IIETA International Information and Engineering Technology Association
Advancing the World of Information and Engineering

Mathematical Modelling of Engineering Problems
Vol. 10, No. 5, October, 2023, pp. 1675-1682
Journal homepage: http://iieta.org/journals/mmep

Mathematical Model by Using Logistic Regression to Investigate the COVID-19 Pandemic's Impact on Humans

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https://doi.org/10.18280/mmep.100517

Received: 23 January 2023
Revised: 13 March 2023
Accepted: 23 March 2023
Available online: 27 October 2023

Keywords:
consumer behavior, COVID-19, regression analysis, psychological impact, Iraq

ABSTRACT

The COVID-19 pandemic has precipitated profound psychosocial disturbances and shifts in consumer behavior due to stress, uncertainty, and imposed social distancing measures. Consequently, an investigation was conducted to elucidate the pandemic's impact and inform potential mitigation strategies. A comprehensive online survey was undertaken, involving 239 participants, focusing primarily on vulnerable groups prone to developing Post-Traumatic Stress Disorder (PTSD), anxiety, and depression, such as children, college students, and healthcare workers. In addition, a logistic regression and multiple regression analyses were employed to examine the pandemic's influence on consumer spending behaviors across 12 sectors. Changes in spending constraints were evaluated using a t-test. Results indicated an increased likelihood of PTSD, anxiety, and depression among children, college students, and healthcare workers due to pandemic exposure. Furthermore, five dominant factors were found to significantly influence consumer behavior: availability of essentials, financial security, health concerns, public sentiment, and quality of purchasable goods. This study proposes that, during a pandemic, businesses should adapt their strategies in accordance with changing consumer behaviors to gain valuable market insight, boost sales, and accelerate the introduction of new products to the market.

1. INTRODUCTION

The end of 2019 marked the emergence of a novel coronavirus, SARS-CoV-2 [1]. It's associated with a highly contagious respiratory disease known as COVID-19. By February, COVID-19 cases were reported on nearly every continent, excluding Antarctica. The new coronavirus continues to disrupt daily life in 213 countries, having infected 8,018,963 individuals and, tragically, resulted in 436,138 fatalities [2].

An early case study from India tells of a 31-year-old student returning from Wuhan University on January 5th with mild symptoms. He was admitted to a hospital on 13th; early testing on January 17th suggested he might be uninfected and he was discharged. At the time, there were no other cases warranting testing, and public labs in India were not equipped with necessary reagents. Consequently, samples were shipped to Hong Kong where they tested positive for COVID-19 [3].

Studies of post-pandemic societies, such as those affected by SARS, Ebola, H1N1, Equine Flu, and now COVID-19, highlight that mental effects of disease and confinement extend beyond the fear of infection. Other pandemic-related factors, including social isolation, loss of freedom, vulnerability to disease progression, and feelings of powerlessness, significantly impact individuals [4]. Given this considerable emotional toll, it's essential to carefully evaluate the potential benefits of quarantine [5].

Further research examining a sample of students during the pandemic's spread in China showed that certain protective factors, such as urban residence, family financial stability, and cohabitation with parents, helped mitigate anxiety levels in young adults [6]. Additionally, an online survey conducted in China found that undergraduates were more prone to experiencing stress, anxiety, and depression during the pandemic than other groups [7]. These findings suggest the need for monitoring and promoting mental health in young people to lessen the negative impact of quarantine [8].

It's worth noting that a pandemic differs from other catastrophic events in several ways. For instance, healthcare professionals, who are at daily risk of disease exposure, often face significant mental health challenges [9]. During the SARS outbreak, almost half of healthcare workers experienced significant psychological stress, exhaustion, and post-traumatic stress due to their families' fear of the disease and their extended social isolation [10]. Figure 1 presents the cumulative cases of COVID-19 worldwide over the past three years.

