset (Top 150 Popular words)

From the Word Clouds of the State governments, it can be observed that the respondents were most frequently discussing words like ‘lockdown’, ‘government’, ‘people’, ‘distancing’, ‘testing’, ‘medical’, ‘state’, ‘social’, ‘provide’, ‘health’, ‘measures’, ‘proper’, etc. Thus, it may be concluded that the respondents are concerned about things like ‘lockdown’, ‘measures by the state government’, ‘social distancing’, ‘medical testing’, ‘provide food’, social distancing by people’, etc. These issues are of concern and being discussed by the people about the state governments. In comparison with the issues relating to the Union government, it can be concluded that the respondents do not differ much on issues relating to Union and State governments.

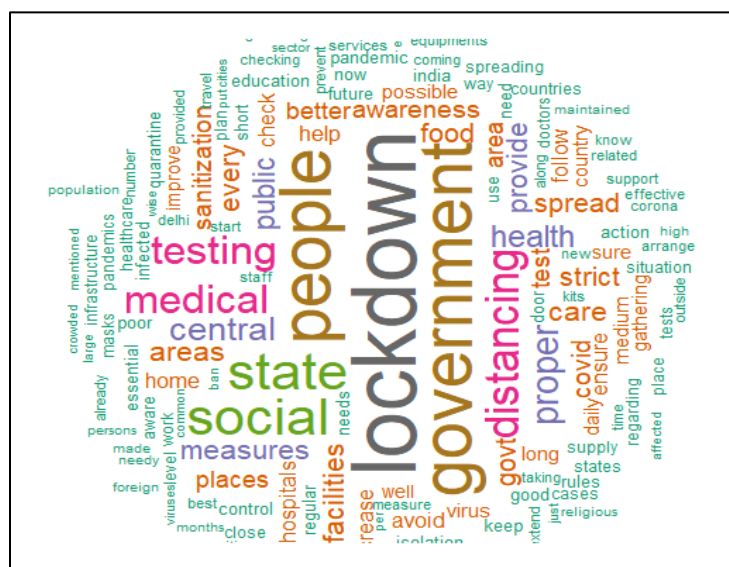


Figure 3: Word Cloud of State Government Dataset (Top 150 Popular words)

government. Another important connection is between ‘short’, ‘long’, and ‘government’ and ‘lockdown’. This simply means that the people are concerned about the long-term and short-term lockdown by the government. Which may be referred to as the people’s concern about the duration of the government-imposed lockdown.

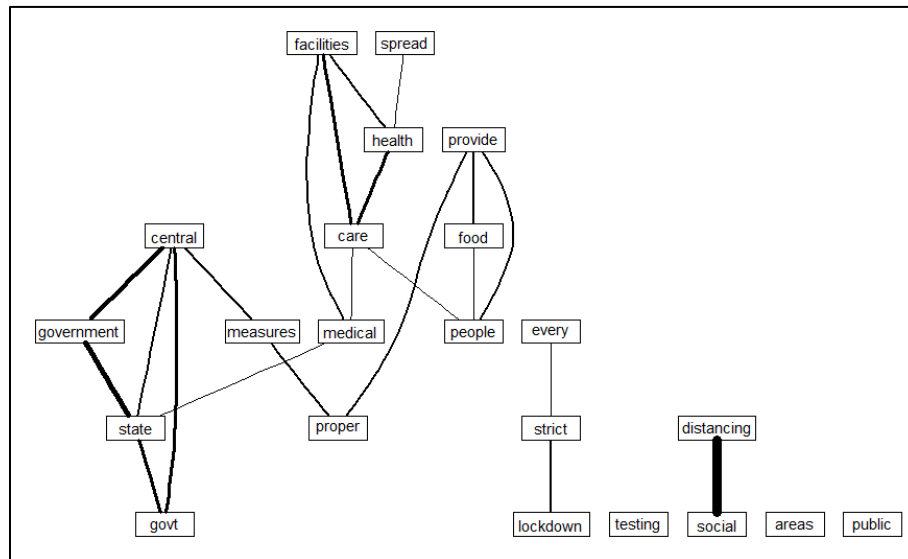


Figure 5: State Government Dataset with associations and connections

Word streaming diagram for the State governments indicates that the people are highly concerned about ‘social distancing’. The same can be inferred from the thickest lines between these words. Maybe the people are talking about the social distancing measures adopted and enforced by the State governments. Second, the thickest line connects words Central, State, and Governments. This simply means that people are seeing State and Central governments as a collective whole when it comes to their COVID-19 concerns.

