Analyzing the State of Mind of Self-quarantined People during COVID-19 Pandemic Lockdown Period: A Multiple Correspondence Analysis Approach

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Abstract—**COVID-19 (Corona) virus has spread across the world threatening lives of millions of people. In India first COVID-19 case was detected on 30th January 2020 in Kerala. To minimize the spread of Corona Virus, countries all over the world implemented complete lockdown. Due to complete lockdown even people who are not exposed to corona virus, have to self-quarantine to keep themselves safe from getting infected by the disease. People (especially Indians) have never experienced such complete lockdown and quarantining situations before. Thus, this creates a space for curiosity that how people are going to react to this situation. The present study aims to analyse how self-quarantined people during COVID-19 lockdown period are reacting to quarantining, what measures they are taking to deal with this situation, and what are their sentiments towards quarantining. The study also aims to measure their Happiness and to identify the factors that are statistically significant to Happiness. For this study, the data is collected through a survey method. Multiple correspondence analysis are performed to analyse the survey data. The happiness score is evaluated by using the GNH (Gross National Happiness) methodology. Proportional Odd Logistics Regression is used to identify factors that are statistically significant in predicting happiness. The study suggests that family factor is related to the happiness of the self-quarantined people during such lockdown situations.**

Keywords—*Correspondence analysis; happiness index; sentiment analysis; proportional odds logistic regression; self-quarantining*

I. INTRODUCTION

'Quarantine' is a practice in which restrictions are imposed on the movement of people. Sometimes people may have been exposed to disease but do not show any symptoms of being infected by the disease. In such cases, people are not allowed to go to public places for some period. This period is called as quarantine period. Quarantine period identifies whether someone is being infected by the disease or not. In case of COVID-19, the Corona Virus has spread so rapidly making the situation worse. To deal with this dangerous situation and to minimize the further spread of this deadly virus, many countries were locked down and thus even people who are not infected by this virus or not been exposed to this disease have to Self-quarantine to keep themselves safe from getting infected by Corona Virus. The intensity of a lockdown depends on the situation in which it is declared. In case of COVID-19 pandemic situation, many countries including India declared a complete lockdown. During a complete lockdown period, people are informed to stay where they are and are not allowed to leave their premises. Many organizations started practising Work From Home. People who are dependent on daily wages are deeply affected due to the COVID-19 lockdown situation. Lockdown has adverse effects on the economy, human life, environment and transport sector of the country that in turn leads to unemployment, inflation and recession [1]-[3]. Thus, lockdown disturbs normal life of people. This adversely affects the psychological well-being of people. There are various researchers who have studied the impact of lockdown on the psychological wellbeing of the human being. The researcher discusses the impact of large-scale quarantine during the early 2003 outbreak of severe acute respiratory syndrome (SARS). The research focuses on the factors that influenced people's willingness to follow quarantine orders [4]. Reynolds and Melanie studied the problems, compliance, and psychological impact of the quarantine experience during the SARS pandemic, and the findings imply that quarantine implementation should be evaluated [5],[6]. Researchers have also studied the psychological impacts of quarantining a city in a review study [7], [8]-[13]. Residents in afflicted areas are socially shunned, face workplace discrimination, and have their property vandalized, according to the article. The author of this research studies "coping with the psychological impact of quarantine".The researcher has also explained how quarantine affects mental health, what are the factors that influence coping, and various ways of dealing with the effects of quarantine. [14]. The author developed a Happiness Index survey tool to measure happiness, wellbeing, as well as features of sustainability and resilience. It can also be used to assess happiness with one's life and living circumstances. Survey Development, Domain and Question Reduction, Survey Standardization, and Survey Honing were the four stages of development for the survey instrument [15]. The research on a mental health survey of the UK population before and during the COVID-19 pandemic. The authors find that being young, a woman, and living with children, particularly preschool-aged children, had a significant impact on the extent to which mental anguish rose during the

pandemic[16]. The impact of assessing the prevalence of depression, anxiety, and mental well-being before and during the COVID-19 pandemic is explored in this work by the author [17]-[19]. A review study on "The psychological impact of quarantine". The authors of this review find that quarantine has a wide-ranging, significant, and long-lasting psychological impact [20]. The author of this research investigated whether or not being quarantined to stop the spread of H1N1 virus had negative psychological impacts [21].

Thus, the present study is about analysing the state of mind of self-quarantined people by measuring their Happiness, identifying the factors that are statistically significant to happiness and to evaluate their sentiments towards quarantining. This study may help policy makers to decide on measures to cut down the psychological consequences of quarantine and to provide guidelines on what things are to be done to take care of the mental health of those who are undergoing quarantining.

II. METHOD

The current study has followed the methodology as displayed in Fig. 1

A. Data Collection and Preparation

The data for this study was collected through a survey method. A structured questionnaire designed and shared with people through online mode during second phase (15th April 2020 – 3rd May 2020) and third phase (4th May 2020 – 17th May 2020) of COVID-19 lockdown period in India. For this analysis, samples are collected using Stratified Sampling Method. Stratified Sampling is a type of Probability Sampling. In Stratified Sampling method, the population is divided into strata or subgroups and a random sample is taken from each strata [22]. The structured questionnaire designed for this analysis is shared with people who belong to age group 22 and above. Three age groups are created as 22-40, 41-55, 56 & above. A total of 473 responses to the questionnaire are received. After data collection, the data preparation was done. Data preparation includes the data selection and data cleaning. The happiness score will be calculated separately for respondents staying with family and respondents staying away from their family during lockdown period as some parameters that will be used for calculating the happiness score will be different for these two groups of respondents. Thus the data is divided into two datasets. The variables containing text data are used for Sentiment Analysis. The collected data consisted variables such as 'timestamp', 'name' that were not required for the analysis. Thus, these variables were dropped from the dataset. The null values were not present in the dataset as all the questions were marked as mandatory.

B. Exploratory Data Analysis (EDA)

The dataset consists of categorical data. To understand how frequently categories of each variable are occurring, frequency distribution technique is used. 'countplot()' function of seaborn library is used for plotting the graphs for better understanding of the distribution of categories. From these plots, the categories with very low frequencies will be

identified. The variable with very low frequency categories will be dropped from the further analysis.

C. Multiple Correspondence Analysis (MCA)

MCA is a method which is usually used to analyse data acquired through a survey questionnaire [23]. The dataset under study consists of many categorical variables. In this study, instead of using correspondence analysis (CA) that is suitable when there are only two categorical variables, MCA is used to understand the relationships between more than two categorical variables. By performing MCA, the similarities between respondents will be identified based on their category selection pattern. From MCA results, the variables that are contributing the most to define dimensions are identified.

D. Happiness Score Evaluation

To evaluate the happiness score the dataset was divided into two parts as , People who are staying with family (with family dataset) and People who are staying away from their family (without family dataset) . To measure the happiness, the 5-point Likert Scale along with the score 1-5 was used. Table I shows the responses for indicators and their respective score which were used for the analysis. Table II shows the responses for indicators for Yes/No indicators and their score. For measuring happiness of the people who are staying with family and people who are staying away from family, 11 indicators are used. Thus, the maximum score is 55 (11*5). The happiness score for each respondent is calculated by taking the sum of the score of each indicator.
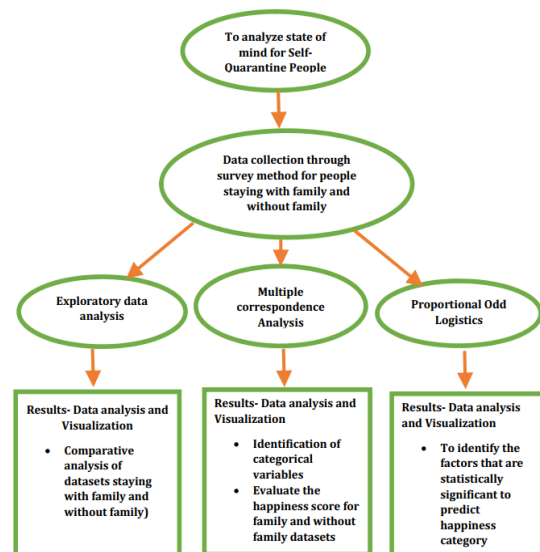

Fig. 1. Research Methodology.