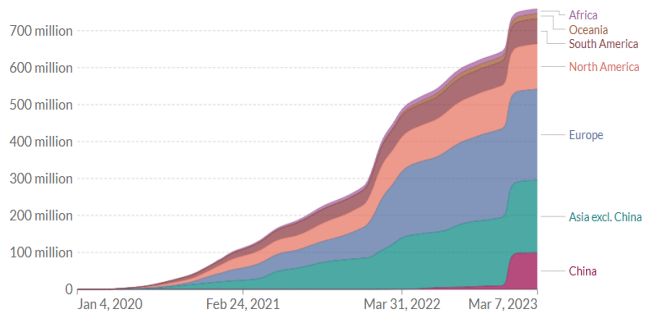

Figure 1. Cumulative cases of coronavirus (COVID-19) worldwide (https://ourworldindata.org/grapher/cumulative-covid-cases-region)

The COVID-19 pandemic has placed immense stress on the global population. Consequently, scholars have shown increased interest in identifying signs of social and community unrest. A deeper understanding of the current situation, as well as future diseases and pandemics, would facilitate better control and management strategies. Various protective measures were implemented to combat the pandemic, the effects of which varied among individuals based on their socioeconomic status. It's critical to acknowledge that certain individuals are more susceptible to symptoms of anxiety, depression, and post-traumatic stress disorder. The pandemic influences both the psychological and social well-being of individuals, particularly children, college students, and healthcare professionals [11]. Even those not directly at risk of infection are adversely affected by quarantine measures and the fear of contagion [12].

The virus causing SARS first emerged in Southern China in 2002, quickly multiplying and infecting more than 8,000 individuals by July 2003, resulting in 774 fatalities. Only four additional cases of a mild pandemic were documented in 2004. Symptoms of this COVID variant include fever, headache, and respiratory issues such as coughing and shortness of breath. MERS first appeared in Saudi Arabia in 2012, according to available records [13]. Nearly 2,500 people have been infected with this variant, the majority hailing from the Middle East. Although MERS is less contagious than SARS, it has proven more lethal, with 858 recorded fatalities [14]. In addition to the aforementioned respiratory symptoms, it may also lead to renal failure. The public was advised to refrain from handshakes, maintain a minimum distance of two meters from one another, and wear face masks as precautionary measures [15].

The full extent of the mental, physical, social, and spiritual consequences of the COVID-19 pandemic is yet to be ascertained. The ethical crises it engenders are not limited to war-torn or developing countries [16].

2. BACKGROUND

Every time a new viral outbreak occurs, people across the globe scramble for a cure. The influenza pandemic in 1918 claimed over 50 million lives worldwide [17]. SARS-CoV in 2002, H1N1, Middle East respiratory syndrome coronaviruses in 2012, Ebola in 2014, and Zika are a few examples from the last two decades. The past century has seen significant global changes [18]. Thanks to major advancements in transportation technology, the world now resembles a small village with minimal distances between its disparate regions. This facilitated the rapid spread of COVID-19, which has infected a vast number of people in the past year [19]. Over two million lives have been lost to the virus, which has infected more than 100 million individuals. The novel coronavirus (COVID-19) pandemic, which began in Wuhan City, Hubei Province, China, on December 31st, exposed a global lack of preparedness and an inefficient response to pandemic disasters, including psychological aspects and existing vulnerabilities in the public health infrastructure. Lower respiratory tract infections like COVID-19 can be transmitted via droplets or surfaces contaminated by infected or healthy individuals coughing or sneezing [20].

Algeri et al. [1] explored the psychological responses to the COVID-19 pandemic. Emotional and behavioral reactions to the COVID-19 outbreak are complex and depend on both external elements and individual characteristics. However, the general public's reaction to the current situation appears to exhibit strong commonalities, with increasing levels of frustration and anger, feelings of functional impairment, boredom, and stigma. The impact of the pandemic on mental health necessitates careful examination of several key facets.

