

Analysis of Emotional Manifestations of Indian Demography to Pandemic

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Abstract

Covid-19 infection had serious health implications not only for an individual and also for the family. It has disrupted the normal life of all of us. Studies have shown that people are also mentally and psychologically affected by Covid-19 due to the disruptions in their day-to-day lives besides the infection per se. Fear of being infected and resulting trauma for the family is one of the many emotional manifestations experienced by people besides its other mental and psychological impact on our day-to-day life. The present study electronically surveyed 424 respondents in India across the demographics on their emotional manifestations during pandemic. The responses were collected on the semantic differential scale for common emotions exhibited by people during such past episodes of mass outbreak of infection, epidemics as well as current pandemic as reported in the past research. The data collected was grouped into three clusters using cluster analysis. One-way ANOVA results found significant differences in the three clusters for each emotional variable. The result of Chi-square test of independence found three clusters to be independent with respect to age and occupation dimension.

Keywords: *Covid-19, psychological health impact, emotion-based clustering, India*

JEL Clasification: *I1, I3, A14, A19*

1. INTRODUCTION

The novel Covid-19 has shaken the entire world over past three years since it was first detected and reported in December 2019. Covid-19 is an infectious disease caused by virus known as SARS-CoV-2 (severe acute respiratory syndrome). We have now entered the fourth year of this pandemic. With a spread in more than 200 countries and territories worldwide and deaths running into millions, Covid-19 became one of the most serious health pandemics of present times as more than 300 million people worldwide have been infected by the disease so far^{1,2}. This pandemic disrupted the lives of people around the world. Besides serious concern for health of the people, it was observed that pandemic also took a toll on the psychological and mental well-being of people³. Anxiety, stress, depression, fear, irregular sleep and loss of appetite or indulgent eating to cope with stress, as well as feeling of isolation due to impairment in social interactions were some of the most common non-covid manifestations observed in people. This was irrespective of their demographics i.e. age, gender, income, occupation or place⁴. As reported by WHO and medical experts across the globe, the pandemic has entered the endemic stage where people have to learn to live with the covid and start leading a new normal way of life. The pandemic posed unprecedented challenges for people to adjust and cope to the new scenario. This necessitates a continuous monitoring and improvement in the psychological and mental

health of people so that they not only become resilient to this pandemic but are also prepared to handle any such health calamity in the future and are able to provide emotional support to their families and near ones to cope with such disruptions in the future.

2. LITERATURE REVIEW

It has been widely observed in the past studies that a large-scale disease outbreak to the tune of pandemic not only disrupts the day-to-day activities of people but is also physically, financially and emotionally draining for the people^{5,6}. While public (government) data can present statistics with respect to physical and financial effect of a pandemic, what remains unaccounted is the emotional effect of such unexpected long-lasting large-scale pandemic^{5,6}. School closures, suspension of shopping, dining, entertainment and religious activities^{7,8} lead to isolation⁹ and irritative behavior due to restrictions on movement^{10,11,12}. Lockdowns imposed by government also added to increased emotional exhaustion, stress and burnout since one was unable to revive the energies on weekend due to stress caused by pandemic, work environment and family demands¹³. Past researchers have also concluded a significant negative effect of infectious disease outbreak on the psychological and mental well-being of people. These negative effects have been observed in past studies as depression and psychological distress^{14,15,16,17}, worry and functional impairment¹⁸, anxiety^{4,19,20,21} and

reduced quality of life^{22,23,24}. There were also indirect manifestations of pandemic as observed in the past studies in the form of challenging work conditions³ resulting in fatigue, sleeping and eating disorders, headaches^{5,25}, increased anxiety due to future job uncertainty^{26,27}. The impact on mental well-being has been observed to vary across age, gender, economics status & occupation of the people. In few studies adults are found to be more effected by pandemic whereas in other studies young are found to be more impacted^{7,8,12,15,16,17,22,27}. It was largely concluded in past studied that female are more negatively impacted by pandemic^{3,15,16,17,22}. Similarly poor were more severely impacted by pandemic^{3,6,26}. Those, businesses & occupations that were badly affected in pandemic caused more emotional turmoil in people working there^{10,11,13,14,25,26}. Further, this impact has also been observed to vary from country-to-country. Developed countries were not as badly impacted by pandemic as compared to developing countries due to the existence of social security schemes that provided adequate coverage to the poor^{3,4,5,6,10,17,18,20,21,26,28}.