TABLE I. RESPONSE CONVERSION TO SCORE FOR 5 POINT SCALE INDICATORS

Response	Score for 'sleep','Governance' and 'creativity'	Score for 'boredom', discomfort
0-1	1	5
2-3	2	4
4-6	3	3
7-8	4	2
9-10	5	1

TABLE II.   RESPONSE CONVERSION TO SCORE FOR 2 POINT SCALE INDICATORS

Response	Score for break needed', 'new skill', 'new routine', 'home exercise',	Score for 'recession', 'feeling lonely','fear', 'anxiety', 'stress'
Yes	5	1
No	1	5

GNHI (Gross National Happiness Index) methodology, respondents are classified into one of the four categories as follows (Table III) [24].

TABLE III.   HAPPINESS CATEGORIES

Happiness Category	Score Range
Deeply Happy	77% - 100% of the maximum score
Extensively Happy	66% - 76% of the maximum score
Narrowly Happy	50% - 65% of the maximum score
Unhappy	0% - 49% of the maximum score

Thus, for example, if the happiness score of the respondent is 42 out of 55 (77%-100% range) then the respondent is classified as Deeply Happy.

E. Proportional Odds Logistic Regression

The objective for using proportional odds logistic regression model is to identify the factors that are statistically significant to predict happiness category (unhappy/narrowly happy/extensively happy/deeply happy). Based on these factors the happiness category (unhappy/narrowly happy/extensively happy/deeply happy) to which the individual respondent belongs will be predicted. This prediction is done based on the factors that are used to evaluate the happiness score. Here, the happiness categories are ordered and thus proportional odds logistics regression method is used. The proportional odds model can be mathematically represented as:

$$\text{logit } [P (Y <= j)] = \alpha_j - \Sigma \beta_i X_i \qquad (1)$$

Where, j ranges from 1 to J-1

- Here, J refers to the number of categories of the target variable, in this case the happiness category. Since there are four categories, J = 4.

- The happiness categories are coded as unhappy = 1, narrowly happy = 2, extensively happy = 3 and deeply happy = 4. The category 'deeply happy' is the highest category and 'unhappy' is the lowest category.

- $P(Y<=2)$ refers to the probability of being unhappy or narrowly happy versus being extensively happy and above category (in this case, deeply happy).

- Logit refers to 'log odds'. Odds can be defined as the ratio of the probabilities of success of an event and failure of an event. Logit $[P (Y <=1)]$ refers to log odds of the probability [25].

- For better understanding, log odds are converted to probability as follows:

$$P (Y <= j) = \exp (\alpha_j - \Sigma \beta_i X_i) / (1 + \exp (\alpha_j - \Sigma \beta_i X_i)) \qquad (2)$$

- Model fitting is done using 'polr()' function from 'MASS' package. The summary result of the model provides intercepts, coefficients of regression with values (slopes), and p-values is calculated from this result [25].

- The coefficients (Variables used in the model) with p-value less than or equal to 0.05 are kept in the model.

- Once the model is finalised, prediction is done on the new values. The 'predict()' function returns estimated probability values for all four categories. The category with highest probability is the category predicted for a respondent [25].

III. RESULTS AND DISCUSSION

A. EDA Results

The total number of respondents staying with their family is 422. The total number of respondents staying away from their family is 51. The frequency distribution of different variables is as follows.

The Fig. 2 and Fig. 3 shows that more than 50% of the respondents of both 'with family' and 'without family' dataset wanted such break from their regular routine that they got due to COVID-19 lockdown. More than 50% of the respondents of both 'with family' and 'without family' dataset planned a new routine for the self-quarantined period (Figure 1 & 2). This shows that instead of being worried, people are trying to adjust with the quarantining situation. It is also shows that, for 'with family' dataset, 55% of the respondents are not learning any new skills whereas for 'without family' dataset, more than 55% of the respondents are learning new skills. This shows that, those who are not staying with their families during self-quarantining period are trying to deal with the loneliness and utilizing the free time they got.

In the questionnaire, respondents were asked to rate the quality of sleep they are getting during self-quarantining period. It is observed that the maximum respondents selected categories for quality of sleep as 7, 8, 9, 10 under both the datasets. Categories 7-9 were considered as, having a good quality sleep while category 10 is considered as having an excellent quality sleep.
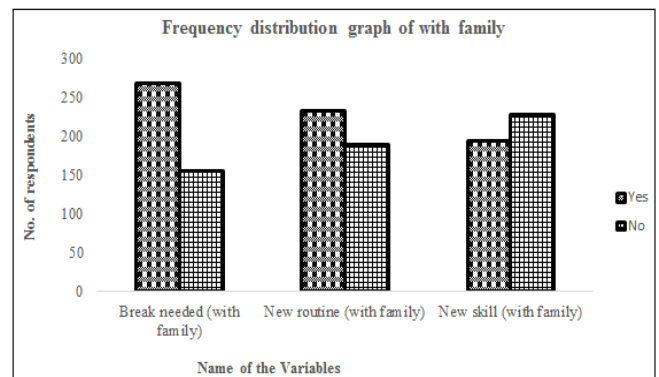

Fig. 2.   Response of Indicators (Break Needed, New Routine and New Skill) with Family.
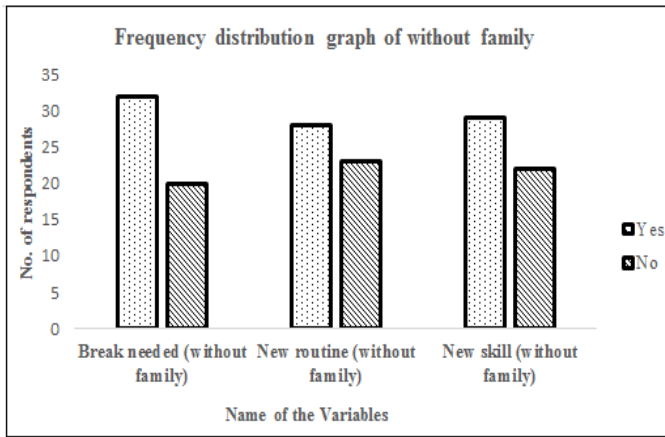
Fig. 3. Response of Indicators (Break Needed, New Routine and New Skill) without Family.
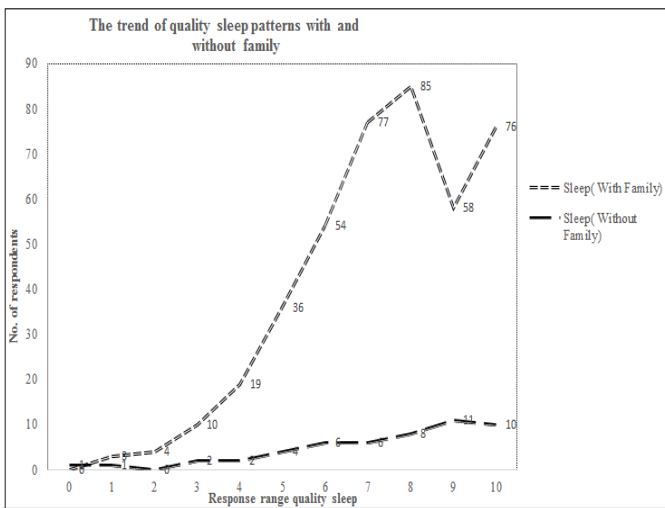

Fig. 4. Quality of Sleep with and without Family.