Alvarez et al. [2] examined healthcare-confined viral pandemics such as SARS and MERS. However, COVID-19 has spread far more widely. With everyone at risk, the mandatory restrictions have created an unprecedented sense of fear and uncertainty. Fear can be beneficial for those who believe they can manage the environmental challenges they face. However, those who feel unable to cope with such threats can become overwhelmed by fear. When fear extends beyond the potential of death to encompass the disruption of family structures, school closures, social isolation, and economic impact, prioritizing mental health becomes critical. Saladino et al. [3] demonstrated that when assessing the emotional and cognitive impacts of the pandemic, stressors related to the outbreak must be taken into account. This category includes events directly related to COVID-19, such as exposure to the virus or loss of loved ones, as well as secondary adversities like financial difficulties or food scarcities, which carry psychological implications or impact future plans.

Barbisch et al. [4] highlighted that even as the "stay home" advice remains prevalent, it is crucial to remember that homes are not always a safe haven for everyone. There is potential for homes to become places where authority is distorted or abused under the guise of familial support. Even the threat of infection or the fear of COVID-19 could be used as a coercive tool to perpetuate abuse. Consequently, individuals subjected to domestic violence might hesitate to seek medical attention due to fear of falling ill. In essence, social distancing, though necessary to curb COVID-19, may intensify and conceal violence.

Baylor et al. [5] reported that an individual's emotional response, when experiencing psychological distress, is significantly influenced by personal variations and stress-mediated situations. A study on the general population in Italy explored the relationship between gender and personality traits, and the psychological impact of the COVID-19 pandemic. The results revealed that those with anxious, cyclothymic, or depressive temperaments were more likely to feel the intensity of the current situation. Men, due to their stable and avoidant adult attachment styles, were less likely to bear a higher psychological burden.

Békés and Aafjes-van Doorn [6] posited that the COVID-19 pandemic could exacerbate or potentially trigger psychiatric disorders such as panic disorder and obsessive-compulsive disorder. A nationwide survey in China, involving over 52,000 individuals, found that 35% reported psychological distress as a consequence of exposure to SARS-CoV-2. The study also discovered that women were more stress-sensitive than men, although other studies have reported the opposite. Therefore, understanding the psychological impacts of the pandemic requires a more nuanced examination.

Brivio et al. [7] found that public anxiety has surged during this pandemic. This condition is characterized by misinterpretations of significant sensations, confused health and illness beliefs, and poor coping strategies. Such anxiety can lead to social withdrawal, panic buying, and overspending on antimicrobials, hand sanitizers, and protective masks.

Iqbal [8] argued that when the negative impacts of this disease are not immediately evident, mental health support

must be prepared to handle the situation. Longer periods of social isolation are associated with an increased likelihood of developing PTSD, which in turn is linked to a 2.5–5-fold increase in suicide risk. Individuals with PTSD have been shown to be less likely to seek help, possibly due to a lack of accessible information about the issue, fear of stigmatization, or a belief that symptoms will subside over time.

Brooks et al. [9] noted that some countries restricted the sale of alcoholic beverages during global lockdowns. The authors suggested that such limitations could be more effective if enforced, given that intoxicated individuals are less capable of taking preventive measures, alcohol is a factor in domestic violence, and it weakens the immune system. However, higher rates of abstinence syndrome emerged among patients with addiction. During the lockdown at a psychiatric emergency facility in Bangalore, India, the incidence of seizures, delirium tremens, and hallucinations doubled.

Cai et al. [10] reported that certain individuals are more vulnerable than others to the emotional, behavioral, and psychological effects of this pandemic. The subjects of focus will be those that have garnered the most attention since our last such gathering. Cao et al. [11] demonstrated that frontline healthcare workers are among the most significant subgroups in this category during a pandemic. These professionals are placed in a distressing situation by this health crisis, having to confront numerous challenges, including the fear of getting infected and spreading the disease, an increased workload, and significant pressure.

Elderly individuals, who are at a high risk for COVID-19, are being advised to stay home and limit social interactions. Many in this group lack access to community centers, houses of worship, volunteer work, or social services when they are in need. However, these activities have been significantly curtailed due to the COVID-19 pandemic [12].

The initial stage of the 2019 pandemic has shown that college students are particularly susceptible to its psychological effects due to the temporary closure of universities caused by this global health crisis. Indeed, past instances of a pandemic impacting a student's graduation have been associated with higher rates of depression. Factors such as living far from family, having an unstable family income, and limited access to technology can intensify this situation [21].