Accordingly, the objectives of this study are to gauge the impact of the pandemic on the mental health of the Indians and to suggest to the government, medical practitioners and psychological and mental health experts for an early intervention strategies²⁸ for the vulnerable groups i.e. those people witnessing negative emotions in order to promote their

psychological and mental well-being so that they can lead a better life.

3. RESEARCH OBJECTIVES

Accordingly, the objective of the present study is to understand the emotional manifestations of Indians to Covid-19 which has globally disrupted the normal life of people. This objective is achieved through:

- Cluster analysis of the people in India on the basis of their positive and negative emotional manifestations to Covid-19 pandemic
- Analyses of the observed differences in the identified clusters (based on emotional effect to Covid-19) with respect to socio-demographic variables.

4. HYPOTHESES OF THE STUDY

Following hypotheses have been proposed to investigated above mentioned objectives:

H₁: People in India significantly vary in their emotional manifestations to Covid-19 pandemic

H₂: Clusters based on emotions vary significantly according to socio-demographics of Indians

The hypothesis H₂ has been studied through four sub-set of hypotheses pertaining to socio-demographic profile of respondents

H_{2a}: Gender-wise, people in India significantly differ in their emotional manifestation to pandemic

H_{2b}: Age-wise, people in India significantly differ in their emotional manifestation to pandemic

H_{2c}: Occupation-wise, people in India significantly differ in their emotional manifestation to pandemic

H_{2d}: Income-wise, people in India significantly differ in their emotional manifestation to pandemic

5. METHODOLOGY

5.1 *Sample Population, Data Collection & Research instrument*

This study was conducted in India in the months of January-April 2022. Non-probability convenience sampling method of data collection was adopted using online survey method. However, it was ensured that male and females are fairly represented in the sample as well as adequate spread of data was ensured across all the age categories. 424 usable responses were eventually obtained after approaching 600 respondents via emails, what's app messenger, etc.

A pre-tested structured questionnaire was used for data collection. It was divided into two parts: Part A – contained sociodemographic information about the respondents viz.,

gender, age, level of education, occupation, family income; Part B – contained list of emotions commonly exhibited during different phases of life by an individual. Respondents were asked to rate their emotions during the pandemic scenario. The common emotions were listed with the bipolar ends representing the opposites through a semantic differential scale where 1 represented negative emotions, 5 represented positive emotions and 3 representing neutral emotions. During the pre-testing stage of the questionnaire, 50 respondents rated themselves on ten emotions. This questionnaire also inquired the respondents regarding other emotions exhibited by them during the covid times via an open-ended questionnaire. Accordingly, from the pre-test responses, two more emotional effects of pandemic were added to the scale viz., sleeping disorder and level of satisfaction with the current state. The final scale therefore, had 12 emotions presented with bipolar ends.

5.2 *Data Analysis*

The data collected was analysed for the descriptive statistics such as frequency and percentage to study the sociodemographic profile of the respondents. Cluster analysis was then performed on the 'emotions' data set which was measured on a semantic differential scale of 1 to 5. This was done to categorize the respondents on the basis of their widely exhibited emotions in the survey. The clusters

so obtained were further analysed using one way ANOVA for significant differences between the clusters on the rated emotions. Also, Chi-square test was run to investigate the association between the identified clusters and sociodemographic dimensions of the respondents.

6. RESULTS

6.1 Sociodemographic Profile of the Respondents

The study is based on the responses from 424 respondents. The sociodemographic profile of the respondents is presented in Table 1.