People are also talking about ‘health care facilities’ while discussing COVID-19 issues. This means they are concerned about the state of the health care facilities in their state. Further people are connecting ‘measures to provide proper food and health care facilities to people’. This may be interpreted as the people are concerned about the government measures to provide proper food and health care facilities to people in the state concerned.

5. SENTIMENT ANALYSIS

Sentiment analysis or opinion mining is the interpretation and classification of emotions (positive, negative, and neutral) within text data using text analysis techniques. Sentiment analysis allows researchers to identify the respondent’s sentiment toward the object under study. Sentiment analysis is the area which deals with judgments, responses as well as feelings, which is generated from texts because sentiments are the most essential characteristics to judge

the human behaviour (Chakraborty et al., 2019). To understand the respondent’s sentiments towards COVID-19 a sentiment analysis was conducted.

Sentiment analysis was done for the 394 responses received from the respondents. The respondents have voiced their opinion on what the central government and the state government should do to tackle COVID 19. “R-Programming” platform was used for carrying out the sentiment analysis. There is a recognized library in “R-Programming” named “tidytext” which is extensively used for text mining and sentiment analysis. The library (tidytext) consists of three inbuilt lexicons (lexicons are a dictionary of words) named “afinn”, “nrc” and “bing” which are used to define the sentiment of a word.

“afinn” lexicon classifies the sentiment of a word by scoring an integral number between -5 to +5 with -5 representing extreme negative sentiment and +5 representing extreme positive sentiment. At the time of writing this research, a total of 2477 words were rated with a sentiment score in the “afinn” lexicon.

“bing” lexicon classifies the sentiment of a word by classifying it either as “positive” or “negative”. Similarly, “nrc” lexicon decides the sentiment of a word by assigning it with words like: “trust”, “fear”, “negative”, “sadness”, “anger”, “fear”, “surprise”, “positive” etc. In our research, we have used “afinn” lexicon for carrying out sentiment analysis. However, before carrying the sentiment analysis, proper data cleaning was done by removing punctuation marks, white spaces, some stopwords (like: ‘in’, ‘of’, ‘the’ etc.) and some other words would not make any sense otherwise.

Any word which was present in the dataset and for which there was no sentiment score in “afinn” lexicon was scored a ‘0’. Also, in this research, a single response was broken into individual words and the sentiment score for each of the words was added to obtain a final sentiment score of the whole response. This has been illustrated below:

a) Suppose, RESPONSE_1: “Increase the lockdown”.

Overall “RESPONSE_1’s Sentiment Score” = Sentiment score of “increase” + Sentiment score of “lockdown” (the word ‘the’ was removed in data cleaning and hence it’s value was not computed).

Table 4: Sample Words with Sentiment Values in “afinn” Lexicon

Word	Value	Word	Value
Abductions	-2	Admire	3
Ability	2	Affected	-1
Abuse	-3	Afraid	-2



Accept	1	Amazing	4
Acrimionious	-3	Anger	-3
Audacious	3	Awesome	4
Award	3	Bastard	-5
Bitch	-5	Breathtaking	5

Similarly, an overall sentiment score was obtained for each of the 394 responses and the results have been summarized for the Central and State governments both.

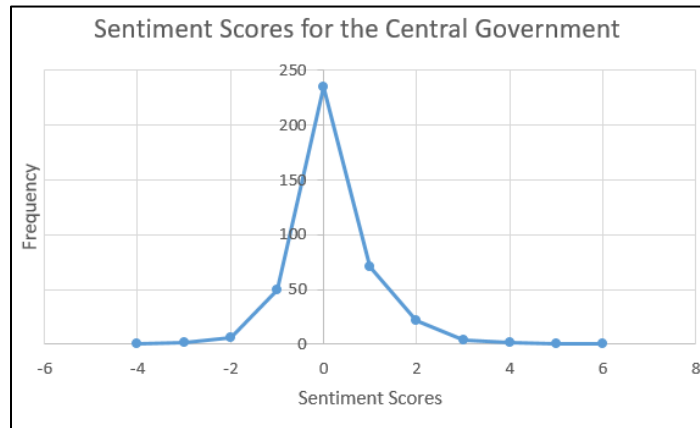


Figure 6: Sentiments for Central Government

Table 5: Frequency Distribution Sentiments for Central Government

Sentiment Scores of "Responses"	Frequency (Total = 394)
-4	2
-3	2
-2	12
-1	55
0	227
1	63
2	19
3	7
4	2
5	0
6	1
7	0