Around 70% of the total respondents from both the datasets are getting good to excellent quality sleep. Having a good quality sleep helps in maintaining psychological well-being (Fig. 4).
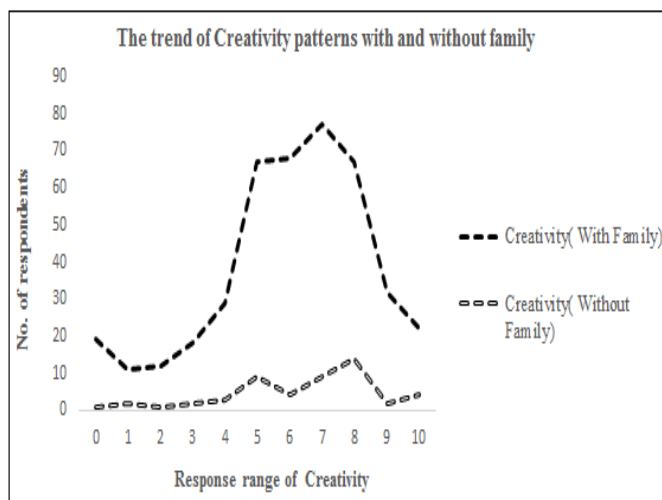

Fig. 5. Creativity with and without Family.

With reference to the creativity attribute, Fig. 5 shows that, most selected categories for 'with family' dataset are 5-8 and for 'without family' dataset are 5-8 and 10. This indicates that people are trying to be creative to deal with boredom no matter whether they are staying with their family or not.

The Fig. 6 shows the response of boredom from the respondents on a scale of 0-10 and 10 being 'extremely bored'. This question received mixed responses for all the categories (category '5' being the most selected) from the respondents who were staying with their family. Respondents who are staying away from their family experienced high level of boredom.
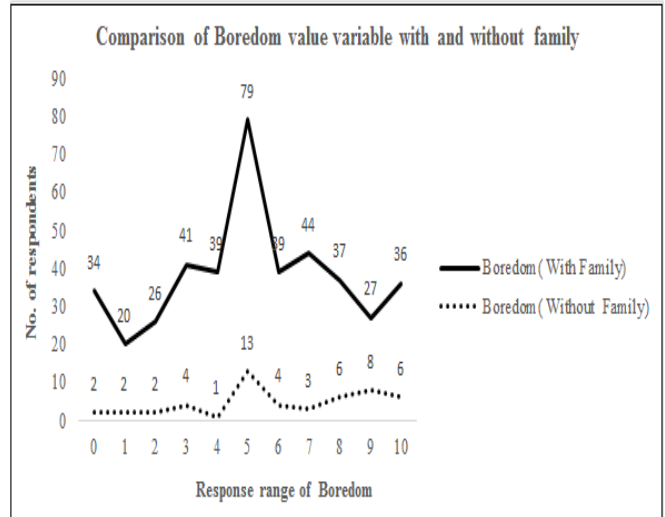

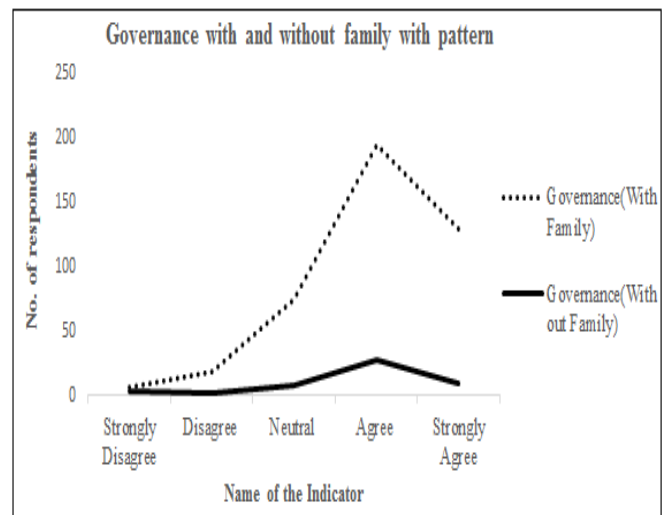Fig. 6. Comparison of Boredom Value Variable with and without Family.

Fig. 7. Comparison Governance with and without Family with Pattern.

Governance is one of the important factor which affects the Happiness of the people. Whether people are satisfied with the strategies adapted by government for handling pandemic is related to the Happiness of population. Fig. 7 shows, the responses of the respondents to the statement 'The Government is taking the right measures to handle the COVID-19 pandemic situation'. From the graphs it is

observed that from 'with family' dataset, 44% of the respondents 'agree' and 30% of the respondents 'strongly agree' with the above-mentioned statement. From 'without family' dataset, 55% of the respondents 'agree' and 21% of the respondents 'strongly agree' with the above-mentioned statement.

Fig. 8 and Fig. 9 show that, 76% of the respondents from 'with family' dataset and 82% of the respondents from the 'without family' dataset are worried about the consequences they have to face due to the upcoming recession/inflation. This worry- "about the future", may affect the psychological well-being of respondents. People may experience anxiety, fear, irritability, stress, depression, fatigue, sadness, panic during quarantining that can impact mental health. From 'with family' dataset 62% of the respondents and from 'without family' dataset 69% of the respondents experience such feelings (Fig. 8 and Fig. 9). One of the important measures to be taken to stay physically and mentally healthy is to do a regular exercise. Due to lockdown people cannot go to parks or gym. But they can definitely do exercise at home. They can do yoga, meditation, Zumba, home gym etc. Fig. 8 and Fig. 9 shows that, 67% of the respondents of 'with family' dataset and 71% of the respondents from 'without family' dataset follow home exercise routine.

From 'with family' dataset, 95% of the respondents selected category 'Yes' for answering whether being with family is helping them to cope with the quarantining situation or not. Also, to answer whether they are satisfied with the quality time spent with their family, 95% of the respondents selected category 'Yes' (Fig. 10).

Respondents who are staying with their family during quarantining period may experience discomfort due to extended lockdown (too much togetherness). In response to the statement 'Extended lockdown (too much togetherness) may cause discomfort with family', 32% of the respondents selected 'Disagree', 29% of the respondents selected 'Neutral', 23% of the respondents selected 'Strongly Disagree', 13% of the respondents selected 'Agree'(Fig. 11).
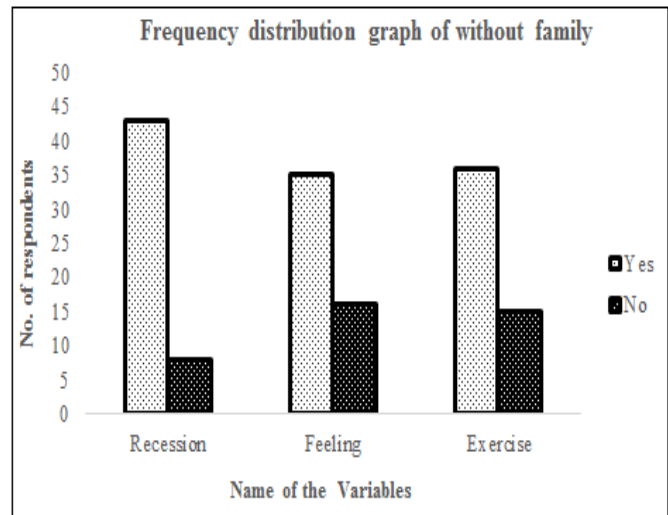

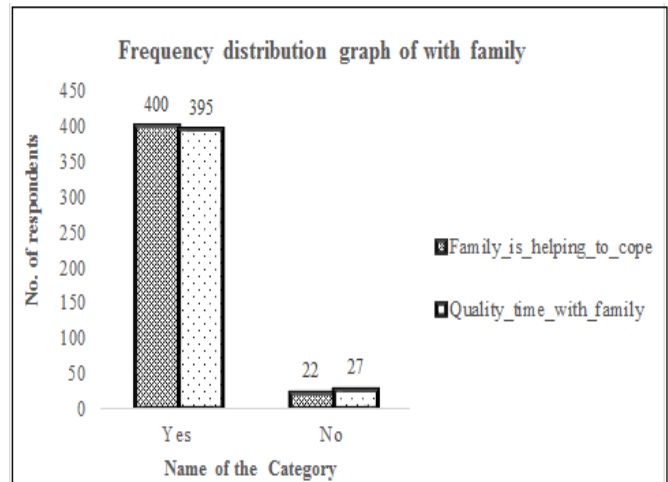Fig. 9. Response of Indicators (Recession, Feeling, & Exercise) without Family.