Table 1: Socio-demographic Profile of Respondents

SOCIO-DEMOGRAPHIC VARIABLES	COMPONENTS	FREQUENCY ^a
GENDER	Female	218
	Male	210
AGE	20 years or below	182
	21-30 years	42
	31-40 years	16
	41-50 years	134
	51 years & above	50
LEVEL OF EDUCATION	Schooling only	117
	Graduate	180
	Post-graduate	84
	Professional	43
	Student	213
	Professional	34
	Business	55
	Employed	51

OCCUPATION	Housemaker	60
	Retired	11
FAMILY INCOME LEVEL (monthly)	<₹20,000 p.m.	32
	₹20,000-40,000 p.m.	86
	₹40,001-80,000 p.m.	155
	>₹80,000 p.m.	151

^a N=424

Source: The Authors

It is observed that the study is based on fairly equal representations of females and males. Age-wise, the data gives more representation of young people. Majority of respondents were graduates. Also 50% of the respondents were students. Monthly family income of respondents varied, with majority of respondents from middle income category followed by high income category.

6.2 Clustering of respondents on emotions related to pandemic

Part B of the questionnaire collected responses for emotional feelings exhibited by the people in India during pandemic. K-mean cluster analysis was run on semantic differential scale that gauged the respondents' emotions. These emotions were measure on a scale 1 to 5, where value 1 denoted negative emotions and value 5 denoted positive emotions. Accordingly, point 3 on the scale was the central value of the scale denoting neutral emotions. In line with the scale values and the emotions studied, the respondents were

grouped into 3 clusters viz., Cluster 1, 2 and 3 on performing the cluster analysis as shown in Table 2. Cluster 1 comprised of 98 respondents, Cluster 2 consisted of 104 respondents and Cluster 3 had 222 respondents. The centroid value of each cluster for corresponding emotion is presented in Table 3.

therefore, represented people exhibiting neutral stand on emotions and was labelled '*neutral emotional outlook*'. This has also been shown graphically in Figure 1 representing the mean value of each emotion in the three identified clusters 1, 2 and 3.

Table 2: Result of Cluster Analysis

Sum of squares Table		
	Count ^a	Value
Cluster 1 (-)	98	752
Cluster 2 (+)	104	642
Cluster 3 (=)	222	1616
Between clusters		2077
Total	424	5087

^aN=424

Source: The Authors

The centroid of cluster 1 was in the negative range -0.531 to -1.041. Cluster 1, therefore, represented people exhibiting negative emotions and accordingly labelled '*negative emotional outlook*'. The centroid of cluster 2 was in the positive range 0.666 to 1.061. Cluster 2 was represented by people exhibiting positive emotions and therefore was labelled '*positive emotional outlook*'. Finally, the centroid of cluster 3 was approximating to 0 with range between -0.105 to 0.029. Cluster 3,

Table 3: Centroid Mean Value of Three Clusters on each Emotion

Emotions ^a	Cluster1	Cluster2	Cluster3
	Negative emotional outlook	Positive emotional outlook	Neutral emotional outlook
E1. Fear-Hope	-0.86	0.836	-0.015
E2. Stressed-Relaxed	-1.007	0.952	-0.005
E3. Anxiety-Calm	-1.041	0.975	-0.001
E4. Sad-Happy	-1.016	1.033	-0.039
E5. Lonely-Togetherness	-0.925	0.862	0.001
E6. Bored-Busy	-0.531	0.666	-0.079
E7. Sense of insecurity-security	-1.005	0.97	-0.014
E8. Insomnia-sound sleep	-0.913	0.792	0.029
E9. Impatient-Patient	-0.779	0.954	-0.105
E10. Distrust-Trust	-0.842	0.945	-0.074

E11. Depressed- Cheerful	-1.034	1.061	-0.044
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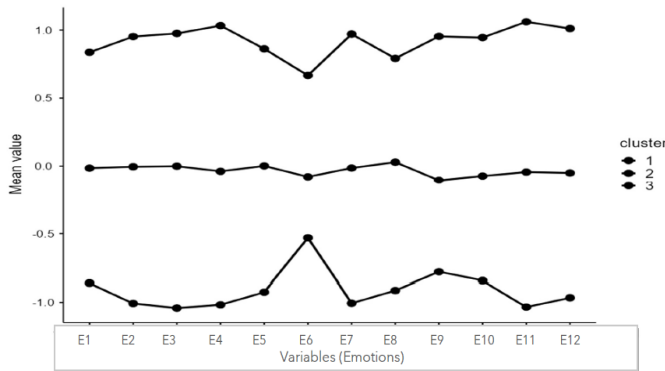