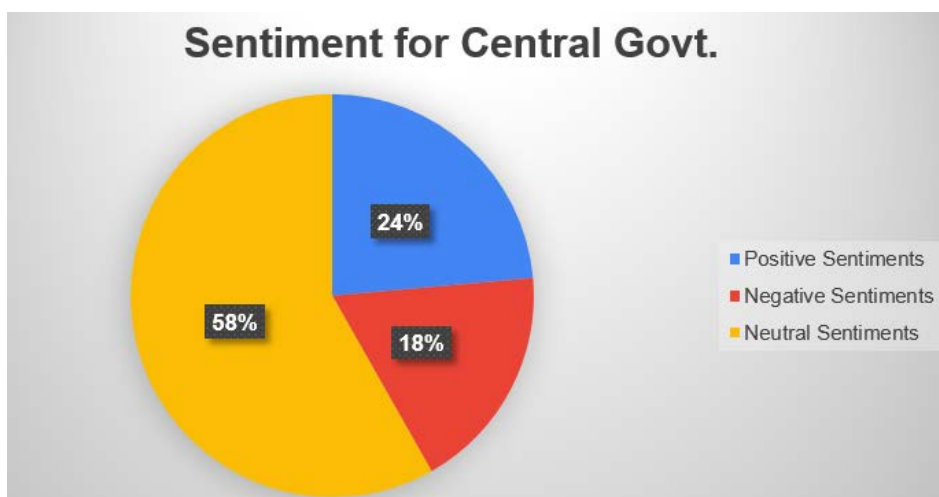


Figure 7: Positive, Negative, and Neutral Sentiments for Central Government

From the figures and Table, it can be concluded that most of the responses scored an overall sentiment score of ‘0’ meaning they hold neutral sentiments (sentiment score = 0). But the count of positive sentiments (sentiment score > 0) reported at 24 percent exceeded over negative sentiments (sentiment score < 0) reported at 18 percent by a thin margin of 6 percent. Hence, it can be concluded that overall people have a positive reaction towards the measures and initiatives taken by the Central Government.

So, the measure initiated may be continued. But the margins between the positive and negative sentiments are not very large. This demands a need to analyse the issues which are causing a negative reaction towards the measures and initiatives. In the light of findings of this research, the measures and initiatives taken by the Central Government need to be modified to make them more appropriate for people’s requirements.

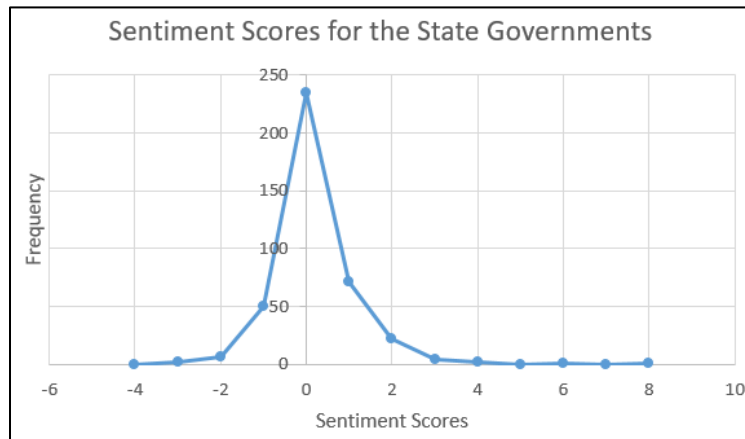


Figure 8: Sentiments for the State Governments

Table 6: Frequency Distribution Sentiments for the State Governments

Sentiment Scores of “Responses”	Frequency (Total = 394)
-4	0
-3	2
-2	6
-1	50
0	235
1	71
2	22
3	4
4	2
5	0
6	1
7	0
8	1