Fig. 10. Response of Indicators (Family_is_Helping_to_Cope, & Quality_Time_with_Family) with Family.
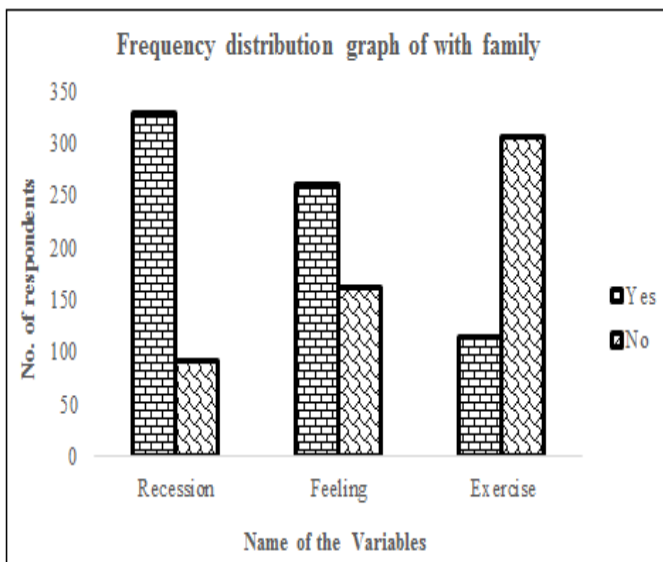

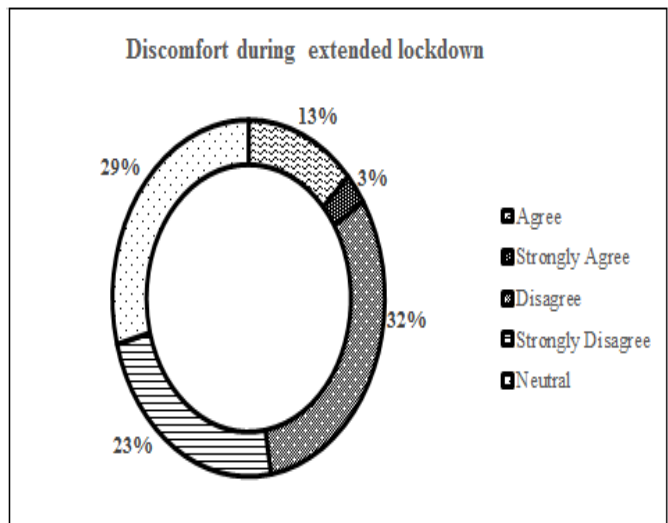Fig. 8. Response of Indicators (Recession, Feeling, & Exercise) with Family.

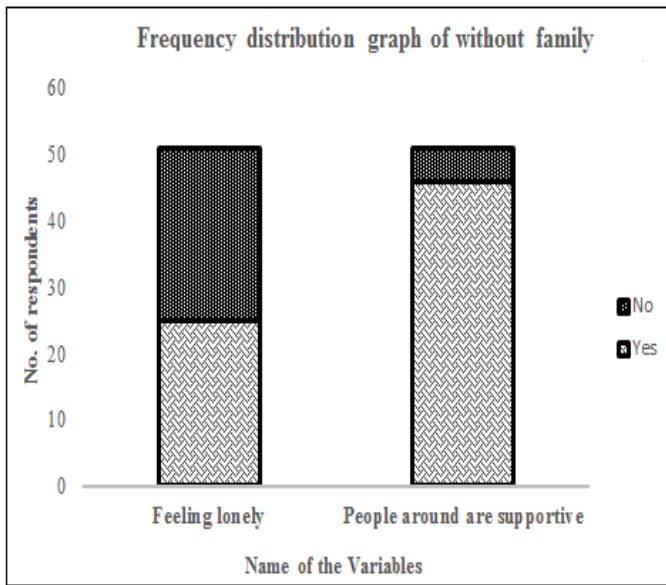Fig. 11. Response Response of Indicator Discomfort with Family.

Fig. 12. Response Response of Indicator (Feeling Lonely, & People Around are Supportive) without Family.

Respondents who are not staying with their family during quarantining period may experience loneliness. The question 'Do you feel lonely as you are away from your family during this self-quarantined situation?' almost equal number of responses for categories 'Yes' and 'No'. In such difficult situations, getting social support is very important especially for those who are staying away from their family. Respondents staying away from their family were asked whether people around them are supportive or not. In response to this question, 92% of the respondents selected category 'Yes'. From the above frequency distribution plots, it is found that the variables 'family_is_helping_to_cope', 'quality_time_with_family' from 'with family' dataset contain categories having very low frequencies as compared with other category of these variables. Thus, these two variables are omitted from the analysis. Also, the variable 'people_around_are_supportive' from 'without family' dataset contain category ('No') having very low frequency as compared with the other category ('Yes') of variable. Thus, this variable is omitted from the analysis (Fig. 12).

B. MCA Results

In Fig. 13 and Fig. 14, each point on a graph represents the contribution of that particular variable in constructing dimension one and dimension two. From these graphs we can say that for 'with family' dataset, creativity contributes the most in constructing dimension one and dimension two. Whereas for 'without family' dataset creativity contributes the most in constructing dimension one and dimension two while new_skill contributes in constructing dimension one and Governance contributes the most in constructing dimension two.

From the Fig. 15 and Fig. 16 the important categories of the variables were identified.For 'with family' dataset, categories sleep_1, sleep_2, Governance_2 contributes the most towards

positive direction of the first dimension whereas categories creativity_1, discomfort_with_family_1 contributes the most towards positive direction of the second dimension. For 'without family' dataset, categories sleep_1, creativity_2 contributes the most towards positive direction of the first dimension whereas category Governance_2 contributes the most towards positive direction of the second dimension. The value of cos2 represents the quality of representation of variables and variable categories. The Fig. 17 and Fig. 18 show that for 'with family' dataset, feeling_1, feeling_5, governance_5, exercise_5, exercise_1, new_routine_1, new_routine_5 these categories have higher values of cos2 as compared with other categories for dimension one.
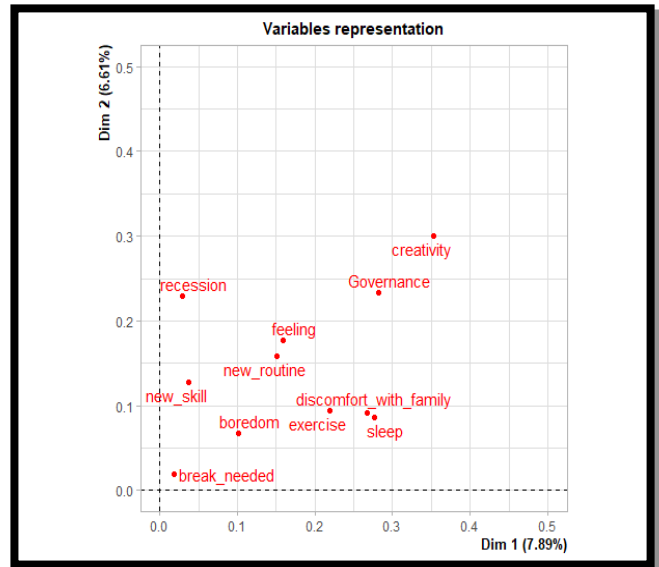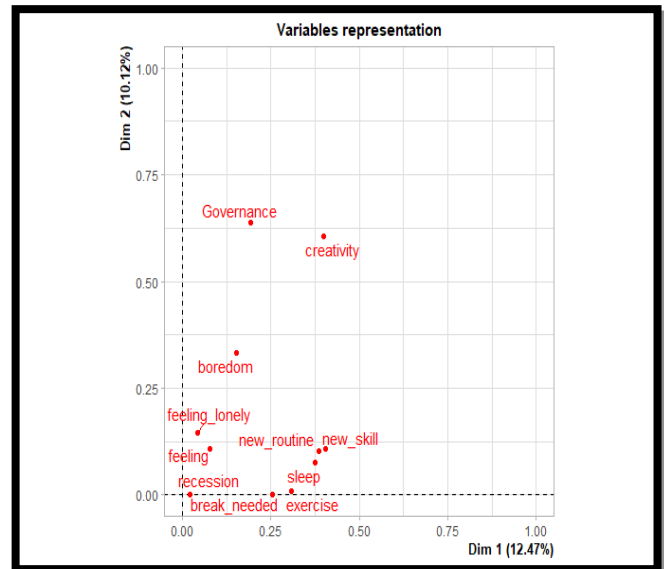

Fig. 13. Variable Representation (with Family).