Figure1: The figure is the graphical representation of the centroid of the clusters table. X-axis shows variable studied i.e. E1 to E12 representing the 12 emotional manifestations of respondents in response to pandemic scenario. Y-axis shows the centroid mean value of each emotional variable in three clusters. Cluster 1 has all the centroid mean value between -1.0 to 0.0 representing the negative emotional outlook; Cluster 2 has all the centroid mean value between 0.0 to 1.0 representing the positive emotional outlook and Cluster 3 denotes all the centroid mean centered around 0.0 value representing the neutral emotional outlook.

E12. Unsatisfied- Satisfied	-0.965	1.011	-0.051
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^a 5-point Semantic Differential Scale was used to measure each respondent on 12 emotions studied in this research. 1 represents negative emotions, 5 depicts positive emotions & mid-point 3 denotes neutral emotions

Source: The Authors

Figure 1: Graph of mean centroid value for three clusters

Source: The Authors

6.3 One-Way ANOVA Results

One-way analysis of variance test was performed on 3 clusters for all the emotions to test the significant differences in the 3 cluster groups for each emotion. The results are presented in Table 4. Table 4 also give the group descriptive (sample size-N, mean value, standard deviation-SD and standard error-SE) for each emotion under each cluster.

Table 4: Group Descriptive and One-Way ANOVA Results for Differences between Clusters on each Emotion

Variables	Cluster-Emotions ^a	N	Mean ^b	SD	SE	F	p
1. Fear-Hope	1 (-)	98	2.30	0.902	0.0638	227.4	<0.001 ^c
	2 (+)	104	4.14	0.857	0.0586		
	3 (=)	222	3.22	0.886	0.0415		
2. Stressed-Relaxed	1 (-)	98	1.74	0.712	0.0504	438.9	<0.001 ^c
	2 (+)	104	4.03	0.874	0.0598		
	3 (=)	222	2.91	0.922	0.0431		
3. Anxiety-Calm	1 (-)	98	1.71	0.671	0.0474	509.9	<0.001 ^c
	2 (+)	104	4.08	0.857	0.0586		
	3 (=)	222	2.93	0.914	0.0428		
4. Sad-Happy	1 (-)	98	2.17	0.815	0.0576	437.3	<0.001 ^c
	2 (+)	104	4.30	0.669	0.0457		
	3 (=)	222	3.19	0.731	0.0342		
5. Lonely-Togetherness	1 (-)	98	2.23	0.960	0.0679	280.5	<0.001 ^c
	2 (+)	104	4.34	0.851	0.0581		
	3 (=)	222	3.32	0.955	0.0447		
6. Bored-Busy	1 (-)	98	2.50	1.250	0.0884	84.7	<0.001 ^c
	2 (+)	104	3.98	1.050	0.0718		
	3 (=)	222	3.11	0.969	0.0453		
7. Sense of insecurity-security	1 (-)	98	2.08	0.864	0.0611	409.9	<0.001 ^c
	2 (+)	104	4.36	0.754	0.0515		
	3 (=)	222	3.22	0.874	0.0409		
8. Insomnia-sound sleep	1 (-)	98	2.31	1.009	0.0714	254.3	<0.001 ^c
	2 (+)	104	4.30	0.779	0.0533		
	3 (=)	222	3.41	0.990	0.0463		
9. Impatient-Patient	1 (-)	98	2.27	1.034	0.0731	267.1	<0.001 ^c
	2 (+)	104	4.26	0.815	0.0557		
	3 (=)	222	3.04	0.906	0.0424		
10. Distrust-Trust	1 (-)	98	2.38	0.900	0.0636	280.9	<0.001 ^c
	2 (+)	104	4.29	0.777	0.0531		
	3 (=)	222	3.20	0.843	0.0394		
11. Depressed-	1 (-)	98	2.21	0.745	0.0527	493.1	<0.001 ^c
	2 (+)	104	4.42	0.692	0.0473		