Day et al. [22] noted that the persistent threat of SARS-CoV-2 has fuelled increased prejudice and intolerance towards Chinese individuals and other marginalized groups. This isn't the first time such a phenomenon has occurred in history; Jews were associated with the Black Death, the LGBTQ+ community was blamed for HIV transmission, and West Africans faced discrimination during the Ebola outbreak. The unfamiliarity with the virus and its potential societal impacts, such as on the military, have likely amplified xenophobic behavior during this pandemic.

De Luca and Calabrò [23] suggested that, as with natural disasters, those who are less advantaged are more vulnerable and more likely to bear the brunt of the consequences. In other words, individuals with lower incomes, perhaps due to limited access to the internet and other technological resources, may have engaged in less physical activity. They are more susceptible to the physical and psychological effects of social isolation, as well as the economic disadvantages that come with it. Consequently, socioeconomic hardship is associated with a decreased likelihood of taking protective measures.

3. IMPACT OF COVID-19 LOCKDOWN

When it comes to limiting the transmission of coronavirus, lockdown has been shown to be beneficial. Many nations are currently on high alert in an effort to slow the spread of the virus. Until then, the most effective way to keep healthy people apart is through severe social isolation. Even if all goes according to plan, developing a coronavirus vaccine will take between 12 and 18 months. Figure 2 shows psychosocial relationship.

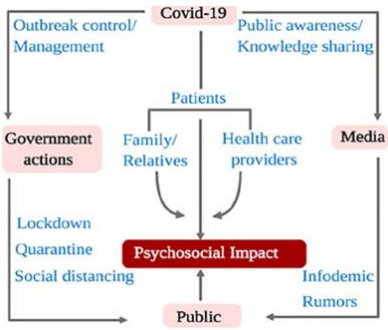

Figure 2. Psychosocial relationship

3.1 Impact on trade and tourism

Iraq's government ordered the suspension of all trade between Iraq and China in order to prevent the spread of COVID-19 into Iraq, thereby stopping bilateral trade. China's supply of raw materials for the manufacture of goods was limited as a result of the plant's closure. Additionally, Iraq closed its open borders with the rest of the globe, affecting trade significantly.

3.2 Impact on education

When the Iraqi government closed all educational institutions, postponed all national level tests, and prohibited gatherings of more than two individuals, a large number of people may have fled to the hamlet, believing it was clean, germ-free, and unlikely to contract the coronavirus.

Table 1. Studies reporting psychological impacts due to COVID-19 pandemic

Country	Participants	Sample Size	Results
China	Health workers	2,182	Insomnia, anxiety, depression, somatization and obsessive-compulsive symptoms
America	Mount Sinai Health System (MSHS) employee, faculty, and trainee crisis support, task force	NA	Fear for their personal safety
China	General public	1,210	Higher levels of stress, anxiety and depression
China	Students	2,330	Depressive symptoms, including anxiety
China	Healthcare workers	1,257	Depression, anxiety, insomnia and distress
India	General public	1,106	Significant psychological impact
China	Medical staff treating patients with COVID-19	180	Anxiety, negativity, poor sleep quality and self-efficiency social support

3.3 Impact on media sectors

Fake and illegal news portal websites spread false information and wrong ideas more quickly, which leads to the spread of myths and rumors. Many popular myths about how to prevent the spread of the coronavirus are false. These include the use of alcohol, spicy peppers, ginger, and garlic in meals, as well as exposure to cold weather and snow. As a result, while using social media and other communication channels, it's important to be mindful and conscientious. Unauthorized websites should be prohibited so that recognized health groups and the government may deliver up-to-date information on trusted portal platforms and avoid informing the public.

3.4 Impact on health

Because of the pandemic issue, the working environment has changed dramatically, resulting in high levels of stress and difficult relationships among healthcare professionals. Patients' lives are in the hands of frontline health personnel such as physicians and nurses who, despite having insufficient personal protective equipment (PPE), do their all to keep them safe. The stress of working with infected patients while trying to maintain a family life made them feel guilty about potentially making my family sick. Table 1 shows some studies reporting psychological impacts due to the COVID-19 pandemic.