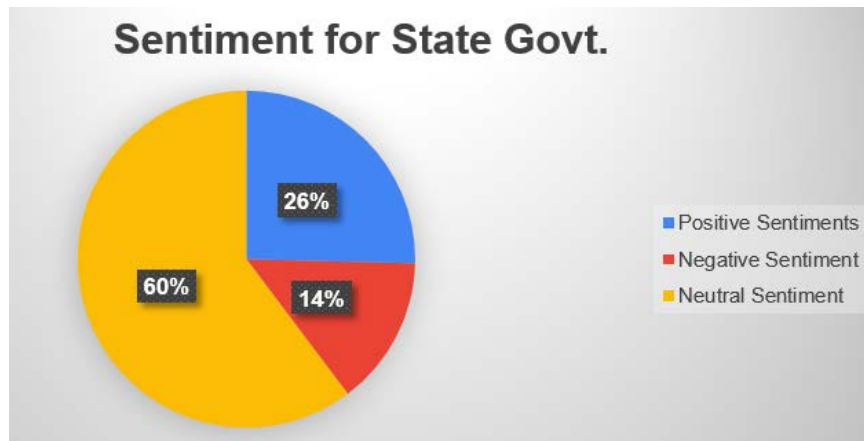


Figure 9: Positive, Negative, and Neutral Sentiments for the State Governments

From the figures and Table relating to sentiment analysis for the state governments, it can be concluded that most of the responses scored an overall sentiment score of '0' meaning they hold neutral sentiments (sentiment score = 0). But the count of positive sentiments (sentiment score > 0) reported at 26 percent exceeded over negative sentiments (sentiment score < 0) reported at 14 percent by a comfortable margin of 12 percent.

Hence, it can be concluded that overall people have a positive reaction towards the measures and initiatives taken by the State Government. So, the measure initiated may be continued and augmented further. But there is still a need to analyse the issues which are causing a negative reaction towards the measures and initiatives. In the light of findings of this research, the measures and initiatives taken by the State Governments need to be modified to make them more appropriate for people's requirements.

6. SUMMARY AND CONCLUSION

A pandemic like COVID-19 is unprecedented in recent human memory. It presented not only a threat to social and economic functioning but also human lives. So, it required ordinary people to modify their behaviour. Governments across the nations initiated unique measures like social-distancing, lock-down controlling different social and economic activities, planning for social and economic activities, increasing emphasis on public health initiatives, etc. Some governments failed to meet public expectations, but some were able to live up to their expectations.

The present research, in the first part, explored the concerns of the Indian working class toward the COVID-19 pandemic and associated responses in the form of behaviour modifications. It was observed that most of the Indian working-class people were seriously concerned about the pandemic and responded to the measures suggested by the Governments

and other agencies in a big way. However, the response observed for the individual behaviour modifications were high as compared to group behaviour modifications. Most of the respondents believed the pandemic will be effectively controlled across the globe within one year.

To understand the perception and sentiments text analytical methods like word-cloud, word-streaming, and sentiment analysis were used. In the word cloud of the top 150 popular words for both central and state governments lockdown, people and government have taken the central stage. The word streaming analysis suggests the intense relationship among the most frequent words in the dataset.

For the central government, it was social distancing and for state government, it was social distancing and relationship between central and state government. It was observed that the majority was having a 'neutral' sentiment towards the initiatives and measures taken by the Central and State Governments, both. However, the respondents who indicated a positive sentiment were marginally higher as compared to those who indicated a negative sentiment for the Central and State Governments out of those who expressed their sentiments.

7. IMPLICATION OF THE RESEARCH

It is evident for the findings that the sentiment of Indian working class is neutral in both cases of Central and State Governments. The word cloud suggests that the most important concern of people at the time of COVID-19 is lockdown and social distancing. The behavioural practices as suggested by government and other agencies in eight cases were reported to be followed in high numbers (more than 90% cases), so reported in table 1.

The compliance to the measures suggested by the WHO and Government of India was much higher as compared to earlier works in Hong Kong and Italy done at the time of spread of H5N1 pandemic (Lau et al., 2003, Di Giuseppe et al., 2008, Fielding et al., 2005). Probably the reason for the same may be widespread availability of information about the seriousness of the COVID-19 resulting in loss of human lives.

A large extent (88.58%) of the respondents were sure that it will take around a year's time to control this pandemic. The findings of the research can be used Government to create and adopt various measures to not only come out with an effective plan to control COVID-19 and associated risks but also help her to control pandemic like this or some new and different health emergency in future.



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