Cheerful	3 (=)	222	3.25	0.740	0.0346		
12. Unsatisfied-Satisfied	1 (-)	98	2.17	0.859	0.0607	407.8	<0.001 ^c
	2 (+)	104	4.37	0.725	0.0496		
	3 (=)	222	3.19	0.831	0.0389		

^a signs (-), (+), (=) symbolize clusters exhibiting negative emotions, positive emotions & neutral emotions respectively

^b On 5-point semantic differential scale Mean value ≤ 2.5 represents negative emotions; mean value between 2.5 to 3.5 represents neutral emotions & mean value ≥ 3.5 represents positive emotions

^c Significant at 0.05 level

Source: The Authors

Cluster 1 labelled ‘negative outlook’ consisted of 98 respondents with the mean value ≤ 2.5 on all emotions. Cluster 2 was labelled ‘positive outlook’ consisted of 104 respondents with the mean value ≥ 3.5 on all emotions. Cluster 3 that was labelled ‘neutral outlook’ comprised 222 respondents with the mean value between 2.5 to 3.5 on all emotions. The p-value for differences in 3 clusters for each emotion was found to be significant (p value < 0.001) at 0.05 level of confidence for one-way ANOVA results. This shows that there were significant differences between the three clusters on their emotions exhibited during pandemic. Hypothesis H₁ is therefore, accepted.

6.4 Chi-Square Results

Chi-square test of independence was then performed to assess if there are differences in three clusters with respect to sociodemographic variables viz., gender, age, income level and occupation. The results of the chi-square test of independence are presented

in Table 5. The results show significant differences in the three clusters on the basis of age (p < 0.001) and occupation (p < 0.001), thereby accepting hypotheses H_{2b} (for age) and H_{2c} (for occupation). Young people in the age category 20 years and below are having more negative emotions due to pandemic. It should be noted that this age category also relates to students. However, with respect to gender and income level no such significant differences were observed in the three clusters as reported in the chi-square results.

Table 5: Chi-square Test of Association between Clusters for the Sociodemographic variables

Sociodemographic Variables		Cluster1 Negative emotion outlook (-)	Cluster 2 Positive emotional outlook (+)	Cluster 3 Neutral emotional outlook (=)	Total	χ^2	p
Gender	Female	54	52	110	216	1.41	0.493
	Male	44	52	112	208		
	Total	98	104	222	424		
Age	20 years or below	53	31	98	182	27.9	<0.001 ^a
	21-30 years	9	14	20	43		
	31-40 years	3	6	7	16		
	41-50 years	24	38	71	133		
	51 years & above	9	15	26	50		
	Total	98	104	222	424		
Occupation	Business	11	15	29	55	30.3	<0.001 ^a
	Employed	9	16	27	52		
	Housemaker	10	19	31	60		
	Professional	8	12	13	33		
	Retired	1	4	7	12		
	Student	59	38	115	212		
	Total	98	104	222	424		
Income level	low income group (< ₹20,000)	7	6	18	31	3.88	0.693

low middle income group (₹20,000-40,000)	18	20	49	87
high middle income group (₹40,001-80,000)	39	37	79	155
high income group (> ₹80,000)	34	41	76	151
Total	98	104	222	424

^a Significant at 0.05 level

Source: The Authors

Hypotheses H_{2a} (for gender) and H_{2b} (for income level) are therefore, rejected. This means that emotionally pandemic has equally affected male and females as well as people in different income brackets.