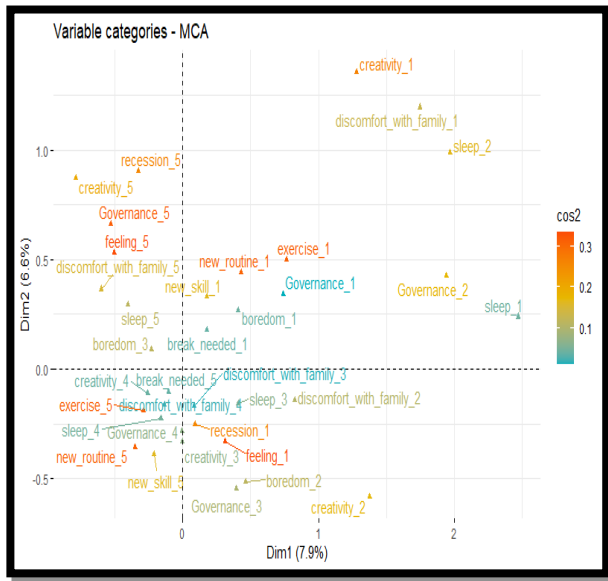Fig. 14. Variable Representation (without Family).
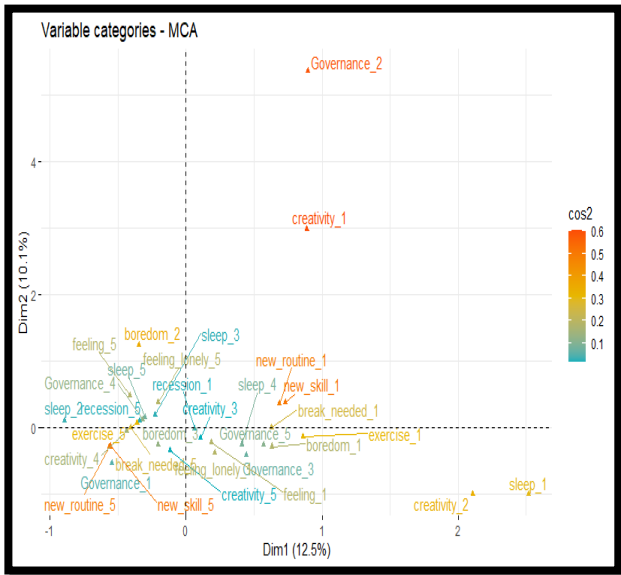
Fig. 15. Variable Categories Plot (with Family).

Fig. 16. Variable Categories Plot (without Family).

Whereas, for 'without family' dataset, categories creativity_1, Governance_2, new_skill_5, new_skill_1, new_routine_1, new_routine_5 have higher values of cos2 as compared with other categories for dimension one.

In Fig. 19 and Fig. 20 each point on a graph represents an individual respondent. Respondents are grouped together based on their category selection pattern. From the above graphs it is identified that there are similarities among respondents in both the datasets.

C. Happiness Score Evaluation Result

Happiness Scores of 422 respondents who are staying with their family is evaluated. Table IV shows that, 15.88 % of

respondents are 'Deeply Happy', 34.6 % of the respondents are 'Extensively Happy', about 37 % of the respondents are 'Narrowly Happy' and 12.56 % of respondents are 'Unhappy'. For respondents staying without family , we can say that, 17.65 % of respondents are 'Deeply Happy', 21.57 % of respondents are 'Extensively Happy', 41.17 % of respondents are 'Narrowly Happy', 19.6 % of the respondents are 'Unhappy'. During quarantining situations, factors such as working from home, gender, personality, staying with family (or not) may related to happiness. To verify this, statistical analysis was performed.
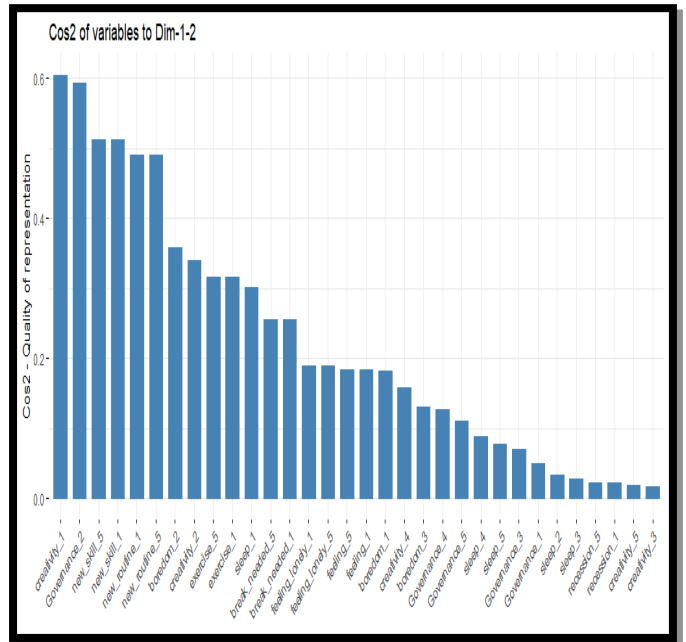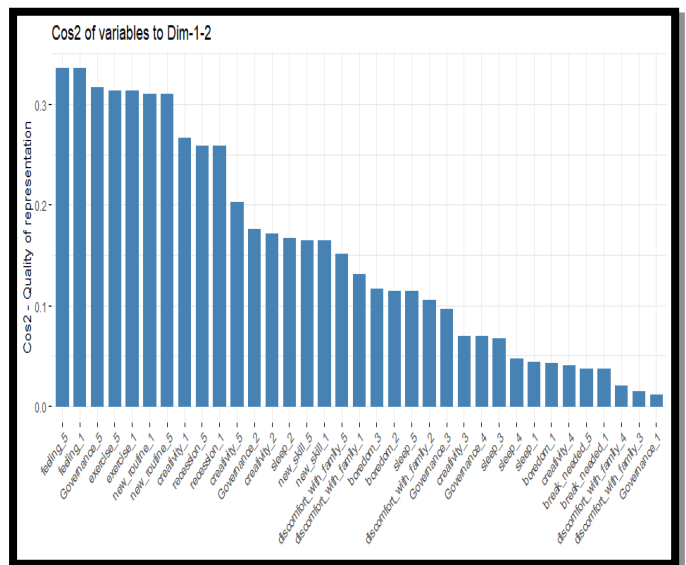

Fig. 17. Cos2 of Variables (with Family).

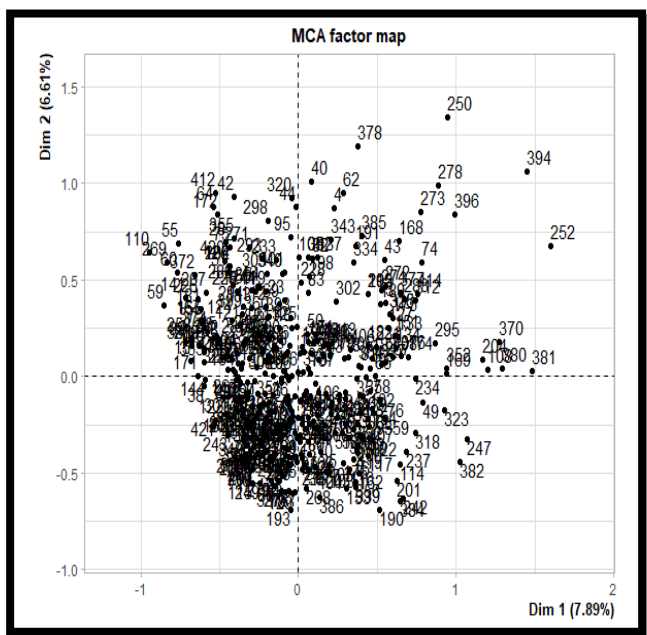Fig. 18. Cos2 of Variables (without Family).