3.5 Impact on vulnerable people

According to the Survey of Living Standards in Iraq, a high percentage of the population lives below the poverty line. Poverty is well known to be a factor in the transmission of illness. It's no different with COVID-19, which has led to a rise in unemployment, a rise in defaults on loans, and significant economic losses around the world. The downturn will have a significant influence on the country's poverty rates by increasing economic instability, health disparities, and social disparities as a result of COVID-19. Even if the lockout has had a negative impact on traders, particularly small business owners and people with low incomes, the impoverished, disenfranchised, and people who make a living by gambling are more at risk.

4. RESEARCH METHODOLOGY

According to this study, children, college students, and healthcare employees are more likely to acquire post-traumatic stress disorder, anxiety, and depression as a result of exposure to toxic substances.

4.1 Hypothesis testing

The hypothesis testing data was subjected to a paired t-test using Excel's t-testing tool. According to the findings, including life insurance schemes and savings, there was a decrease in spending limits in all sectors except for education HO (p-value > 0.10).

Using the information gathered in the questionnaire's third part, we ran hypotheses tests. A t-test was required for each sector because it contained two groups that were similar in some respects but had significantly different means. Each of the variables, such as sectors, was subjected to a paired t-test to compare the means of the two samples.

The null hypothesis will be stated as follows:

(1) Ho (Null Hypothesis): Before and throughout the COVID-19 epidemic, participants' expenditure limits remained unchanged.

(2) HA (Alternate Hypothesis): Before and during the COVID-19 epidemic, there was a shift in the sector's expenditure cap.

4.2 Questionnaire and quantitative method

In order to carry out the study, five factors were found to have the greatest impact on consumer behavior: the availability of food, financial savings, health fears, public attitude, and the quality of the things to be bought. After distributing a structured online survey to gather primary data, a total of 239 people responded. Qualitative research was the focus of questionnaire parts one and two. Researchers have historically used a variety of data analysis methodologies. One of these studies examined the effect of anti-rheumatic therapy on H1N1 influenza vaccination immunogenicity. Seasonal influenza, predictors of positive immunological testing, and patients with low antibody levels were all subjected to a univariate regression analysis to see how they interacted. To see whether the change in COVID impact (the dependent variable) was influenced by other variables, we used a univariate regression analysis (independent variables).

4.2.1 Fear of health

People's fear of contracting the disease affected their purchasing decisions when a pandemic hit. The following sub-categories were created based on respondents' concerns about their health:

1. The time it will take to hold any significant ceremonies when the lockdown is lifted,
2. The time after which it is appropriate to socialize and congregate.

With regard to socializing and time spent socializing, we used numerical pre-processing to transform categorical data.

1. "Less than a month,"
2. "Within 1-2 months" and;
3. "After 2 months"

Which were converted to 1, 2, 3 respectively. It should be noted that R squared here is the fitting precision. R square and adjusted R square values are mentioned as below (Table 2):

Table 2. Impact of fear of health on buying behavior

Factors (Independent Variables)	R Square	Adjusted R Square
Conducting an important ceremony	83.2%	77.6%
Duration of Socializing	79.4%	72.6%

4.2.2 Influence through public sentiment

Every time the globe is confronted with a pandemic, several news pieces are born. Some of them have a significant impact on the purchase decisions of the general public. The influence of anti-China sentiment on purchasing behavior was one of the elements we considered in our poll. Another consideration was whether or not a person preferred to purchase certain things from the store during a time when the country was under lockdown. Primarily, we looked at whether or not a participant's time preference changes if the store follows

government rules such as social distancing. We specified the time as below and the rationale for selecting the time window in the questionnaire.

a) Morning (8 am – 10 am);
b) Afternoon (10 am – 4 pm);
c) Evening (4 pm – 8 pm) and;
d) Night (8 pm – 10 pm);

The impact of both factors is shown in Table 3.