7. DISCUSSION

All exhibited emotions together define an individual who were then allocated to a cluster type. Surprisingly, emotions associated with Covid-19 are not just negative emotions exhibited by respondents but also positive emotions by certain segment. This can possibly be attributed to the cleaner air, relaxed life, closeness with family, etc. experienced by them during the lockdown period. Cluster analysis revealed that the respondents in cluster 1 have negative outlook to pandemic and the respondents of cluster 2 can be seen to have positive outlook to pandemic whereas the respondents of cluster 3 are found to be emotionally neutral to the pandemic scenario. Cluster 1 comprised of 98 individuals (23%),

cluster 2 had 104 individuals (25%) and cluster 3 consisted of 222 individuals (52%). On comparing the clusters identified in the study, it was found that cluster 1 varies significantly from clusters 2 while cluster 3 represents the neutral stand of respondents for their emotions during pandemic. Since, the sample sizes for each category were not comparable; hence, one-way ANOVA using Welch’s test was performed in order to check the variances among the emotions across three clusters. Welch’s test showed significant differences in the three clusters with respect to the 12 emotions studied ($p < 0.001$ at 0.05 significance level for 12 emotions investigated).

Chi-square test of independence results among three clusters for the sociodemographic variable found age and occupation categories to be significantly associated with the clusters ($p < 0.001$ at 0.05 significance level) but no such association was observed for gender and income variable with the clusters. Young Indians i.e. those in the age category 20 years and below, are found to have more negative emotional outlook towards pandemic due its impact on their planned career path. This is also the age where peers, social interactions, start of the college life, achievement of academic goals happen. But the pandemic scenario puts more demand on them in the form of adjustments in the school/college routine as well as family life, etc. and has severely altered their life trajectory from the planned path. Occupation wise students are observed to be more negative in their emotions in the pandemic scenario. This is parallel to the

observations for age wise differences in the clusters, where more negative emotions were observed in the category of 20 years and below. This can again be accounted for factors such as fewer social interactions with peers, higher adjustments demanded from this group with respect to education, family as well as career with less moral support at times. However, with respect to gender and income level no such significant differences were observed in the three cluster from the chi-square results. This means that emotionally pandemic has equally affected male and females as well as people in different income brackets.

8. CONCLUSION

Covid-19 infection has serious health implications for an individual and his family. Studies have shown that people are also mentally and psychologically affected by Covid-19 due to the disruptions in their day-to-day lives besides the infection per se. This research is a step towards future research in the field aimed at investigating the emotions of people during the present as well as similar pandemic situations. An assumption that existed that pandemic has led to only negative outburst of emotions and hence a negative emotional outlook has been challenged by this study. One cluster in the present study had a positive emotional outlook in the form of positive emotions exhibited during pandemic. Yet, there is another large cluster that showed neutral emotions to pandemic. Majority of the

respondents who have been accounted in these two clusters probably see pandemic as a time where there can slow down, spend time with their family, unite with them physically as well as emotionally, witness a positive effect of pandemic on nature with more clear skies, greenery, pollution free air to breathe and a break from the daily hustle-bustle routine. At the same time the cluster exhibiting negative emotions need to be investigated further for their sociodemographic on a larger scale as they are most affected group bearing the emotional and psychological trauma related to pandemic.

9. IMPLICATIONS

Many countries across the world have taken steps to counsel and provide the needed support to mitigate the negative emotional effect of pandemic. This research also recommends to the policy makers for planning an early intervention strategy especially for the young Indians who have been found to be more negative in their emotions during pandemic. Further, this is the segment of the population that need to be mentally stronger today to be able to face and pass through the challenges of future. This necessitates the need for designing the timely intervention strategies as well as coping strategies for such individuals or households before it takes the form of epidemic post this pandemic in India. This necessitates a clinical investigation with an open-ended questionnaire to reach at root

cause this negative emotional exhibit in this cluster.

At the same time, social security schemes of the government need to be made more robust and their coverage need to be enhanced both in terms of financial coverage as well as number of people covered so that any such untoward future situation can provide adequate financial & emotion coverage to people belonging to low-income category.

10. LIMITATIONS

The first limitation of the study is that it has not gone to the root cause of the exhibited emotions. Such understanding requires a qualitative survey which is yet another limitation of the study. Thirdly, though the sample is large yet it is concentrated with respondents from north India and that too using convenience, quota and snowball sampling techniques. More robust sampling techniques can lead to a balanced cluster size. However, this study opens a gateway to the future research in this area on negative, positive or neutral (stable) emotional outlook of respondents independently. Further, such future research in this area can also investigate about the mitigation strategies for the negative emotional outburst at home and workplace and government actions in this direction.

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