Fig. 19. Individuals Plot (with Family).

Fig. 20. Individuals Plot (without Family).
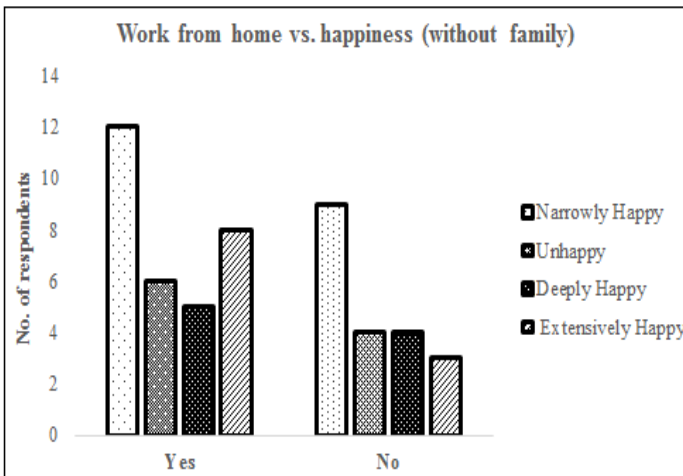
TABLE IV. HAPPINESS SCORE

Happiness Score	Count of respondents staying with family	Count of respondents staying without family
Deeply Happy	67	9
Extensively Happy	146	11
Narrowly Happy	156	21
Unhappy	53	10
Total	422	51

1) Work from home vs. happiness: From the statistical analysis (Fig. 21 and 22) it is found out that respondents who

are working from home and staying with their family (51%, unhappy and narrowly happy) tend to be happier than respondents who are working from home and staying away from their family (58%, unhappy and narrowly happy).
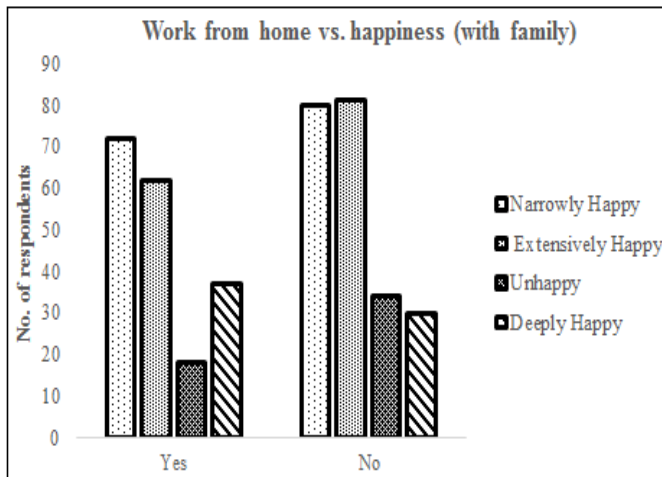
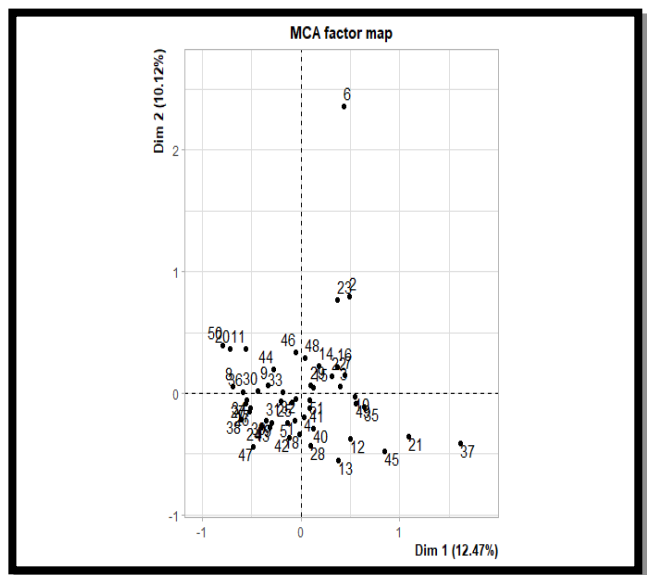

Fig. 21. Work from Home vs. Happiness (with Family).

Fig. 22. Work from Home vs. Happiness (without Family).

2) Gender vs. Happiness: From Fig. 23 and Fig. 24, it is observed that male respondents staying away from their family tend to be unhappier (57%, unhappy and narrowly happy) than the male respondents staying with their family (47%, unhappy and narrowly happy).

3) Personality vs. Happiness: Fig. 25 & Fig. 26 shows that, there is no relation found between personality (Introvert/Extrovert) of the respondent and happiness. But both Extroverts and Introverts who are staying with their family are happier than those who are staying away from their family.

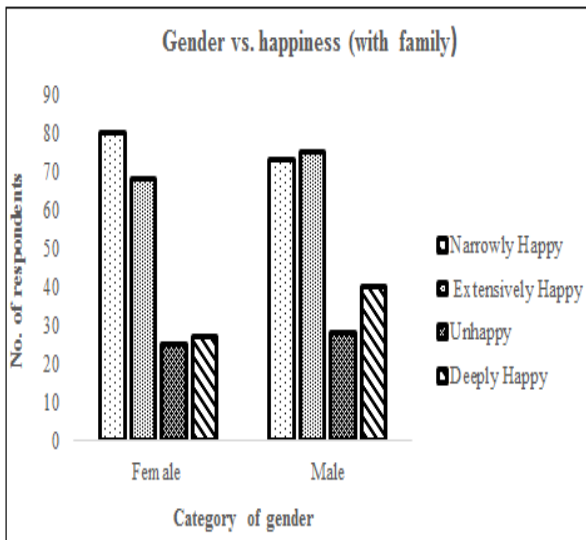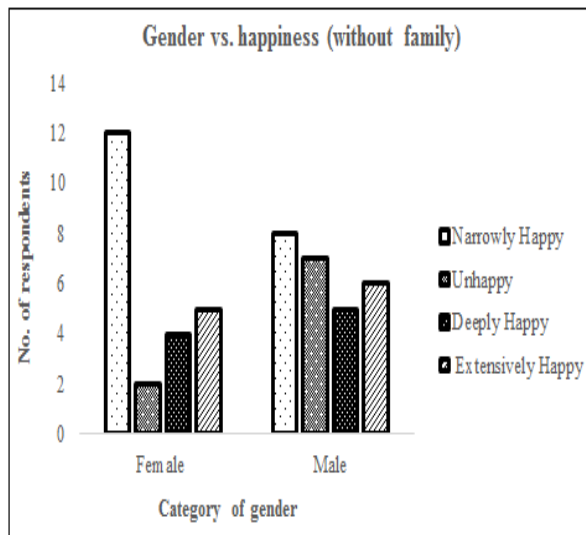Fig. 23. Gender vs. Happiness (with Family).

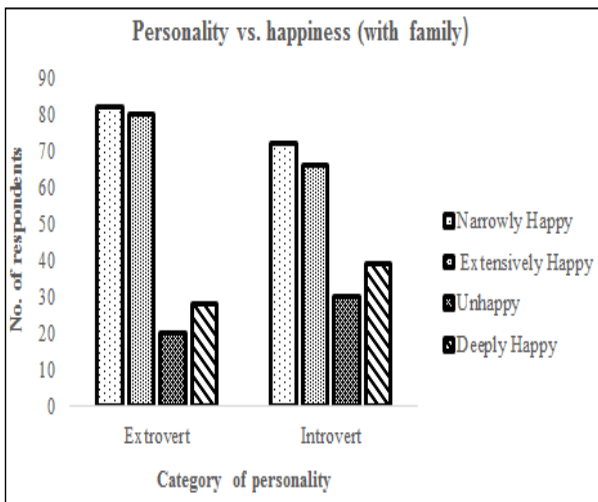*Fig. 24.* Gender vs. Happiness (without Family).