Table 3. Impact of fear of health on buying behavior

Factors (Independent Variables)	R Square	Adjusted R Square
Anti-China Sentiment	80.4%	73.9%
Time Preference	84.4%	79.2%

4.2.3 Consolidated view

According to the survey of the study, the following are the five most important criteria (together with their sub-categories) impacting COVID-19 consumers' purchasing decisions (Table 4):

Table 4. Top 5 most preferred reasons for change in buying behavior

Factors (Independent Variables)	R Square	Adjusted R Square
(Quality) Personal Care and pharmacy	84.40%	79.20%
(Influence) Time Preference	84.40%	79.20%
(Quality) Household & cleaning supplies	84.30%	79.00%
(Availability) If the product is not of a known brand	84.20%	79.00%
(Availability) Not known brand – Bought in bulk	84.10%	78.80%

Five least liked criteria (together with its sub-category) have also not had an impact on customer purchasing behavior have been highlighted. These are the numbers, along with their R square and corrected R square values.

5. RESULTS AND DISCUSSION

5.1 Questionnaire response

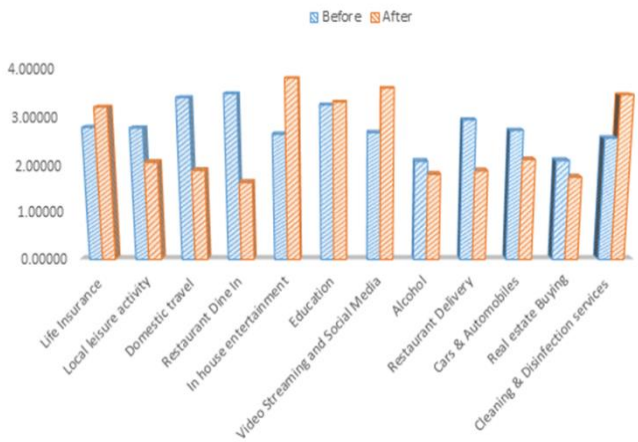

Figure 3. Spending of respondents based on sectors

We have also included a sector-by-domain analysis in this study. Domains such as life insurance and home cleaning and disinfection services are among those included in this list. Others include local leisure activities and domestic travel. In-house entertainment includes dining at restaurants and watching movies. Education includes watching movies and using social media. Before and after the COVID-19 pandemic lockdown, respondents were asked to rate their expenditure limit on these sectors using a Likert scale of 1 to 5, with 1 being highly improbable and 5 representing extremely likely. As a result of participant replies to a questionnaire concerning these services, the following expenditure restrictions were established before and during COVID-19 lockdown (Figure 3 and Table 5).

Table 5. P-values for sectors

Sectors	P-Value-One Tail	Ho
Life Insurances scheme & Savings	5.60154E-09	Rejected
Local leisure activity (Example- swimming, gym, etc)	8.74811E-12	Rejected
Domestic travel	4.77307E-40	Rejected
Restaurant Dine In	2.15444E-53	Rejected
In house entertainment (Example - Cooking, Reading)	7.12818E-30	Rejected
Education	1.196787323	Accepted
Video Streaming and social media	8.07436E-30	Rejected
Alcohol	2.23557E-05	Rejected
Restaurant Delivery	5.52593E-24	Rejected
Cars & Automobiles	2.89068E-11	Rejected
Real estate Buying	4.88297E-06	Rejected
Cleaning & Disinfection services	2.89968E-21	Rejected

When the world is confronted with a pandemic, people's attitudes and behaviours toward purchasing items shift, creating a ripple effect for connected sectors. Durkheim [19] examined the relationship between a pandemic, human reaction, and subsequent sectoral impact. During the H1N1 influenza outbreak, individuals avoided flying, putting a strain on the airline industry. The study enabled us to deduce that a similar effect on consumer behaviour could be duplicated, potentially affecting multiple sectors during the COVID-19 pandemic.