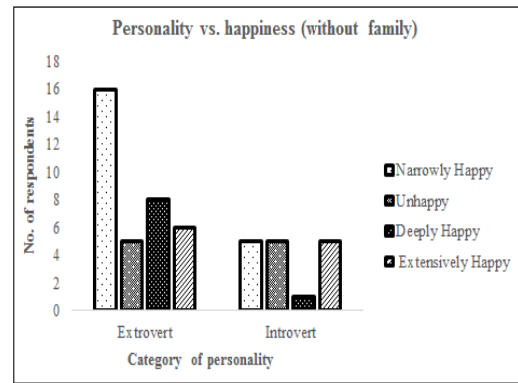Fig. 25. Personality vs. Happiness (with Family).

Fig. 26. Personality vs. Happiness (without Family).

D. Proportional Odds Logistic Regression Result

Proportional odd logistic regression model is created using polr() function. Initially all 11 variables that are used to calculate happiness score are included in model creation. In each iteration, the variables with p-value greater than 0.05 are excluded from the model creation (Table V). Finally, a model is created with seven important variables that are break needed, new routine, new skill, recession, discomfort, exercise, feeling for 'with family' dataset and with five important variables that are break needed, new routine, new skill, recession, feeling for 'without family' dataset (Table VI).

The summary result of the model created for with-family dataset is as follows:

TABLE V. PROPORTIONAL ODD LOGISTIC REGRESSION SUMMARY RESULT (WITH FAMILY)

Coefficients	Value	Std. Error	t-value	p-value
break_needed5	4.563	0.4799	9.507	0.000
new_routine5	4.311	0.4611	9.350	0.000
new_skill5	4.563	0.4764	9.577	0.000
recession5	4.235	0.4812	8.801	0.000
discomfort2	3.151	0.9342	3.373	0.001
discomfort3	5.199	0.9549	5.444	0.000
discomfort4	5.743	0.9567	6.003	0.000
discomfort5	6.945	1.0082	6.888	0.000
exercise5	4.972	0.5193	9.573	0.000
feeling5	5.342	0.5262	10.152	0.000

TABLE VI. TABLE VI. INTERCEPTS (WITH FAMILY)

Proportion	Value	Std. Error	t-value	p-value
1|2	11.2652	1.2860	8.7600	0.000
2|3	19.3984	1.8702	10.3722	0.000
3|4	25.9091	2.3327	11.1069	0.000

TABLE VII. TABLE VII. RESIDUAL DEVIANCE AND AIC (WITH FAMILY)

Residual Deviance	382.3822
AIC	408.3822

Interpretation:

- The coefficient values correspond to β and intercept values correspond to α.

- Residual Deviance and AIC values are used to compare different models.

- The categorical variables can be interpreted as follows:

- Variable 'new_skill' can be interpreted as the respondent who selected category of new_skill variable as '5' tends to be happier than the respondent who selected category '1'. Other variables are interpreted in the same manner.

- Intercept interpretation:

Table VII shows that the intercept 1|2 (i.e Unhappy|Narrowly Happy) corresponds to logit[P(Y≤1)]. It can be interpreted as log odds of being 'Unhappy' versus being 'Narrowly Happy', 'Extensively Happy' or 'Deeply Happy'.

The intercept 2|3 (i.e Narrowly Happy|Extensively Happy) corresponds to logit[P(Y≤2)]. It can be interpreted as log odds of being 'Unhappy' or 'Narrowly Happy' versus being 'Extensively Happy' or 'Deeply Happy'.

The intercept 3|4 (i.e Extensively Happy| Deeply Happy) corresponds to logit[P(Y≤3)]. It can be interpreted as log odds of being 'Unhappy' or 'Narrowly Happy' or'Extensively Happy' versus being 'Deeply Happy'.

The summary result of the model created for without-family dataset is shown in the Table VIII.

The interpretation of this result is same as that of with-family dataset result Table IX and Table X.

The prediction function returns the estimated probabilities for each class (Unhappy/Narrowly Happy/Extensively Happy/Deeply Happy)

For with-family dataset the prediction result is as follows:

For data values break_needed = 5, new_routine = 1, new_skill = 1, recession = 1, discomfort = 2, exercise = 5, feeling =5 the total score is 20 out of 35 (57.14 %) the prediction output is shown in Table XI.

The estimated probability for class 2 (Narrowly Happy) is highest. Thus, the model correctly predicts the class for given data values.

Similarly, for without-family dataset the prediction result is shown in the Table XII.

For data values break_needed = 5, new_routine =1, new_skill =5, recession=1, feeling=1 the total score is 13 out of 25 (52 %) the prediction output is:

Validation:

- In the questionnaire, the respondents were asked to describe self-quarantining in one word. To validate the happiness score calculated for each respondent, this one word mentioned by the respondent is used to compare it with the happiness category.

- To perform validation, happiness categories 'Unhappy' and 'Narrowly Happy' are coded as 0 and happiness categories 'Extensively Happy' and 'Deeply Happy' are coded as 1. The positive words used to describe self-quarantining are coded as 1 and negative words that are used to describe self-quarantining are coded as 0. Then the number of 1's and 0's for both the happiness categories and one word are counted.

- For with-family dataset, number of 0's for one word is 61 and number of 1's is 131. For happiness categories, number of 0's is 75 and that of 1's is 117. Thus, 89.31 % respondents are correctly categorized as 'Happy'. And 81.33 % respondents are correctly categorized as 'Unhappy'.

- For without-family dataset, number of 0's for one word is 8 and number of 1's is 18. For happiness categories, number of 0's is 13 and that of 1's is 13. Thus, 72.22 % respondents are correctly categorized as 'Happy'. And 61.53 % respondents are correctly categorized as 'Unhappy'.

TABLE VIII. PROPORTIONAL ODD LOGISTIC REGRESSION SUMMARY RESULT (WITHOUT FAMILY)

Coefficients	Value	Std. Error	t-value	p-value
break_needed5	2.605	0.7730	3.370	0.001
new_routine5	2.839	0.9018	3.148	0.002
new_skill5	2.422	0.8092	2.993	0.003
recession5	2.178	0.9726	2.239	0.025
feeling5	2.980	0.8189	3.639	0.000

TABLE IX. INTERCEPTS (WITHOUT FAMILY)

Propotion	Value	Std. Error	t-value	p-value
1|2	2.2204	0.7305	3.0396	0.002
2|3	6.7077	1.3324	5.0343	0.000
3|4	9.7029	1.7837	5.4397	0.000

TABLE X. RESIDUAL DEVIANCE AND AIC (WITHOUT FAMILY)

Residual Deviance	70.69671
AIC	86.69671

TABLE XI. PREDICTION OUTPUT (WITH FAMILY)

1	2	3	4
0.001	0.796	0.202	0.000

TABLE XII. PREDICTION OUTPUT (WITHOUT FAMILY)

1	2	3	4
0.057	0.786	0.148	0.009

E. Discussion

- This study found that respondents who needed break from regular routine, who planned a new daily routine

to follow during quarantine, who utilized the available free time by learning some new skills, who exercise regularly during quarantine to be physically fit, tend to be happier.

- Respondents experiencing anxiety, stress, fear, irritability, frustration, panic tend to be unhappier.

- This study suggested that the family factor is related to the happiness of the respondents.

- Respondents who are staying with their family may feel discomfort due to extended lockdown and this may lead to unhappiness.

- It is also found that the happiness of the respondents who are working from home during the self-quarantining period is related to whether they are staying with their family or not. Also, irrespective of the personality of the respondent, those who are staying with their family during self-quarantining period tend to be happier than those who are staying away from their family.

- Male respondents who are staying away from their family tend to be unhappier.

- The worry about the future consequences such as inflation or recession that the respondents may have to face post lockdown is related to the happiness.

- From the sentiment analysis it is found out that most respondents have a positive attitude towards self-quarantining that leads to respondents being psychologically healthy.

F. Limitations

This study has some limitations.

- The sample size is small. Thus, the results are not generalizable.

- The samples are taken during second and third phase of the COVID-19 lockdown period. If samples were taken during fourth phase, then the results might have been different.

IV. CONCLUSION

The overall happiness of self-quarantined people is measured. This study identified the factors affecting happiness of those who undergo quarantining. For 'with family' dataset, these factors include 'break needed', 'new routine', 'new skill', 'recession', 'discomfort with family', 'exercise' and 'feeling'. For 'without family' dataset, these factors include 'break needed', 'new routine', 'new skill', 'recession' and 'feeling'. The sentiments of self-quarantined people towards quarantining are evaluated. This study may help to identify the measures that can be taken to mitigate the consequences of Quarantine. According to the results, people who undergo quarantining can be advised to plan a routine, utilize the free time by learning some new skills, to do regular exercise at home. This will keep them happy and mentally healthy which

eventually will help them to cope with the quarantining situation.

REFERENCES

[1] S. Nundy, A. Ghosh, A. Mesloub, G. A. Albaqawy, and M. M. Alnaim, "Impact of COVID-19 pandemic on socio-economic, energy-environment and transport sector globally and sustainable development goal (SDG)," J. Clean. Prod., vol. 312, p. 127705, 2021, doi:10.1016/j.jclepro.2021.127705.

[2] S. Abdullah et al., "Air quality status during 2020 Malaysia Movement Control Order (MCO) due to 2019 novel coronavirus (2019-nCoV) pandemic," Sci. Total Environ., vol. 729, p. 139022, 2020, doi:10.1016/j.scitotenv.2020.139022.

[3] M. Abdullah, C. Dias, D. Muley, and M. Shahin, "Exploring the impacts of COVID-19 on travel behavior and mode preferences," Transp. Res. Interdiscip. Perspect., vol. 8, p. 100255, 2020, doi:10.1016/j.trip.2020.100255.

[4] C. DiGiovanni, J. Conley, D. Chiu, and J. Zaborski, "Factors influencing compliance with quarantine in Toronto during the 2003 SARS outbreak.," Biosecur. Bioterror., vol. 2, no. 4, pp. 265–272, 2004, doi: 10.1089/bsp.2004.2.265.

[5] D. L. Reynolds, J. R. Garay, S. L. Deamond, M. K. Moran, W. Gold, and R. Styra, "Understanding, compliance and psychological impact of the SARS quarantine experience.," Epidemiol. Infect., vol. 136, no. 7, pp. 997–1007, Jul. 2008, doi: 10.1017/S0950268807009156.

[6] M. R. Taylor, K. E. Agho, G. J. Stevens, and B. Raphael, "Factors influencing psychological distress during a disease epidemic: Data from Australia's first outbreak of equine influenza," BMC Public Health, vol. 8, pp. 1–13, 2008, doi: 10.1186/1471-2458-8-347.

[7] G. J. Rubin and S. Wessely, "The psychological effects of quarantining a city.," BMJ, vol. 368, p. m313, Jan. 2020, doi: 10.1136/bmj.m313.

[8] F. J. de Oliveira Araújo, L. S. A. de Lima, P. I. M. Cidade, C. B. Nobre, and M. L. R. Neto, "Impact Of Sars-Cov-2 And Its Reverberation In Global Higher Education And Mental Health," Psychiatry Res., vol. 288, p. 112977, 2020, doi: 10.1016/j.psychres.2020.112977.

[9] G. J. G. Asmundson and S. Taylor, "How health anxiety influences responses to viral outbreaks like COVID-19: What all decision-makers, health authorities, and health care professionals need to know," J. Anxiety Disord., vol. 71, p. 102211, 2020, doi: 10.1016/j.janxdis.2020.102211.

[10] S. Galea, R. M. Merchant, and N. Lurie, "The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention," JAMA Intern. Med., vol. 180, no. 6, pp. 817–818, 2020, doi: 10.1001/jamainternmed.2020.1562.

[11] J. Qiu, B. Shen, M. Zhao, Z. Wang, B. Xie, and Y. Xu, "A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations," Gen. Psychiatry, vol. 33, no. 2, pp. 1–4, 2020, doi: 10.1136/gpsych-2020-100213.

[12] R. P. Rajkumar, "COVID-19 and mental health: A review of the existing literature," Asian J. Psychiatr., vol. 52, p. 102066, 2020, doi: 10.1016/j.ajp.2020.102066.

[13] X. Zhou et al., "The Role of Telehealth in Reducing the Mental Health Burden from COVID-19," Telemed. e-Health, vol. 26, no. 4, pp. 377–379, 2020, doi: 10.1089/tmj.2020.0068.

[14] R. Laslo-Roth, S. George-Levi, and M. Margalit, "Hope during the COVID-19 outbreak: coping with the psychological impact of quarantine," Couns. Psychol. Q., vol. 34, no. 3–4, pp. 771–785, 2021, doi: 10.1080/09515070.2021.1881762.

[15] L. Musikanski et al., "Happiness Index Methodology," J. Soc. Chang., vol. 9, 2017, doi: 10.5590/JOSC.2017.09.1.02.

[16] M. Pierce et al., "Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population.," The lancet. Psychiatry, vol. 7, no. 10, pp. 883–892, Oct. 2020, doi: 10.1016/S2215-0366(20)30308-4.

[17] A. S. F. Kwong et al., "Mental health before and during the COVID-19 pandemic in two longitudinal UK population cohorts," Br. J. Psychiatry, vol. 218, no. 6, pp. 334–343, 2021, doi: 10.1192/bjp.2020.242.

[18] M. M. Kshirsagar, A. S. Dodamani, G. A. Dodamani, V. R. Khobragade, and R. N. Deokar, "Impact of Covid-19 on Mental Health: An Overview," Rev. Recent Clin. Trials, vol. 16, no. 3, pp. 227–231, 2021, doi: 10.2174/1574887115666210105122324.

[19] W. Cao et al., "The psychological impact of the COVID-19 epidemic on college students in China," Psychiatry Res., vol. 287, p. 112934, 2020, doi: 10.1016/j.psychres.2020.112934.

[20] S. K. Brooks et al., "The psychological impact of quarantine and how to reduce it: rapid review of the evidence," Lancet, vol. 395, no. 10227, pp. 912–920, 2020, doi: 10.1016/S0140-6736(20)30460-8.

[21] Y. Wang, B. Xu, G. Zhao, R. Cao, X. He, and S. Fu, "Is quarantine related to immediate negative psychological consequences during the 2009 H1N1 epidemic?," Gen. Hosp. Psychiatry, vol. 33, no. 1, pp. 75–77, 2011, doi: 10.1016/j.genhosppsych.2010.11.001.

[22] H. Taherdoost, "Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research", International Journal of Academic Research in Management (IJARM), vol. 5, no. 2, pp. 18-27, 2016, doi: 10.2139/ssrn.3205035.

[23] F. Husson and J. Josse ," Multiple Correspondence Analysis", in Visualization and Verbalization of Data, Chapman and Hall/CRC, 1st ed. Boca Raton, Florida, US, 2014, pp.163-181

[24] S. Pratt, "A Gross Happiness Index for the Solomon Islands and Tonga: an Exploratory Study," Glob. Soc. Welf., vol. 3, no. 1, pp. 11–21, 2016, doi: 10.1007/s40609-015-0041-1..

[25] C. L. Lackner and C. H. Wang, "Demographic, psychological, and experiential correlates of SARS-CoV-2 vaccination intentions in a sample of Canadian families," Vaccine X, vol. 8, p. 100091, 2021, doi: 10.1016/j.jvacx.2021.100091.