According to the questionnaire, a total of 239 persons responded, with females accounting for 42.7 percent and males for 56.9 percent of the responses. The respondents' ages ranged from 15 to 66, and 87 percent of them agreed that the COVID-19 outbreak had impacted their shopping patterns. On the other hand, 13 percent of respondents did not indicate any shift in their purchasing behaviors.

5.2 Regression analysis

Regression analysis is a statistical method used to figure out how two variables are related to each other. It explains how the value of a dependent variable changes when one independent variable is variable and another is fixed in building cost estimating. It's got some limitations. Regression analysis is used to investigate the COVID-19 pandemic's emotional, behavioral, and psychological impact on humans.

1. They don't have a clear way to help estimators choose the cost model that fits historical data best for a certain cost estimating application.
2. To be acceptable for the regression equation, a

particular form of multiple equations and its data must be assumed to be identical.

3. It is necessary to review the variables impacting the estimation in advance, and it is also challenging to employ a large number of input variables. However, regression analysis, as it is commonly referred to, is a highly powerful statistical technique that may be employed analytically as well as predictively in analyzing the contribution of prospective new items to the overall estimate's dependability. In general, regression analysis (RA) takes the form of Eq. (1).

$$Y = C + A_1 + A_2X_2 + \cdots + A_nX_n \quad (1)$$

where, Y denotes the total estimated expenses, X_1, $X_2...X_n$ denote measures of distinguishing variables that may aid in predicting Y, C denotes the calculated constant, and A_1, A_2..., An denote regression coefficients determined using some relevant data.

Logistic regression is a technique for modelling the relationship between a single target (dependent) variable y and one or more independent variables (predictors) x. (LR). When only one predictor variable is used, it is referred to as simple Logistic regression; when many predictors are used, it is referred to as multiple Logistic regression. Eq. (1) defines the logistic regression model:

$$y = \beta_0 + \beta_1x_1 + \beta_2\beta_2 \ldots + \beta_nx_n \quad (2)$$

The dependent variable (goal) is y, and the independent variables are x_1, x_2..., x_n (predictors). β_1, β_2, and n are all parameters (coefficients). 0 is a constant value. Due to the fact that LR is used to approximate Logistic functions to data points, it does not operate well with real-world data, which typically exhibit non-Logistic correlations. However, LR has a variety of practical applications. It can be used to assess the strength of the relationship between x_j and y, or to determine which x_j do not have a relationship with y. One of the most distinguishing characteristics of the LR model is its simplicity and ease of understanding. In compared to neural networks (which may simulate non-Logistic relationships), the LR model is significantly faster and requires less memory space. Additionally, by analyzing the levels and sign of the regression coefficients, it is possible to deduce the predictors' effect on the target variable. Figure 4 shows the Fitted plane with 2 predictive variables.

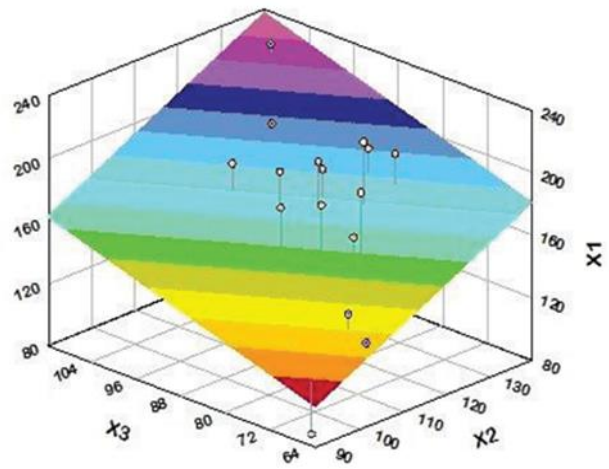

Figure 4. Fitted plane with 2 predictive variables

For the prediction of the construction cost, the 'time-cost' model proposed it is implemented in our LR model. It is given in Eq. (2):

$$T = K.C^B \quad (3)$$

$$InT = InK + B.InC \quad (4)$$

And this form is used for the requirements of the Logistic regression model. From Eq. (3) we shall express the cost as a function of time (Eq. (4)):

$$InC = \frac{1}{B}InT - \frac{1}{B}.InK \quad (5)$$

In Eq. (4), in (real time) is the independent (predictor) variable and ln (real price) is the target variable, not the actual values of real time and real price during construction. This implementation of Bromilow's model significantly improved the model's accuracy. The first column of Table 6 contains the Logistic regression model's coefficients. They are as follows: 1/B=1.22251, the coefficient preceding the variable ln (real time), and (1/B) lnK=7.11869. The parameter K can be calculated using the following equation:

$$K = e - \frac{7.11869}{1.22251} \quad (6)$$

The model will be (Eq. (5)):

$$C = \left(\frac{T}{K}\right)^{\frac{1}{B}} i.e. C = \left(e - \frac{T}{\frac{7.11869}{1.22251}}\right) 1.22251 \quad (7)$$

One portion of the data set available for modelling is utilized for training, while the remainder is used for validating the model. It illustrates the most often used estimators of model accuracy for validation data: the coefficient of determination R2, the correlation coefficient between predicted and actual values of the target variable, and MAPE, the mean absolute percentage error (Figure 5). Regression analysis is used to examine the emotional, behavioral, and psychological effects of the COVID-19 epidemic on humans.

Table 6. Estimation of the accuracy for validation data (LR model)

Coefficient of Determination R2	**0.66583 (66.583%)**
Coefficient of correlation between actual and predicted target values r	0.816458
MAPE	4.7913225

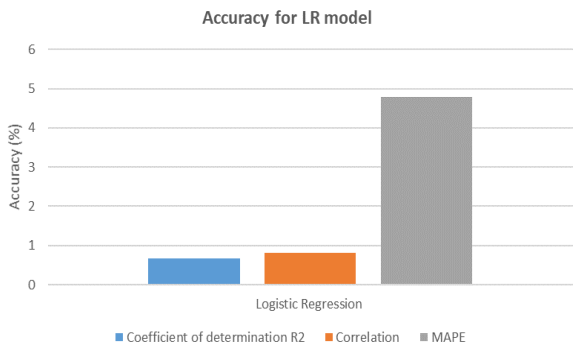

Figure 5. Accuracy for LR model for the COVID-19 pandemic's emotional, behavioral, and psychological impact on human

6. CONCLUSION

The COVID-19 pandemic presents new difficulties for humans. Emotional, behavioral, and psychological effects on the population are as important as viral propagation and disease mortality for vulnerable populations. Quarantine, social isolation, and social distance are all methods of preventing disease transmission that may have an impact on people's behavior and can lead to psychological problems. Regression analysis is used to investigate the COVID-19 pandemic's emotional, behavioral, and psychological impact on humans. According to this study, children, college students, and healthcare employees are more likely to acquire post-traumatic stress disorder, anxiety, and depression as a result of exposure to toxic substances. When the globe is confronted with a pandemic, people's perspectives and purchasing behaviors shift, having an impact on adjacent industries. The current research looked at the relationship between the onset of a pandemic, the response of the public, and the following influence on several industries. People avoided flying because of the H1N1 influenza scare, which had an adverse effect on the airline industry. This study's results suggest that the COVID-19 pandemic may have a comparable impact on consumer behavior, with implications for a wide range of sectors. The study found that 239 people participated, with 42.7% of them being female and 56.9% being male. People surveyed were ages 15 to 66, with 87% saying the COVID-19 outbreak altered their purchase patterns and 13% saying it didn't. Findings from this study's independent variables have been combined into one report. People's interpersonal interactions have changed as a result of the COVID-19 epidemic. People were more sanitary due to the fear of contracting the coronavirus, which led to an increase in the demand for cleaning services such as sanitizing and disinfecting. Consequently, during the pandemic, there was little profit in the life insurance and cleaning services sectors. People have become increasingly interested in life insurance plans as a result of their increased health-related anxiety. Restaurant dine-in and restaurant delivery, as well as travel, were hit the hardest by the COVID-19 pandemic lockdown. People were the most cautious about spending in these areas for fear of contracting an infection, which would further complicate their already precarious health situation.

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